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The Legal Instruments for the control of emissions of medicines for human and veterinary use

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1. Introduction

Both the production and use of human medicines and veterinary medicines result in emissions to the environment. Although the subject is on the international and European agenda, the legal instruments for the evaluation and control of risks to the environment following the production and use of human medicines and veterinary medicines are still a rather new subject. In this research the European legislation which regulates the authorization, production and use of medicines will be summarized in combination with the European legislation governing the emission of medicines and their metabolites and their presence in the environment. This concerns in particular the European water and soil legislation. Understanding the compatibility, gaps and obstacles in the present regulatory framework requires an analysis of the relevant EU instruments, considering as well the competences at EU and Member State level and relevant transboundary aspects. This permits to conclude where instruments are lacking or insufficient and what improvements could be made regarding instruments and competence level.

The problem

Before delving into the legal details of this research, the environmental problem that lies behind deserves some scrutiny. Traces of commonly used medicines, such as birth control pills, tranquillizers, antibiotics, pain relievers and anti-depressants can be found in the European aquatic environment and in drinking water.[1] Concentrations in surface water depend on consumption in the area, the metabolism of the medicine in the body of the patient, excretion, removal of the medicine through wastewater treatment, volume of the water body and the degradation and adsorption in the environment.[2] Other factors are discarding medicines in the toilet and discharges from poorly controlled manufacturing factories.[3] Measurements between 2002 and 2008 in the Rhine at Lobith (at the Dutch border) revealed that tons of carbamazepine, diclofenac, pentoxifylline pass there each year.[4] Concentrations in groundwater also depend on consumption in the area, in particular by farmed animals. The route to groundwater contamination proceeds through urine and manure, which either seep from manure storages or from the land on which it was spread as a fertilizer.[5] Other factors are leakage from sewage and landfill sites.[6] It appears from research in the Netherlands that the establishment of drinking water protection areas prevents medicine pollution of groundwater used for the abstraction of drinking water.[7] Empirical research has shown that this is not always the case however.[8]

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[1] Karl Fent, Anna A.Weston, Daniel Caminada, 'Ecotoxicology of Human Pharmaceuticals', (2006) *Aquatic Toxicology*, 122-159. L. Vergouwen, B. Pieters, S.Kools, *Inventarisatie van emissie van geneesmiddelen uit zorginstellingen*, Stowa 2011/2.

[2] B. Halling-Sorensen, S. Nielsen, P. Lanzky, F. Ingerslev, H. Lutzhoft en S. Jorgensen, 'Occurrence, fate and effects of pharmaceutical substances in the environment – A review', (1998) *Chemosphere* 36, pp. 357-394.

[3] World Health Organization, *Pharmaceuticals in Drinking-water*, WHO Press 2011.

[4] Corine Houtman, Monique van der Aa, Thomas ter Laak, 'Relatie tussen gebruik geneesmiddelen in Rijnstroomgebied en concentraties in de Rijn', (2010) *H2O* 6, p. 33.

[5] Jasper Steggink, *Geneesmiddelen in het waterige milieu: Kansen en mogelijkheden tot probleemaanpak in Groningen*, afstudeer project, 2011. Available at: www.rug.nl/umcg/onderzoek/wetenschapswinkel/index..

[6] World Health Organization, Pharmaceuticals in Drinking-water, WHO Press 2011.

[7] N.G.F.M. van der Aa, G.J. Kommer, G.M. de Groot en J.F.M. Versteegh, *Geneesmiddelen in bronnen voor drinkwater: Monitoring, toekomstig gebruik en beleidsmaatregelen*, (2008) RIVM report 609715002/2008. Available at: www.rivm.nl.

[8] S. Wuijts, SA Rutjes, N.G.F.M. van der Aa, I. Mendizabal, A.M. de Roda Husman, Invloed humane en animale verontreinigingen op grondwaterwinningen. Van veldonderzoek naar beschermingsbeleid. RIVM rapport 734301031/2008, 2008.

Since medicines need to stay in the body long enough to have therapeutic effect, they are characterized as relatively persistent and bioaccumulative. At this moment, the concentrations of these medicines are tiny, as they are measured in parts per million, far below the levels of a therapeutic dose.[9] According to the World Health Organization, this makes it very unlikely that they pose a risk to human health.[10] Nevertheless, the risks of this involuntary lifetime exposure to (a mix of) medicines for aquatic life and human health, in particular for sensitive subpopulations, are unknown.[11] Since medicines are developed to have effect at very low concentrations, the low concentrations that are frequently found in surface water may already pose a threat to the ecology.[12] They can be toxic for fish, frogs and other aquatic species or affect their reproductive systems. Potential human risks identified are the development of allergies, genotoxicity and the transfer of resistance genes, for instance antibiotic resistance genes.[13]

In the midst of uncertainty about the risks posed by medicines, it is likely that their presence will increase due to the ageing European society, if no action is taken. The precautionary principle, the principle that pollution needs to be rectified at the source, and the integration principle encourage finding a regulatory approach that minimizes the presence of medicines in the environment and in drinking water.[14] Even in the absence of certainty about the environmental risks of the use of medicines, European action is warranted because European law regulates the presence of medicines on the internal market and sets the agenda for water management. So far, the effects of human and veterinary medicines on the environment have received little attention in policy documents at EU level. Although several documents on human and animal health make a reference to the environment, their focus is on the importance of the environment for health issues, but not on the effects of health policy on the environment. Only the action plan against the rising threats from Antimicrobial Resistance, which the Commission launched on 15 November 2011, specifically formulates the need to take measures to reduce the contamination of the environment with antimicrobial medicines.[15]

Another issue, which is outside the scope of this research but deserves mentioning, is whether the EU should also take action abroad. Outside the EU, concentrations of medicines in waters can be much higher due to a lack of emission controls. It has been documented that the environmental pollution with pharmaceuticals, such as antibiotics, in the area of Hyderabad (India) is unprecedented in scale and intensity. Surface water concentrations are higher than the therapeutic concentration in blood plasma as a result of the industrial production of

[9] J.F.M. Versteegh, N.G.F.M. van der Aa, E. Dijkman, *Geneesmiddelen in drinkwater en drinkwaterbronnen*, (2007) RIVM report 703719016/2007. Available at: www.rivm.nl.
[10] World Health Organization, *Pharmaceuticals in Drinking-water*, WHO Press 2011.
[11] World Health Organization, Pharmaceuticals in Drinking-water, WHO Press 2011; Karl Fent, Anna A.Weston, Daniel Caminada, 'Ecotoxicology of Human Pharmaceuticals', (2006) Aquatic Toxicology, 122-159. See on knowledge gaps and future research needs: C.G. Daughton, 'PPCPs in the Environment: Future Research - Beginning with the End Always in Mind,' In: K. Kummerer (ed), Pharmaceuticals in the Environment, 2nd ed (Springer 2004), pp. 463-495.
[12] B. Halling-Sorensen, S. Nielsen, P. Lanzky, F. Ingerslev, H. Lutzhoft en S. Jorgensen, 'Occurrence, fate and effects of pharmaceutical substances in the environment – A review', (1998) *Chemosphere*, 357-394; A. Johnson, M. Jurgens, R. Williams, K. Kummerer, A. Kortenkamp and J. Sumpter, 'Do cyotoxic chemotherapy drugs discharged into rivers pose a risk to the environment and human health? An overview and UK case study', (2008) *Journal of Hydrology*:167-175.
[13] P.L.A. van Vlaardingen en M.H.M.M. Montforts, *Geneesmiddelen in het milieu. Twee verkennende studies samengevat*, (1999) RIVM rapport 734301017/1999.
[14] Cf. N. Dhondt, *Integration of Environmental Protection into other EC Policies. Theory and Practice*, (2003) Europa Law Publishing.
[15] COM (2011) 748 final.

medicines in the area. Environmental concerns here actually affect the quality of life, since even ground water resources are contaminated.[16] The EU could consider taking the EU Sustainable Development Strategy as a starting point for reducing the environmental footprint of medicines, including producing countries outside the EU, as a part of the Good Manufacturing Practice. Sweden has taken an initiative in this field.[17]

Outline

In this legal research report we will summarize the relevant legislation throughout the entire product chain of human and veterinary medicines. Since some Regulations and Directives encompass more than one stage of the product chain, the sequence followed in the report will not be based on the product chain but on the various Directives and Regulations that apply to the regulation of medicine pollution. This facilitates the assessment of the adequacy of the current legal framework.

	Authorization	Production	Use	Waste
Human medicines	Medicinal products for human use (Dir. 2001/83) Centralized Authorization (Reg. 726/2004)	GMP Human medicins (Dir. 2003/94) IPPC (Dir. 2008/1, 2010/75)	Medicinal products for human use (Dir. 2001/83)	IPPC (Dir. 2008/1, 2010/75) Water: Water Framework Directive (Dir. 2000/60); Groundwater (Dir. 2006/118); Priority substances 2008/105) (Proposal soil Directive) Nitrates (Dir. 91/676) Urban wastewater (Dir. 91/271)
Veterinary medicines	Medicinal products for veterinary use (Dir. 2001/82) Centralized Authorization (Reg. 726/2004)	GMP Veterinary medicins (Dir. 1991/412) IPPC (Dir. 2008/1, 2010/75)	Medicinal products for veterinary use (Dir. 2001/82)	IPPC (Dir. 2008/1, 2010/75) Water: Water Framework Directive (Dir. 2000/60); Groundwater (Dir. 2006/118); Priority substances 2008/105) (Proposal soil Directive) Nitrates (Dir. 91/676) Urban wastewater (Dir. 91/271)

The table above shows the stages of the product chain and the applicable EU legislation. As can be seen, the authorization of medicines for human and veterinary use can be found in separate pieces of legislation. Although at first sight quite similar, the legislation differs considerably regarding the regulation of environmental effects. For that reason, they are

[16] Fick J, Söderström H, Lindberg RH, Phan C, Tysklind M, Larsson DGJ (2009) Contamination of surface, ground, and drinking water from pharmaceutical production. Environmental Toxicology and Chemistry 28(12): 2522-2527.

[17] See: http://www.lakemedelsverket.se/upload/eng-mpa-se/Swedish-platform-GMP-environmental-July-2011.pdf

summarized and analyzed separately. By contrast, the regime on access to information is common to both and can therefore be found in a separate chapter.

The general European legal water framework consists of the Water Framework Directive and its daughter directives: the Priority Substances Directive and the Groundwater Directive. The Hazardous Substances Directive plays a role until 2013 and will therefore be summarized as well, but briefly, as it does not make sense to devote much attention to legislation that will soon be history. Since the requirements established by the Drinking Water Directive complement those set on the basis of the WFD, the Groundwater Directive and the Priority Substances Directive, it is integrated in the general water law chapter. The general European legal water framework is supplemented by sectoral legislation, of which the IPPC Directive, the Nitrates Directive and the Directive on Urban Waste Water Treatment are relevant for emissions of medicines to the environment. These pieces of legislation will be summarized in the chapter on sectoral environmental legislation. There, the proposed Soil Directive will also be summarized.

The WFD is the overarching directive regarding water quality management of inland surface waters and ground waters. Indeed the WFD establishes the legal framework, which is then further elaborated by specific other Directives. The WFD takes a combined approach to effect based regulation focusing on water quality and emission based regulation focusing on pollution. The effects based policy establishes environmental goals, environmental objectives, exemptions, water quality standards & monitoring, reporting and enforcement obligations.

Substances used in medicines can threaten the achievement of environmental objectives and compliance with environmental quality standards. The source based policy concerns the regulation of discharges through emission standards & prior authorization of discharges and a programmatic approach for diffuse pollution and of course enforcement as well. Medicine pollution can be both caused by discharges – from factories and waste water treatment plants – and by diffuse pollution – caused by the spreading of contaminated manure.

Limitations

The scope of this research is limited to legal research of the regulation of the chemical substances in medicinal products for human and veterinary use. Micro-organisms, vaccines, blood products, homeopathic preparations, traditional herbal medicines, health products and feed additives (which may contain medicinal substances) fall outside the scope of this research. This report will not analyze the specific regulation required for material which derives from manure processed in digesters and is subsequently used as fertilizer. The subject falls outside the scope of this research. The REACH Regulation also falls outside the scope of this research, because substances used in medicines are explicitly excluded from the scope of application of REACH. Since the REACH Regulation does not apply to the regulation of (substances used in) medicines for human or veterinary use, it will not be described or analyzed in this report. The regulatory framework which applies to pesticides and biocides also falls outside the scope of this report and therefore it will only be described and analyzed in this report to a very limited extent, i.e. in so far as useful for a better comprehension of the gaps, obstacles and opportunities regarding the regulation of emissions to the environment of medicines.[18] The research has been concluded on 3 May 2012.

[18] See for example: E.M. Vogelezang-Stoute, The Authorization of Pesticides in the Light of Sustainability, in: F. den Hond e.a. (red), Pesticides, Problems, Improvements, Alternatives, Oxford: Blackwell Science 2003, pp. 31-52; H.F.M.W. van Rijswick and E.M. Vogelezang-Stoute, The Influence of Environmental Quality Standards

2. General European law aspects

2.1 Harmonization

The European Union has evolved into a single market. This means that in addition to the establishment of a customs union, rules have been established to guarantee the free movement of factors of production: capital, establishment, workers, services and goods. Barriers to trade – tariffs, quota and measures of equal effect – have to be removed, the so-called negative integration. In addition, the EU provides for positive integration, i.e. harmonization of national laws of the Member States in order to remove non-tariff barriers to trade.[19] This includes legislation established for the protection of public health and the environment. Harmonization offers the certainty of common standards that eliminate substantial and justifiable obstacles to the free movement of goods, services and persons. Harmonization is also used to create a European regime to address transboundary problems such as water pollution. It offers a minimum level of protection and hence a level playing field in the EU. Harmonization is an option in the EU because the European Treaties provide for a host of legislative competences, based on a high level of protection of health, safety, the environment and consumers.[20]

Regulations and Directives can be based on Article 114 TFEU (ex Art. 95 EC) if they have as their objective the establishment and functioning of the internal market. When the Commission proposes internal market legislation which concerns health, safety, environmental protection and consumer protection, it will take as a base a high level of protection, taking account in particular of any new development based on scientific facts. Environmental Regulations and Directives can either be based on Article 114 TFEU, if its main aim is to integrate the market, or on Article 192 TFEU (ex 175 EC), which provides for a specific legal basis to harmonize environmental law. In the latter case, a Directive or Regulation should contribute to the pursuit of (a) preserving, protecting and improving the quality of the environment, (b) protecting human health, (c) prudent and rational utilization of natural resources or (d) promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.
In the field of environmental law, minimum harmonization prevails. Consequently, environmental law based on Article 192 TFEU usually contains a safeguard clause which repeats the text of Article 193 TFEU and entitles a Member State to maintain or introduce a regime that ensures a higher level of protection for non-economic environmental reasons provided that it is compatible with the Treaties. The Member State has to notify this to the Commission. The situation is different when harmonization of an area of environmental law (e.g. the inclusion of environmental risk assessments of medicines in the European medicines legislation) has as its main aim to integrate the market and is therefore based on Article 114 TFEU (ex 95 EC). In that case, when the European legislator replaces national regulatory regimes by common rules, interests such as environmental protection remain protected, but at

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and the River Basin Approach taken in the Water Framework Directive on the Authorisation of Plant Protection Products, *European Energy and Environmental Law Review*, April 2008, p. 78-89.

[19] P. Craig, The Evolution of the Single Market, in C. Barnard and J. Scott (eds) *The Law of the Single European Market: Unpacking the Premises*, Hart Publishing 2002, pp. 1-40.

[20] J.H.H. Weiler, Epilogue: Towards a Common Law of International Trade, in J.H.H. Weiler (ed), *The EU, the WTO and the NAFTA, Towards a Common Law of International Trade?*, Oxford University Press 2000, pp 201-232.

a European level, rather than at a national level.[21] That does not however exclude the introduction or maintenance of stricter national environmental rules, provided that the requirements of Article 114 (5) TFEU are met (see below).

Stricter national rules

In an area that has not been (completely) harmonized, the instrument of mutual recognition contributes to integration of the internal market. Mutual recognition was established by the European Court of Justice (ECJ) in its judgment in the *Cassis de Dijon* case to remove trade barriers created by slightly divergent national regulations.[22] It means that the Member States – even when no harmonization of standards has been achieved – have to admit goods/services/persons which are lawfully marketed, offered or employed in their country of origin to their own markets, unless restrictions can be justified on the basis of a ground established by the Treaty, secondary legislation or recognized in ECJ case law.

In order to avoid double burdens, the Member States cannot simply apply their own standards without taking account of (and in that sense: recognizing) the requirements and controls already fulfilled in the country of origin.[23] Consequently, the burden of proof for justifying non-recognition is on the Member State that refuses to recognize standard applied in another Member State. A restrictive national measure must pursue a legitimate objective (this includes environmental protection and public health) and be necessary and proportionate to the aim in view. A measure can be justified if it is suitable and necessary as a means of obtaining its objective.[24] The European medicines legislation, which has harmonized the requirements and procedures for the authorization of medicines, also applies the principle of mutual recognition. It provides for a mutual recognition procedure for applications referring to authorizations pending or issued in another Member State which lists the grounds that can justify non-recognition (see the paragraphs on the authorization of medicines for human and veterinary use).

The ECJ has refined these requirements in its case law. A measure is only suitable for securing attainment of the public interest objective if it genuinely reflects a concern to attain this objective in a consistent and systematic manner. Inconsistencies undermine the suitability of a measure.[25] The necessity test is also rephrased as the least restrictive alternative test. Only the measure that is least restrictive of free movement may also be deemed necessary. Finally, whether a measure can be justified depends also on a balancing act between the free movement and the public interest served by the measure.[26] The Court of Justice's Nederhoff ruling shows that environmental quality standards may result in the restriction or prohibition of the use of a product.[27]

When an area has been harmonized in order to integrate the market, additional requirements apply regarding maintaining or introducing national legislation. Unless of course the national

[21] S. Weatherill, Pre-emption, Harmonisation and the Distribution for Competence to Regulate the Internal Market, in: C. Barnard and J. Scott (eds) *The Law of the Single European Market. Unpacking the Premises*, Oxford University Press 2002, pp. 41-74.
[22] Case 120/78 Rewe-Zentrale AG v Bundesmonopolverwaltung für Branntwein, [1979] ECR 649.
[23] Markus Möstl, Preconditions and limits of Mutual Recognition, *Common Market Law Review* 2010, pp. 405-463.
[24] P. Craig and G. de Burca, *EU Law*, 4th ed, OUP 2007.
[25] G. Mathisen, Consistency and Coherence as Conditions for Justification of Member State Measures Restricting Free Movement, *Common Market Law Review* 2010, p. 1021-1048.
[26] Idem.
[27] ECJ 29 September 1999, C-232/97 (Nederhoff en Zn), Jur. 1999, p. I-6385.

legislation falls beyond the scope of coverage of the secondary legislation. Beyond the scope of the European Directive or Regulation there is no pre-emption and the normal Treaty rules apply. Article 114 TFEU (ex Article 95 EC) establishes that a Member State which wants to maintain an old national measure, has to notify the Commission for approval. It has to justify the measure on grounds of major needs (i.e. on grounds of public morality, public policy or public security; the protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic or archaeological value; or the protection of industrial and commercial property) as established by Article 36 of the TFEU (ex Article 30 EC) or relating to the protection of the environment or the working environment. A Member State which wants to introduce a new national measure after an area has been harmonized also has to notify the Commission for approval. It may only introduce a new measure if the national measure is based on new scientific evidence relating to the protection of the environment or the working environment on grounds of a problem specific to that Member State which arose after the adoption of the harmonization measure.

The Commission scrutinizes the national measure to determine whether it is not a means of arbitrary discrimination or a disguised restriction on trade and whether or not it constitutes an obstacle to the functioning of the internal market. As Case C-430/05 Land Oberösterreich v. Commission illustrates, it is very difficult to successfully invoke the exception based on the protection of the environment. In this case, the region of Upper Austria expressed concerns about the introduction of the new Directive 2001/18 on the authorization of GMOs and would have liked to introduce a more stringent legislation. Thus the Austrian government notified this to the Commission. However, on the basis that there were no new scientific data and no new scientific evidence, the Commission rejected the Austrian application.[28]

The Commission notifies the Member State whether it approves or rejects the measure. Only in case of approval may the Member State maintain the old measure or introduce the new one. If the Commission or a Member State considers that another Member State is making improper use of the power to derogate from internal market legislation, it may bring the matter directly before the Court of Justice. When a Member State is authorized to maintain or introduce national rules which derogate from a harmonization measure, the Commission has to immediately examine whether to propose an adaptation to that measure. Interestingly, the Commission also has to carry out such an examination if a Member State has brought a specific problem on public health in an already harmonized area to its attention.

2.2 Priority

Since there are thousands of EU Directives and Regulations, it is very well possible that a conflict arises between them. EU law does not provide for general rules on precedence. Each of the objectives of the EU, be they a high level of protection of the environment or the free movement of goods or capital, has an equal ranking.[29] And there is no ranking between Regulations and Directives, with the exception of framework and daughter directives such as the Water Framework Directive and the Groundwater Directive.[30] Just like the objectives they

[28] Floor M. Fleurke, What Use for Article 95 (5) EC?: An Analysis of Land Oberösterreich and Republic of Austria v Commission, *Journal of Environmental Law* 2008, pp. 267-278.
[29] N. Dhondt, *Integration of Environmental Protection into other EC Policies. Theory and Practice*, (2003) Europa Law Publishing.
[30] Even in that case there is not a formal ranking, as Daughter directives remain separate directives.

pursue, they are equal in principle.[31] Consequently, European medicines and environmental regulation operate at the same level. That makes it quite a challenge to limit pollution caused by the use of medicines authorized under a European legal regime, which benefit from free movement on the internal market.

Less so than in – for example - Dutch national legislation it can be said that a specific law takes priority over a more general law. The case law of the Court of Justice shows that if more than one directive applies, mainly the contents of the directives determine the order in which they apply and not general criteria such as 'lex generalis - lex specialis'.[32] In the Geharo case, the Court determined that, having regard to the different contents and different objectives, the standards of both directives (a substance norm and a product norm) applied. The Court did not follow the defense that a specific standard was to take priority over a more general standard.[33] One example in which a specific rule did take priority over a more general norm is the Spanish slurry case.[34] Here, it was not possible, the Court stated, to interpret the existing general rules for the protection of groundwater so that they replace the specific rules for slurry.[35] These cases illustrate that the Court bases its rulings on the purpose and text of the relevant directives, and on the circumstances of the case.[36]

General references such as 'This Directive applies without prejudice to' do not offer much guidance either. They are only useful to explain the relation between similar pieces of legislation,[37] unless of course both pieces of legislation contain this phrase.[38] More specific references are not necessarily present. If, as in our case, European legislative acts do not refer to each other, from the outset none prevails over the other. However, that does not absolve the Member States from being responsible for compliance with Regulations and for achieving the results prescribed by Directives (Article 288 TFEU; ex Article 10 EC (repealed at Lisbon) and 249 EC). Thus, a Member State where water pollution caused by medicines occurs, should find a solution to limit the pollution caused by the authorized medicines at a level below the environmental quality standards prescribed by the Priority Substances or Ground Water Directives for the achievement of good chemical status or by national law for the achievement of good ecological status.[39]

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[31] N. Dhondt, *Integration of Environmental Protection into other EC Policies. Theory and Practice*, (2003) Europa Law Publishing.

[32] E.g. the Court's findings in ECJ of 15 September 2005, C-281/03 and C-282/03 (Cindu), see H.F.M.W. van Rijswick and E.M. Vogelezang-Stoute, The Influence of Environmental Quality Standards and the River Basin Approach taken in the Water Framework Directive on the Authorisation of Plant Protection Products, *European Energy and Environmental Law Review*, April 2008, p. 78-89.

[33] ECJ of 6 October 2005, C-9/04. This matter involved cadmium standards provided by the Substances Directive and the Toys Directive.

[34] ECJ of 8 September 2005, C-121/03.

[35] We have some reservations as to whether it is correct for the rules concerning water to be totally sidelined if contamination by slurry is involved – the Court very generally states that in the event of contamination by fertilizers, the protection of water shall be based on the Nitrates Directive – all the more so since the Nitrates Directive includes no reference in this regard and slurry also contains contaminating substances other than nitrates.

[36] H.F.M.W. Van Rijswick and E.M. Vogelezang-Stoute, The influence of environmental quality standards and the river basin approach of the Water Framework Directive on the authorization of plant protection products, *European Energy and Environmental Law Review*, April 2008, p. 78-89.

[37] For instance Article 2(2) of the Directive 2002/96/EC of the European Parliament and the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE), OJ 2003 L 37, states that it applies without prejudice to specific Community waste management legislation.

[38] B.A. Beijen, *'The Implementation of European Environmental Directives: Are Problems Caused by the Quality of the Directives?', European Energy and Environmental Law Review, 2011/4, p. 150-163.*

[39] See above.

Environmental regulation has a specific position. Article 11 TFEU (ex Article 6 EC) prescribes that environmental concerns have to be integrated into other policies.[40] This has also occurred in the medicines policy. Consequently, the Member States have to respect the place of environmental concerns in the medicines regulation in view of the full harmonization brought about concerning the authorization of medicines in the EU. As explained in the previous paragraph, it is not impossible to justify a national measure that restricts the free movement of medicines in order to protect the environment at a higher level than the European level. Finding a solution for water pollution caused by medicines at EU level seems however more feasible in view of the effective barrier function of the 114 TFEU requirements.

3. Regulation of medicinal products for human use

3.1 Authorization for placing on the market

The European medicines legislation completely harmonizes the regulation of the placing of medicines for human use on the internal market. It provides for authorization procedures, to establish the quality, effectiveness and safety of a medicine, and for a pharmacovigilance system to evaluate these aspects once medicines are on the market and being used.[41] A marketing authorization is required before a medicine can enter the market of an EU Member State. Either a national competent authority issues an authorization decision for its territory (the so-called decentralized or mutual recognition procedure) or the Commission (or the Council) issues an authorization decision for the entire European territory on the basis of the advice of the European Medicines Agency (EMA, formerly called EMEA) (the so-called centralized procedure) without any further implementing acts by the Member States required.[42]

When a Member State issues a marketing authorization, other Member States can use the mutual recognition procedure. The Directive has streamlined the mutual recognition procedure to the extent that when a medicine is authorized by one Member State, another Member State can authorize the medicine without any further scrutiny.[43] However, under strict conditions and for a limited number of reasons, recognition can also be refused.[44] Environmental concerns are not included in the medicines for human use legislation as a legitimate ground for non-recognition of an authorization. Non-recognition is followed by a dispute settlement procedure, in which EMA is involved as well. The dispute settlement procedure is established by the medicines legislation and refers to the regulatory procedure established by the Comitology decision. It starts when a Member State raises a controversial issue, which is then informally discussed in the coordination group. If the Member States fail

[40] See on the integration of environmental concerns into other policies, such as the CAP: N. Dhondt, *Integration of Environmental Protection into other EC Policies. Theory and Practice*, (2003) Europa Law Publishing and, more recently, concerning fisheries: Jill Wakefield, 'Fisheries: A Failure of Values', (2009) *CMLRev* 431-470.
[41] Regulation 726/2004 of the European Parliament and of the Council laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency, OJ 2004 L 136/1; Directive 2001/83 of the European Parliament and of the Council on the Community code relating to medicinal products for human use, OJ 2001 L 311/67; and Directive 2001/82 of the European Parliament and of the Council on the Community code relating to veterinary medicinal products, OJ 2001 L 82/1.
[42] Art. 6 Directive 2001/83/EC.
[43] Directive 2001/83; Notice to the Applicants Vol. 2A Chapter 1, p.2.
[44] See: A.M. Keessen, *European Administrative Decisions. How the EU regulates products on the internal market*, Europa Law Publishing 2009.

to reach agreement, the Member States concerned have to inform EMA and the Commission that they resort to arbitration. The Commission or the (prospective) holder of the authorization may also start the arbitration procedure.

The arbitration procedure begins with a referral to the Committee on Medicines for Human Use (CHMP), which consists of national experts. It issues an opinion on the points of discussion after hearing the applicant. On the basis of the CHMP opinion, the Commission will take a draft decision, which is submitted for approval to the Standing Committee on Medicinal Products for Human Use. The Commission then sends its final decision to the Member States involved. If the Standing Committee does not approve the draft Commission decision, the issue is further discussed in the Council and can then lead to a Council decision. If the Council fails to reach agreement, the case is referred back to the Commission, which can then take a final decision. The dispute settlement procedure thus generally results in a binding Commission or Council decision, which is then implemented by the Member States involved (i.e. the Member States where the procedure for application for authorization of the medicine was followed). If a Member State disagrees with the outcome of the procedure, it is entitled to challenge the decision before the Court of First Instance and in appeal before the European Court of Justice.

By contrast, authorizations issued by the Commission (or the Council) under the centralized procedure are valid in all the Member States. The centralized procedure, established by Regulation 726/2004 also refers to the regulatory Comitology procedure and is therefore just like the dispute settlement procedure described above. The centralized applies to biotechnology medicines and other high tech, innovative medicines, medicines for a number of diseases listed in the Annex to the Regulation and orphan medicines (i.e. medicines for rare diseases). In addition, the centralized procedure applies on request of the applicant if:

> (a) the medicine contains a new active substance which was not previously authorized in the EU, or
> (b) the medicine constitutes a significant therapeutic, scientific or medical innovation, or
> (c) the granting of a central authorization is in the interest of patients.

When the centralized procedure is an option, more applicants prefer to use this procedure to using the mutual recognition procedure.[45] The centralized decisions do not require any further implementing measures. Non-recognition of Commission or Council decisions is therefore not an option for Member States. Instead, Member States can voice their opinion during the decision-making procedure. If a Member State disagrees with the outcome of the procedure, it is entitled to challenge the decision before the Court of First Instance and in appeal before the European Court of Justice.

3.2 Environmental risk assessment

New applications for marketing authorizations, including generics, have to include an environmental risk assessment.[46] This assessment has the potential of preventing or limiting the impact of medicines on water quality. It always includes the estimated concentration of excreted substances in surface water and groundwater and biodegradability. These results may

[45] Report on the basis of Art. 71 of Regulation 2309/93/EEC (Review 2001) COM 2001 yyy final.
[46] Art. 8(3) and 10 Directive 2001/83, Art. 12 (3) and 13 Directive 2001/82, Art. 6 and 31Regulation 726/2004.

warrant further investigation into issues such as effects on the aquatic and terrestrial ecosystems.[47] The question is whether the potential of the environmental risk assessment is realized. In other words, what is the function of the environmental risk assessment? Can it be used to justify non-recognition or refusal to issue a marketing authorization? If not, what purpose does the environmental risk assessment have if it cannot lead to refusal of an authorization? The original versions of Directive 2001/83 and Regulation 726/2004 aimed to protect public health and the free movement of authorized medicines for human use. They were amended by Directive 2004/27/EC, which introduced environmental rules, without however including protection of the environment as an aim of the medicines legislation or establishing a link with other European environmental legislation.[48]

From 2005 on, it is formally recognized that a medicine can have undesirable effects on the environment.[49] However, it is not clear when effects on the environment are considered undesirable. Yet the simple acknowledgment of a risk has led to the imposition of duties on the applicant. Applications for medicines have to include an evaluation of the risks which the medicine potentially poses to the environment due to use, storage or disposal.[50] Irrespective of the outcome of this assessment, the risk is not weighed in the risk benefit balance that partly determines whether the medicine is authorized or not. This is because the risk for the environment does not constitute a criterion for refusal of a marketing authorization.[51] Thus, the environmental risk assessment of medicines for human use only serves to know the environmental risks and to propose measures to mitigate the consequences for the environment of the use, storage or disposal of the medicine.[52] Another limitation is that the medicines legislation does not contain any provisions to ensure that the environmental risk assessment is complemented by monitoring of environmental risks after authorization for subsequent modification of risk mitigation measures.

Directive 2004/27 does not contain any provisions concerning the transitional period during which medicines are on the market without an environmental risk assessment or environmental information on the label or the leaflet. It had to be transposed by 30 October 2005. This means that from that day, all applications for medicines have to include an environmental risk assessment.[53] It also means that an environmental risk assessment does not have to be undertaken for medicines that were already on the market on 30 October 2005. Such an obligation can only be introduced by a provision with retroactive effect. However, the question is what should be done with applications filed for generic medicines, i.e.

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[47] See for an example: http://www.ema.europa.eu/humandocs/PDFs/EPAR/votrient/H-1141-en6.pdf. It is argued that the environmental risk assessment could be improved. These improvements include chronic effect testing as a general approach, the use of invertebrate tests including sexual reproduction, the application of endpoints reflecting the mode of action of the medicine or known side effects and the simulation of more realistic exposure conditions in terrestrial laboratory tests. See: H. Schmitt, T. Boucard, J. Garric, J. Jensen, J. Parrot, A. Péry, J. Römbke, J.O. Straub, T.H. Hutchinson, P. Sánchez-Argüello, A. Wennmalm and K. Duis, 'Recommendations on the Environmental Risk Assessment of Pharmaceuticals: Effect Characterization', (2009) *Integrated Environmental risk assessment and Management*, 588-602.

[48] This omission runs counter to the trend to include environmental protection as an objective of product regulation, e.g. Regulation 1907/2006 (the REACH Regulation) OJ 2006 L396/1.

[49] Art. 1 (28) Directive 2001/83.

[50] Art. 8 (ca) and Annex I Directive 2001/83. This is further elaborated in Guidance Document http://www.ema.europa.eu/pdfs/human/swp/444700en.pdf and for genetically modified medicines in Guidance document http://www.ema.eu.int/pdfs/human/bwp/13514804en.pdf. According to the Guidance documents, this obligation may also apply to variations or extensions.

[51] As follows from Directive 2001/83 and the Guidance documents (see footnotes above).

[52] Art. 8 (ca) and 8 (3) (g) Directive 2001/83.

[53] This may also apply to applications for variations (e.g. a new indication) or extensions.

medicines which are comparable with already authorized medicines concerning their quality, effectiveness and safety. In general, these medicines are authorized in accordance with a simplified procedure under which it is sufficient to refer to the research already done for a comparable medicine, which prevents a repetition of all these tests.[54] However, in case of a lacking environmental risk assessment, there is no research to which can be referred. This means that environmental risk assessments have to be done in the course of the simplified procedure. To further complicate matters, even when an environmental risk assessment has been made, it may have to be repeated for the application of a generic, because it is not explicitly included in the list of information to which others may refer under the simplified authorization procedure.

3.3 Production

Regulation of the production of medicines occurs to ensure the quality and safety of medicines. It should offer protection against fake or falsified medicines and medicines of low quality. The EU regulates the production of medicines through the so-called good manufacturing practice (GMP), laid down in Commission Directive 2003/94. It consists of quality standards, principles and guidelines. Compliance with the good manufacturing practice is mandatory within the EEA (European Economic Area). Importers are also bound by this rule as they have to submit a certificate that production has occurred in accordance with equivalent standards as those set by the good manufacturing practice and that the country of production ensures controls of the plant equivalent to those in the Member States of the EU and the EEA. Thus it is ensured that medicines are consistently produced and controlled against the quality standards appropriate to their intended use. Environmental concerns do not play a role in the regulation of the production of medicines. Nevertheless, environmental concerns related to the production of medicinal products may be regulated by other Community legislation.

3.4 Use

The European medicines legislation regulates the use of medicines. The authorization for placing a medicinal product on the market is issued to the authorization holder. The marketing authorization usually requires the authorization holder to indicate information on use on the immediate packaging and/or the outer wrapping and the package leaflet. The authorization holder (a pharmaceutical company or importer) is bound by these rules. The authorization does not bind third parties. This means that doctors and users of medicines are not bound by the rules on use included in the authorization. Consequently, provisions in the authorization on how the product should be used only have an informative purpose. Compliance with these rules has a voluntary character, unless of course rules from other – European or national-regimes impose enforceable obligations on those who prescribe or use medicines.[55] The Dutch legislation on medicines for human use does not provide additional rules that make the provisions on environmentally friendly use binding for third parties.

[54] Art. 10 and 8 Directive 2001/83.
[55] M.H.M.M. Montforts, H.F.M.W. van Rijswick and H.A. Udo de Haes, Legal constraints in EU product labelling to mitigate the environmental risk of veterinary medicins at use, *Regulatory Toxicology and Pharmaclogy*, Volume 40, Issue 3, December 2004, p. 327-335.

4. Regulation of medicinal products for veterinarian use

4.1 Authorization for placing on the market

The marketing authorization is the main instrument in Directive 2001/82/EC on the Community code relating to veterinary medicinal products.[56] A veterinary medicinal product may only be placed on the market when a marketing authorization has been issued by the competent authority of a Member State for its territory (national or decentralized authorization) or when an authorization has been granted in accordance with Regulation 726/2004 for the entire Community (a Community or centralized authorization).[57] In the latter case the scientific evaluation of the application is carried out within the Committee for Medicinal Products for Veterinary Use (CVMP) of the EMEA.

The Community will grant marketing authorizations for[58]:

1. "the veterinary medicinal products referred to in the Annex to Regulation (EC) No 726/2004, which may only be authorised via the centralised procedure (mandatory scope)[59];
2. the veterinary medicinal products referred to in Article 3(2) of Regulation (EC) No 726/2004, relating to products containing new active substances, products which constitute a significant therapeutic, scientific or technical innovation or products for which the granting of a Community authorisation would be in the interest of patients or animal health at Community level. The applicant has to request confirmation that the product be eligible for evaluation through the centralised procedure (optional scope) and the EMEA will decide on the matter; and
3. a generic veterinary medicinal product of a centrally authorised veterinary medicinal product if not using the option in Article 3(3) of Regulation (EC) No 726/2004".

When a Member State issues a marketing authorization, another Member State has to use the mutual recognition procedure and authorize the medicine without any further scrutiny unless strict conditions (and a limited number of reasons) allow a Member State to refuse the authorization. Environmental concerns are a legitimate ground for non-recognition of an authorization. Non-recognition is followed by a dispute settlement procedure. In certain circumstances marketing authorizations granted by the competent authorities of a Member State, become subject of a Community procedure, involving a scientific opinion by the CVMP and leading to the adoption of a Commission decision. This procedure will be followed in case one or more Member States do not recognize an authorization already granted in a mutual recognition procedure or a decentralized procedure due to a potential serious risk to human or animal health or for the environment. In this situation the points of disagreement shall be referred to the coordination group. If the Member States fail to reach an agreement within the coordination group, the matter is referred to the CVMP for application of the procedure laid down in Articles 36 to 38 of Directive 2001/82/EC. The referral leads to an opinion, from which the Commission issues a single decision addressed to all Member States.

[56] Directive 2001/82 of the European Parliament and of the Council on the Community code relating to veterinary medicinal products, OJ 2001 L 82/1.
[57] Regulation 726/2004 of the European Parliament and of the Council laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency, OJ 2004 L 136/1.
[58] See: European Commission (DG Enterprise and Industry), Notice to applicants veterinary medicinal products, Volume 6a, Procedures for marketing authorisation. Chapter 1 marketing authorisations, January 2007, p. 5.
[59] The Annex refers to medicinal products for veterinary use intended primarily for use as performance enhancers in order to promote the growth of treated animals or to increase yields from treated animals.

If a Member State disagrees with the outcome of the procedure, it is entitled to challenge the decision before the Court of First Instance and in appeal before the European Court of Justice.

By contrast, authorizations issued by the Commission (or the Council) under the centralized procedure are valid in all the Member States. The centralized procedure, established by Regulation 726/2004 also refers to the regulatory Comitology procedure and is therefore just like the dispute settlement procedure described above, offering Member States the same opportunities for voicing their opinion and bringing proceedings.

4.2 Environmental risk assessment

Applicants (both in a centralized and decentralized procedure) are required to submit an Environmental risk assessment (EA) for all new authorizations, based on the characteristics of the product, its potential environmental exposure, environmental fate and effects as well as risk management strategies as appropriate. The report should take into account the pattern of use, the administration of the product, the excretion of active substance and major active metabolites as well as the disposal of the product. The requirements for the environmental risk assessment are set out in Annex 1 to the Directive. This Annex is adapted by the European Commission when this is necessary to take account of technical progress (Art. 88(1)). The measures concern the amendment of non-essential elements of the Directive (Art. 88(2)). It is complemented by VICH guidance documents. The environmental risk assessment can lead to refusal of the authorization, because environmental risks have been included in the risk-benefit balance of the veterinary medicinal product (Art. 1(20) and 1 (19)).

In case a marketing authorization is granted in a Member State, an applicant for the same product in one of the other Member States shall submit an application using the procedure of mutual recognition. The Member States should recognize the marketing authorization already granted by the reference Member State and authorize the marketing of the product on their national territory. If there are grounds for supposing that the authorization of the veterinary medicinal product concerned may present a potential serious risk to human or animal health or for the environment, the procedure according to Article 33(3) has to be followed and, if Member States fail to reach agreement within the coordination group, arbitration shall be initiated. In the event of a disagreement between Member States about the quality, the safety or the efficacy of a medicinal product, a scientific evaluation of the matter should be undertaken at a Community level, lead to a single decision by the Commission on the area of disagreement, binding on the Member States concerned.

On the basis of Article 33(2) of the Directive the Commission has issued a guideline to define in which exceptional cases a Member State can refuse to recognize a marketing authorization on the basis of a potential serious risk to human or animal health or for the environment.[60] Directive 2001/82/EC does not provide a definition of a ‘potential serious risk to human or animal health or for the environment’. In the guideline a ‘potential serious risk to human or animal health or for the environment’ is defined as a situation where there is a significant probability that a serious hazard resulting from the use of a veterinary medicinal product will affect human or animal health or the environment and cannot be prevented, reversed or avoided. ‘Serious’ in this context means a hazard that could result in death, could be life-threatening, could result in significant disability or incapacity, could be a congenital

[60] Guideline on the definition of a potential serious risk to human or animal health or for the environment in the context of Article 33(1) and (2) of Directive 2001/82/EC — March 2006, OJ C 132/32.

anomaly/birth defect, or which could result in hospitalization or permanent or prolonged signs in exposed humans or animals, or which could realistically cause these effects where the product enters the environment.

The question whether a 'potential serious risk to human or animal health or for the environment' is at stake has to be assessed taking into account the positive therapeutic effects of the veterinary medicinal product in question (risk/benefit assessment).[61] The guideline specifically refers to an internationally agreed guideline issued by the CVMP.[62] A risk for the environment is considered potentially serious if a major risk for one or more of the environmental compartments (e.g. air, water, soil) is identified, taking into account different environmental conditions (e.g. climate, geo-hydrology) in the Member States and it (they) cannot be mitigated by any risk management strategies ensuring that no unacceptable risk is associated with the use and disposal of this product. An important limitation in this regard is that the medicines legislation does not contain any provision to ensure that the environmental risk assessment is complemented by monitoring of environmental risks after authorization to evaluate withdrawal or modification of the risk mitigation measures.

In March 2012 the CVMP adopted a 'reflection paper on risk mitigation measures related to the environmental risk assessment of veterinary medicinal products'[63] reviewing of the adequacy/appropriateness of risk mitigation measures included in current marketing authorizations of veterinary medicinal products. The criteria used in the evaluation were established by guidance document VICH-TGD.[64] This guidance document stated that to be effective a risk mitigation measure should meet the following criteria: 1 mitigate exposure of the environmental medicine to the environment, 2 be in line with agricultural practice (for food producing species), 3 be in agreement with the legislation of the EU and its Member States and 4 be possible to demonstrate the effect of the proposed risk mitigation measure by re-evaluating the exposure assessment with the proposed risk mitigation measure included. If a risk mitigation measure does not meet these criteria, then a serious risk for the environment exists, which has to be weighed against the benefits of authorizing the medicine.

On the basis of the evaluation, the CVMP reflection paper adds criteria which, if met, will result in greater compliance. These are: 1 the potential risk to the environment is clear, 2 the recommended measure to mitigate the risk is specific and clear, 3 the recommended measure can be readily/ easily implemented, 4 the measure is under the direct control of the animal owner/prescriber (that is, not relying on a third party for implementation) and 5 the measure does not require the animal owner/prescriber to make a direct choice between the appropriate treatment for a specific indication and protection of the environment. It expects that measures that meet these additional criteria as well will result in greater compliance. If a measure does not satisfy these additional criteria, non-compliance is a likely outcome and therefore the paper recommends that this potential risk to the environment should be factored in the risk-benefit evaluation.

[61] See also Article 1(20).
[62] CVMP Note for Guidance: Environmental Risk Assessment for Veterinary Medicinal Products other than GMO. Containing and Immunological Products (EMEA/CVMP/055/96-FINAL) Guidelines on environmental impact assessment (EIAS) for veterinary medicinal products – phase I and II (CVMP/VICH/592/98-FINAL; CVMP/VICH/790/03 FINAL; http://www.emea.eu.int).
[63] EMA/CVMP/ERAWP/409328/2010.
[64] EMEA revised guideline on environmental impact assessment for veterinary medicinal products in support of VICH guidelines GL6 and GL38 EMEA/CVMP/ERA/418282/2005-REV-1.

4.3 Production

The primary purpose of Directive 2001/82/EC is to safeguard public and animal health. This objective must be achieved by means which do not hinder the internal market. Although the Directive includes provisions regarding the consideration of effects on the environment in the assessment of veterinary medicines and on the data requirements regarding such effects, the protection of the environment as such is not an aim of the Directive. The EU regulates the production of veterinary medicines through the so-called good manufacturing practice (GMP), laid down in Commission Directive 1991/412.[65] As well as Directive 2003/94/EC it consists of quality standards, principles and guidelines and environmental concerns do not play a role in the regulation of the production of veterinary medicines. Nevertheless, environmental concerns related to the production of veterinary medicinal products may be regulated by other Community legislation.

4.4 Use

The marketing authorization usually requires the authorization holder to indicate on the immediate packaging and/or the outer wrapping and the package leaflet, where the latter is required, other particulars essential for safety or health protection including any special precautions relating to use (Art. 26(1)). This includes measures to mitigate the risk to the environment. As we already explained an authorization does not bind third parties, so users of medicines are not bound by the authorization. Consequently, provisions in the authorization on how the product should be used only have an informative purpose. Compliance with these rules has a voluntary character, and depend on the cooperation of animal owners and prescribers (see above for an evaluation of the effectiveness of risk mitigation measures). The European rules leave the Member States the discretion to create rules which impose enforceable obligations on those who prescribe or use medicines.

5. Access to environmental information

5.1 Access to the results of the environmental risk assessment

The medicines legislation provides for an access to information regime. When a medicine has been authorized for placing on the market, the competent authority has to make its assessment report and the grounds for authorization publicly available.[66] Since the environmental risk assessment belongs to the tests that should be done before a medicine may be placed on the market and the proposed risk mitigation measures are based on it, it seems logical that a summary of the environmental risk assessment has to be included in the assessment report. However, the environmental risk assessment results are not mentioned at all in the list of information that the authorities will make publicly available through publication of their assessment report.[67] This has created uncertainty as to whether the summary of the

[65] Commission Directive 91/412/EEC of 23 July 1991 laying down the principles and guidelines of good manufacturing practice for veterinary medicinal products, OJ L 228/170.
[66] Art. 25 Directive 2001/82; Art. 21 Directive 2001/83; Art 10 (6) and 35 (6) Regulation 726/2004.
[67] The absence of a transparency clauses concerning environmental information of medicines renders it different from the transparency regimes concerning environmental information present in genetically modified organisms, plant protection products and biocides legislation. Consequently, case law such as C-552/07 Commune de Sausheim v Pierre Azelvandre [2009]ECR I-0000, where the transparancy regime of Directive 2001/18 supersedes the general environmental information transparency regime, does not apply to this situation.

environmental report should or should not be made publicly available.[68] Consequently, while EMA publishes this information, this information is generally not placed in the assessment report that is made public by national medicine regulators.[69]

5.2 The environmental information legal framework

There is also a general regime on access to environmental information.[70] This regime aims both to guarantee the right of access to environmental information and to promote active dissemination of environmental information by the public authorities of the Member States and the EU institutions and bodies. The environmental risk assessment report constitutes environmental information in the sense of Directive 2003/4/EC and Regulation 1367/2006, which provide the European legal framework on public access to environmental information,[71] because it contains information about substances affecting or likely to affect water (Article 2 (b) Directive 2003/4 and Article 2 (d) (ii) Regulation 1367/2006). It applies to both the EU institutions and the Member States. Perhaps the report as well, but at any rate the data about usage and monitoring results which reveal the presence of medicines and metabolites in water constitute data or summaries of data derived from the monitoring of activities affecting or likely to affect, the environment (Article 7(e) Directive 2003/4 and Article 4 (3) Regulation 1367/2006).

According to the Directive and the Regulation, environmental information held by public authorities should be made public. The legal regime provides that when the authorities do not publish environmental information, any applicant is entitled to request access without having to state an interest. A limited number of specific grounds justify that a request may be refused. A relevant ground in this regard is the confidentiality of commercial or industrial information where such confidentiality is provided for by national or Community law to protect a legitimate economic interest (Article 4 Directive 2003/4 and Article 6 Regulation 1367/2006). Since disclosure is the general rule, the grounds of refusal have to be interpreted in a restrictive way, taking into account the public interest served by disclosure.[72] In every particular case, the public interest served by disclosure has to be weighed against the interest served by the refusal on the basis of an actual and specific examination of the situation.[73] Member States may not refuse a request relating to emissions to the environment (Article 4 (2) Directive 2003/4), while in case of information held by EU institutions and bodies an overriding interest must be deemed to exist in case of information relating to emissions into the environment (Article 6 Regulation 1367/2006).

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[68] M.H.M.M. Montforts and A.M. Keessen, *The public nature of environmental information acquired at the registration of (veterinary) medicines* (in Dutch, English summary), (2007) RIVM report 601500006/2007.
[69] See previous footnote.
[70] Respectively Directive 2003/4/EC of the European Parliament and of the Council on public access to environmental information, OJ 2003 L41/26 and Regulation 1367/2006 of the European Parliament and the Council on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making an Access to Justice in Environmental Matters to Community institutions and bodies, OJ 2006 L264/13. Both are based on the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, done at Aarhus on 25 June 1998 (Aarhus Convention), available at: http://www.unece.org/env/pp/welcome.html. Both the EU and the Member States are parties to this convention.
[71] Environmental information is broadly defined; cf Case C-321/96 Mecklenburg [1998] ECR I-3809 and Case C-316/01 Glawischnig [2003] ECR I-5995.
[72] Case C-71/10 Office of Communications v Information Commissioner [2012] ECR I-00000 and Case C-321/96 Mecklenburg [1998] ECR I-3809.
[73] C-266/09 Stichting Natuur en Milieu and Others [2010] ECR I-0000.

Since the environmental information might be commercially sensitive, an individual examination is required to appropriately balance the private right to withhold information with commercial sensitivity against the public interest in access to this information.[74] Here it becomes relevant that similar results of other research done in order to get a marketing authorization are included in the assessment report. In view of the general rule that environmental information should be public and that exceptions should be interpreted narrowly,[75] it seems obvious that the environmental risk assessment is comparable to the other tests that should be done before a medicine may be placed on the market and whose results are made public and that therefore the results of the environmental risk assessment should be included in the assessment report that is made publicly available.

Thus, the authorities should in principle disclose the results of the environmental risk assessment on request because it constitutes environmental information and the invocation of an exemption for non-disclosure does not seem justified. Since there is not a provision on publication of the environmental risk assessment results, the authorities may decide not to publish the results with the other test results in their assessment report.[76] The lack of a clear and unequivocal obligation to publish the results of the environmental risk assessment (or the risk assessment itself), with the results of the other tests, allows the authorities not to publish these results in the report they issue.[77] Consequently, while the European Medicine Authority publishes the results of the environmental risk assessment on its website, national medicines regulators may not do so as well.

5.3 Access to the environmental risk assessment

It is a relevant question whether not only the results but also the environmental risk assessment itself should be made publicly available on request. The main arguments for full disclosure of the assessment itself is that it constitutes environmental information and that full disclosure is the only means to control the methods used to arrive at the results. The issue of access to the environmental risk assessment of a medicine falls within the scope of the general European rules on access to environmental information.[78] A relevant exception in this regard is that the environmental information about the medicine can be commercially sensitive.[79] The environmental risk assessment constitutes confidential information because it is carried out after the medicine has been patented, with the sole purpose of obtaining a marketing authorization. This research is not protected by intellectual property rights. Yet in order to prevent competitors from using the environmental risk assessment for their applications, the medicines legislation states that applicants that want to refer to the data of an already authorized, essentially similar medicine can only do so eight years after authorization has

[74] See: D. Adamski, 'How wide is "the widest possible"? Judicial interpretation of the exceptions to the right of access to official documents revisited', (2009) *CMLRev*, 521-549. Note that this article is on the general regime on access to information.
[75] See: S. de Abreu Ferreira, 'The Fundamental Right of Access to Environmental Information in the EC: A Critical Analysis of WWF-EPO v Council', (2007) *Journal of Environmental Law* , 1-10.
[76] M.H.M.M. Montforts and A.M. Keessen, *The public nature of environmental information acquired at the registration of (veterinary) medicines* (in Dutch, English summary), (2007) RIVM report 601500006/2007.
[77] Ibid.
[78] See para 5.1.
[79] Art. 4 Aarhus Convention, Art. 6 Regulation 1367/2006 and Art. 4 Directive 2003/4.

been granted, unless the authorization holder has given his consent before expiry of this period.[80]

There is no case-law of the Court of Justice regarding disclosure of environmental risk assessments of medicines, but there is a case regarding the disclosure of the environmental risk assessment of a plant protection product. In case C-266/09, the European Court of Justice gave judgment after a reference for a preliminary ruling was made in proceedings brought by several environmental organizations in the Netherlands who sought the annulment of a decision of the Dutch Board for the Authorization of Plant Protection Products and Biocides ('the Ctgb').[81] The Ctgb refused to disclose studies of residues and reports of field trials submitted in connection with a procedure for extending the authorization of a product within the scope of Directive 91/414 (plant protection product). The Court decided that the information at issue was 'environmental information' in the sense of Article 2 of Directive 2003/4/EC on public access to environmental information because plant protection products can have non-beneficial effects upon plant production, and their use may involve risks and hazard for humans, animals and the environment, especially if they are placed on the market without having been officially tested and authorized and if they are incorrectly used.

The Court further stated that on the basis of Article 4 of Directive 2003/4, Member States may provide that a request for environmental information may be refused if disclosure of the information would adversely affect the confidentiality of commercial or industrial information where such confidentiality is provided for by national or European Union law. This rule applies except where the information relates to emissions into the environment, however the reference for the preliminary ruling did not address the question whether the information concerned should be regarded as emissions. The Court emphasized that Article 4 requires that such a ground for refusal must be interpreted in a restrictive way, taking into account the public interest served by disclosure, and that in every particular case the public interest served by disclosure must be weighed against the interest served by the refusal.

This case signals that that it is possible that the Court of Justice or a national court decides that the environmental risk assessments of medicines should be disclosed on request. Whether that will indeed occur, depends on the balance struck between the interest in disclosure and in confidentiality. It is to be expected (both for plant protection products and for medicines) that it will be relevant in the weighing of interests whether or not the data protection period has already expired. Expiration had occurred in this case and probably influenced the decision that the requested information be disclosed. Another aspect of the case also has implications for the disclosure of the environmental risk assessment of medicines. The Court ruled that the moment of decision of the authority is the moment on which the application of a Directive crystallizes. The request for access to environmental information in the case was made before the transition period of the previous Directive (90/313) came to an end but the decision by the authorities was taken after the transition period of Directive 2003/4 on access to environmental information had expired. The Court found that in that case the latter directive applied because it was in effect during the time of decision.

[80] Eight years is the average period. Under circumstances it can be longer. See: Art. 10 Directive 2001/83, Art. 13 Directive 2001/82 and Art. 14 (11) and 39 (10) Regulation 726/2004.
[81] C-266/09 Stichting Natuur en Milieu and Others [2010] ECR I-0000.

6. Water law

European water law originated as water *quality* law, and it is part of European environmental law.[82] Over the years a large number of European water quality directives have been adopted. Many are relevant for the regulation of the pollution caused by human and veterinary medicines, but they do not explicitly regulate the phase of production, use or waste of medicines . The Water Framework Directive (WFD) aims to streamline these water quality directives and, to some extent, integrate them. The general objectives of the WFD are elaborated for the most part in terms of water quality. These requirements are further elaborated in the two daughter directives of the WFD, the Groundwater Directive and (for surface waters) the Priority Substances Directive. The protection and improvement of water quality based on the WFD and its daughter directives takes place through a combination of effects-based quality standards and source-based emissions-tackling measures, which will both be described below.[83] While the Hazardous Substances Directive is still relevant for water quality management at the time of writing this report, it will not be elaborated on in great detail, as it will lapse in 2013.

6.1 Environmental objectives

Article 1 of the WFD contains the general aims. The purpose of the WFD is to establish a framework for the protection of waters, to prevent further deterioration, promote sustainable water use, etc. These aims are further elaborated in the environmental objectives contained in Article 4 WFD, and constitute the core of the Directive. Most of the instruments in the WFD relate to achieving these environmental objectives. Article 4 distinguishes between objectives for surface waters, for groundwater and for protected areas. These objectives are further elaborated into water quality standards, which are established in the Annexes to the WFD, several daughter Directives and national legislation. In general, whether a water quality standard for a substance is set in the (Annex to) an EU Directive or at the national or (sub) river basin level depends on the hazardousness of its characteristics and the number of EU Member States where it poses a threat to the water quality. When standards are not set at the EU level, various water directives oblige the Member States to set water quality standards for substances whose presence endangers the achievement of a good status objective at the national or (sub) river basin level. So, even if on a European level no standards have been set for substances contained in human and veterinary medicines, Member States have to assess whether these substances might endanger the water quality and are under the obligation to establish standards themselves if the substances may have an adverse effect on water quality.

[82] See on European water law: H.F.M.W. van Rijswick and H.J.M. Havekes, *European and Dutch Water Law*, Europa Law Publishing, Groningen 2012.

[83] See for the relationship between water quality management and authorization of medicines, Andrea. Keessen, Annelies Freriks, Marleen van Rijswick, 'The Clash of the Titans: The Relation between the European Water and Medicines Legislation', *CMLRev* (5) 2010, pp. 1429-1454; H.F.M.W. van Rijswick en S. Wuijts , *Sustainable river basin management under the Water Framework Directive: an effective protection of drinking-water resources*, in: conference proceedings of the 11th International Specialised Conference on Watershed & River Basin Management, 4-5 September 2008, Budapest, Hungary, ISBN 978-963-06-5689-4; M.H.M.M. Montforts, H.F.M.W. van Rijswick and H.A. Udo de Haes, Legal constraints in EU product labelling to mitigate the environmental risk of veterinary medicins at use, *Regulatory Toxicology and Pharmaclogy*, Volume 40, Issue 3, December 2004, p. 327-335.

Good surface water status

For surface waters, the objective is that in 2015 a *good surface water status* must be achieved. Good surface water status is defined in Article 2(18) WFD as the status achieved by a surface water body when both its ecological status and its chemical status are at least 'good'. *Good surface water chemical status* refers to the chemical status required to meet the environmental objectives for surface waters, while *good ecological status* is an expression of the quality of the structure and functioning of aquatic ecosystems, classified in accordance with Annex V WFD.[84] The requirements for good surface water status vary depending on the type of surface water. A distinction is made between rivers, lakes, transitional waters, coastal waters and artificial and heavily modified surface water bodies (Annex V.1 WFD). For artificial and heavily modified surface water bodies, slightly different requirements apply. They have to achieve good ecological potential and good chemical status. The environmental good status objectives are further elaborated in chemical and ecological quality standards (see Art. 22(4) WFD). It is important to note that quality standards for substances can serve for the achievement of the good chemical status, but also for the achievement of the good ecological status. In case medicines may harm the achievement of this good status, measures have to be taken.

Good groundwater status

For groundwater, the Water Framework Directive requires that good groundwater status must be achieved (Art. 4(b)(ii) WFD). Good groundwater status concerns both good quantitative status and good chemical status. The latter objective is further elaborated in chemical quality standards. In order to achieve good chemical groundwater status, any sustained upward trend in the concentration of pollutants needs to be reversed. If the good groundwater status is influenced by medicines, measures should be taken to improve the good groundwater status.

Protected areas

The regime for protected areas, set out in Article 4(1)(c) and 4(2) WFD, is also an important element for the protection of waters. For protected areas, the Directive states that all standards and objectives must be complied with within fifteen years after the entry into force of the WFD (2015). If the EU legislation under which the individual protected areas have been established sets more stringent objectives, standards or time limits, then these more stringent rules apply. For these areas, the programmes for monitoring water status are supplemented by the specifications contained in the EU legislation under which the individual protected areas have been established (Art. 8(1) WFD). Moreover, in relation to setting less stringent environmental objectives, the reservation is made that this may not undermine the implementation of existing EU environmental legislation.

There are two main reasons why there is still some uncertainty about the regime for protected areas. Firstly, the question arises whether the exemptions [see below] can be invoked in the protected areas. In the opinion of the authors of this report, that is possible: protected areas are designated on the basis of very different factors, and the Directives establishing protected areas (some of which have already lapsed, or will lapse in the future) also contain exemptions.[85] Secondly, it may be unclear what is meant by 'the most stringent requirement'. The Directive aims at the most natural possible status of water, but many ecologically

[84] Howarth, W. (2006) The Progression Towards Ecological Quality Standards, *Journal of Environmental Law*, Vol. 18, no. 1, pp. 3-35.

[85] G.T. Raadgever, C.Dieperink, P.P.J.Driessen, A.A.H.Smit, H.F.M.W.van Rijswick, Uncertainty management strategies: Lessons from the regional implementation of the Water Framework Directive in the Netherlands, *Environmental Science & Policy* Volume 14, Issue 1, January 2011, Pages 64-75.

valuable areas and certain protected species may need water which is 'less natural', for instance if they need calcium-rich or nutritious water.[86] This is an example of an aspect on which the Directive is not entirely consistent with the nature protection regime.

Article 6 WFD provides that Member States must establish a register of all areas lying within each river basin district which have been designated as requiring special protection under specific EU legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water.
According to Article 7(1) and Annex IV of the Directive this covers the following:

- bodies of water used for the abstraction of water intended for human consumption (the areas which previously came within the scope of the Drinking Water Directive, together with groundwater that is used for abstraction of drinking water);
- areas designated for the protection of economically significant aquatic plant and animal species (these areas which previously came within the scope of the by the Shellfish Waters Directive);
- bodies of water designated as recreational waters, including areas designated as bathing waters under the Bathing Water Directive;
- nutrient-sensitive areas, including areas designated as vulnerable zones under the Nitrates Directive and areas designated as sensitive areas under the Urban Wastewater Treatment Directive;
- areas designated for the protection of habitats or plant or animal species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under the Habitats Directive and the Birds Directive.

The river basin management plan must include maps indicating the location of each protected area and a description of the EU, national or local legislation under which they have been designated.

6.2 Exemptions

Article 14(1) WFD provides that the objectives are to be achieved by 2015. There are a number of possible exemptions from this obligation, elaborated in Article 4(3) to (7) WFD. A Member State may (if the preconditions to invoke an exemption are met) invoke an exemption to deal with water pollution caused by medicines.

Extension of time limits
Member States may, under certain conditions stated in the Directive, extend the time limit within which the objectives must be met (see Art. 4(4) WFD). For every extension of a deadline, reasons must be given in relation to each water body in the river basin management plan. An extension of a deadline is possible, for instance, if completing improvements within the time scale would be disproportionately expensive. [87]

[86] C. Dieperink, T Raadgever. PPJ Driessen, A AH Smit, HFMW van Rijswick, Ecological ambitions and complications in the regional implementation of the Water Framework Directive in the Netherlands, 14 (2012) *Water Policy*, p. 160-173.
[87] See for guidance on the interpretation of disproportionate costs: WATECO *Guidance document 2000* (available through the Commission website). See for a different approach: *Matrix report for WWF* of 25 June 2007.

Less stringent environmental objectives and temporary deterioration

It is also possible, pursuant to Article 4(5) WFD, to establish less stringent environmental objectives. This is permitted if the waters are already severely affected by human activity or their natural condition is such that the achievement of the objectives would not be feasible or would be disproportionately expensive. Here too certain conditions must be met. Article 4(6) WFD offers an exemption for a temporary deterioration. Article 4(7) WFD provides for the possibility of failing to meet objectives when this is due to new modifications to the physical characteristics of a water body or because of new sustainable human development activities.

General clause

Article 4(8) WFD provides that if a WFD exemption is invoked, the application of the relevant provision granting the exemption may not permanently exclude or compromise the achievement of the objectives of the Directive in other bodies of water in the river basin district, and must be consistent with the implementation of other EU environmental legislation. Article 4(9) provides that steps must be taken to ensure that application of Article 4 WFD (both the objectives and the exemptions contained therein) guarantees at least the same level of protection as in existing EU legislation. Moreover, when invoking an exemption, all feasible and not disproportionately expensive measures must still be taken in order to reach the required good status to the greatest extent possible.[88]

No deterioration

Another condition for the application of a WFD exemption is that the status of the water may not deteriorate (See Art. 4(1); Art. 4(4); Art. 4(5)(c) WFD). The Water Framework Directive includes the requirement that the status of water may not deteriorate. The concept of 'no further deterioration' raises a number of legal questions and has a different meaning in several Member States,[89] which will have to be answered in the coming years, in the case law of national courts and the Court of Justice of the EU. It is possible that the concept of 'no further deterioration' may have the same meaning as the standstill principle contained in older water directives. For the chemical status this is also described as ‘one out- all out’, meaning that a Member State does not meet its obligations when one of the substances that falls under the regime of the good chemical status does not meet the environmental quality standard. The situation regarding ecological status is more complex, as this status is determined using a number of different classifications. No further deterioration in status could mean that a certain ecological deterioration is allowed, provided this is not to such an extent that the water body comes into a lower classification.[90] This approach would seem to be more flexible than the older water directives, which after all also included quality requirements for substances which partly determine good ecological status. This may also be the case for substances in medicines. The Member States hold disparate views on this.[91]

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[88] Art. 4(4) EFD. See further: *Conclusions on exemptions and disproportionate costs*, Water directors’ meeting under Slovenian Presidency, Brno, 16-17 June 2008.

[89] Keessen, Andrea M., Jasper J.H. van Kempen, Marleen van Rijswick, Jan Robbe and Chris W. Backes, ‘European River Basin Districts: Are They Swimming in the Same Implementation Pool?’, *Journal of Environmental Law* , Volume 22, Issue 2, 2010, pp. 197-222.

[90] This is the interpretation favored by the Dutch Council of State Court: ABRvS 13 april 2011, Milieu en Recht 2011/165, annotated by M. van Rijswick; ABRvS 8 Feb. 2012, nr 201109027/1/A4, LJN BV 3249. A different interpretation was taken by the District court Maastricht, 13 July 2011, Milieu en Recht 2011/165, annotated by M. van Rijswick.

[91] Keessen, Andrea M., Jasper J.H. van Kempen, Marleen van Rijswick, Jan Robbe and Chris W. Backes, ‘European River Basin Districts: Are They Swimming in the Same Implementation Pool?’, Journal of Environmental Law , Volume 22, Issue 2, 2010, pp. 197-222.

Transboundary pollution of surface water with priority substances

The exemption contained in Article 6 of the Priority Substances Directive (Directive 2008/105/EC, also called the Environmental Quality Standards Directive) is also important, because it relates to exceeding an environmental quality standard as a result of transboundary water pollution. If a Member State can demonstrate that the exceedance of an environmental quality standard set by the Priority Substances Directive was due to a source of pollution outside its national jurisdiction, it must use the coordination mechanisms contained in Article 12 WFD so as to involve the Commission. The Member State must also demonstrate that it was unable as a result of such transboundary pollution to take effective measures to comply with the relevant environmental quality standards and, as appropriate, have taken advantage of the exemptions of Article 4 (4), (5) and (6) WFD. It is therefore important to provide an overview of the measures included in the river basin management plan which deal with transboundary pollution and to monitor this at the border. This exemption in the Priority Substances Directive – which is not contained in the Water Framework Directive itself, so it only applies to surface water and pollution from priority substances - is most relevant for transnational water bodies and international river basins. In case of transboundary pollution caused by medicines which contain priority substances, this exemption may be relevant for individual Member States.

Mixing zones

The establishment of mixing zones does not constitute a real exemption, but it is described here because they constitute areas where the quality standards established by or pursuant to the Priority Substances Directive are not met. The Priority Substances Directive introduced in its Article 4 the term 'mixing zone', a transitional area for excesses of water quality standards set by this Directive. A mixing zone is an area, to be designated by the Member States, adjacent to points of discharge for parts of a surface water body where the environmental quality standards cannot be met, as a result of a too high level of pollutants in discharges. The following conditions apply to such zones: concentrations of a pollutant may exceed the relevant standard within such mixing zones if they do not affect the compliance of the rest of the body of surface water with those standards; the limits of the mixing zone around the points of discharge must be fixed by the Member States and a description of the mixing zone must be included in the river basin management plan, as well as the measures taken with a view to reducing the extent of the mixing zones in the future; the mixing zone must be proportionate. This exemption may be relevant for factories/installations where medicines are produced and which discharge wastewater that contains medicines waste water with priority substances or in case a waste water treatment plant discharges waste water which contains priority substances coming from medicines.

Groundwater exemptions

There are a number of exceptions to the strict protective regime of the Groundwater Directive.[92] These exemptions apply in addition to the (more general) WFD exemptions. Unless impeded by more stringent EU legislation, Member States may decide that the measures to prevent and limit ground water pollution do not apply to:

[92] H.F.M.W. van Rijswick, 'Consequences of the new Groundwater Directive for Infiltration for the Purpose of the Drinking-Water Supply', *European Environmental Law Review* 2004, p. 327-334; H.F.M.W. van Rijswick and M.C. Zijp, 'Investeren in de toekomst: een nieuw Europeesrechtelijk regime voor bodemsaneringen', in: J.M. van Dunné, P.H. van den Brandhof, Wh.T. Braams en E.H.P. Brans (red.), *Kostenverhaal bodemsanering, Afrekenen met het verleden, investeren in de toekomst*, Den Haag: Sdu Uitgevers 2008, p. 167-188.

- an introduction of pollutants the result of direct discharges authorized in accordance with Article 11 WFD considered by the competent authorities to be so small as to obviate any present or future danger of deterioration in the quality of the receiving groundwater; or
- introductions that are a consequence of accidents or exceptional circumstances of natural cause that could not reasonably have been foreseen, avoided or mitigated;
- introductions that are the result of permitted artificial recharge or augmentation of bodies of groundwater, and if this introduction cannot, for technical reasons, be prevented or limited without employing measures that would increase risks to human health or to the quality of the environment as a whole;
- *disproportionately costly measures to remove quantities of pollutants from contaminated ground or subsoil, or otherwise to ensure their percolation can be controlled;* and finally
- introductions that are the result of interventions in surface waters for the purposes of, inter alia, mitigating the effects of floods and droughts, and for the management of waters and waterways, including at international level.

Where exemptions are allowed under the Groundwater Directive, efficient monitoring must be carried out and the use of these exemptions may not result in a failure to achieve the environmental objectives of Article 4 WFD. The exemption in italics seems particularly relevant for water pollution with medicines caused by the agricultural sector.

6.3 Water quality standards

Quality standards in older water directives

Ever since the 1970s, there have been European Directives indicating the quality of surface water that should be achieved if that water is used for certain functions. For example, EU directives with quality objectives have been adopted for bathing water,[93] water supporting fish life[94] and water intended for abstraction of drinking water.[95] Most of these directives disappear as their objectives are now (more or less) covered by the WFD regime, but the bathing water and drinking water (98/83/EC) Directives remain. These Directives are all structured in more or less the same way: Member States must designate the waters used for a particular function, and from that moment specific quality standards apply to those waters. The standards can be formulated as limit values (binding values) or target values. Limit values may not be exceeded unless one of the exemptions contained in the relevant directive can be lawfully applied. Limit values are obligations of result in European water law.[96] Most of these directives also include a standstill clause as well as the possibility for Member States to take more stringent measures. In case regulated substances in these directives also appear as a product from medicines, these directives may be relevant, but as stated before, there is no explicit regulation for medicines.

The Directives do not indicate precisely when a particular water body has a certain function. This lack of clarity has had two results: there has been very limited designation of waters with these functions, and questions have been asked to the Court of Justice. This problem is partly solved by the advent of the WFD, as the goals set in the WFD apply to all waters, irrespective

[93] Directives 76/160/EC and 2006/7/EC.
[94] Directive 2006/44/EC.
[95] Directive 75/440/EEC.
[96] ECJ Case C-307/98, (Commission v. Belgium). The Court refers here to ECJ Case C-56/90, (Commission v. United Kingdom) and ECJ Case C-198/97, (Commission v. Germany) and ECJ Case C-147/00, (Commission v. France). See also ECJ Case C-268/00, (Commission v. Netherlands) and ECJ Case C-278/01, in which a penalty payment was imposed on Spain for its failure to comply with obligations under the Bathing Water Directive, for which Spain had already been found in infringement (Case C-92/96).

of their function. Additional requirements only apply to waters that fall within the 'protected areas' category. General European water Directives which contain quality standards for certain substances, regardless of the function of any particular water body are the Dangerous Substances Directive (Directive 2006/11/EC, replacing Directive 76/464/EEC) and two 'daughter directives' of the WFD, which contain quality standards for priority substances in surface water (2008/105/EC) and groundwater (2006/118/EC). The thus established lists of priority substances and maximum concentrations of these substances in surface water and groundwater concern substances that are problematic throughout the whole of the EU, independent whether they originate from medicines or from something else . For other substances, the Member States themselves must take measures.

Quality standards based on the Water Framework Directive

Under the WFD regime, the quality standards can be established at various levels: European, national or regional (river basin district). They are laid down at EU level on the basis of Article 16(7) (for concentrations of priority substances) and Annex IX WFD. They are laid down by the Member States on the basis of Annex V (substances which are not on the priority list) or on the basis of Article 16(8) WFD (substances on the list of priority substances, for which no standard has been established at EU level). The quality objectives contained in the WFD daughter directives and Directive 2006/11 are considered by the WFD to be environmental quality standards, by means of which good chemical status is achieved.[97] These daughter directives are: the Mercury Discharges Directive, the Cadmium Discharges Directive, the Mercury Directive, the Hexachlorocyclohexane Discharges Directive, and the Dangerous Substances Discharges Directive.[98] Furthermore, Member States must establish environmental quality standards for water bodies used for the abstraction of drinking water (Art. 7(2) WFD).

The environmental objectives of Article 4 and the environmental quality standards established as described above count as environmental quality standards for the application of the IPPC Directive[99] (relevant for installations/factories where medicines are produced) and Article 11(5) WFD.[100] Consequently, if it appears that the environmental objectives of Article 4 WFD will not be achieved, this must be investigated. An important obligation in that case, contained in Article 11(5), is that 'relevant permits and authorizations [must be] examined and reviewed as appropriate'. The same provision states that the establishment of stricter environmental quality standards could be a necessary additional measure in order to meet the environmental objectives of Article 4 WFD.

The criteria that determine the placing of a substance on the Annexes to the European water Directives are related to the hazardous characteristics of these substances. The WFD prescribes that a European environmental quality standard for a substance be formulated if a

[97] Art. 2(24) read with Annex IX and pursuant to Art. 16(7) or other EU environmental quality standards.

[98] Respectively: Directive 82/176 (Council Directive of 22 March 1982 on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry, OJ 1982, L 81/29); Directive 83/513 (Council Directive of 26 September 1983 on limit values and quality objectives for cadmium discharges, OJ 1983, L 291/1); Directive 84/156 (Council Directive of 8 March 1984 on limit values and quality objectives for mercury discharges by sectors other than the chlor-alkali electrolysis industry, OJ 1984, L 74/49); Directive 84/491 (Council Directive of 9 October 1984 on limit values and quality objectives for the discharges of hexachlorocyclohexane, OJ 1984, L 274/11); Directive 86/280 (Council Directive of 12 June 1986 on limit values and quality objectives for discharges of certain dangerous substances in List I of the Annex to Directive 76/464/EEC, as amended by 88/347/EEC, and 90/415/EEC, 91/692/EEC, OJ 1986, L 181/16 (amended OJ 1988, L 158/35, OJ 1990, L 219/49, OJ 1991, L377/48).

[99] See Art. 2(7) IPPC Directive (codified), definition of 'environmental quality standard'.

[100] This concerns the need for additional measures if the environmental quality requirements cannot be met using the best available technologies.

risk assessment reveals that it poses *significant* risk to the aquatic environment or to human health via aquatic exposure. This risk assessment is based on

(1) evidence regarding the intrinsic hazard of the substance concerned, and, in particular, its aquatic ecotoxicity and human toxicity via aquatic exposure,
(2) evidence from monitoring of widespread environmental contamination, and
(3) other proven factors which may indicate the possibility of widespread environmental contamination, such as production, use volume and use pattern of the substance concerned.[101]

These criteria are further elaborated in the Annexes to the WFD.

Annex II of the WFD obliges the Member States to collect and maintain information of significant point source pollution and significant diffuse source pollution, in particular by substances listed in Annex VIII. Annex VIII of the WFD provides for an indicative list of the main pollutants.

1. Organohalogen compounds and substances which may form such compounds in the aquatic environment.
2. Organophosporous compounds.
3. Organotin compounds.
4. Substances and preparations, or the breakdown products of such, which have been proved to possess carcinogenic or mutagenic properties or properties which may affect steroidogenic, thyroid, reproduction or other endocrine-related functions in or via the aquatic environment.
5. Persistent hydrocarbons and persistent and bioaccumulable organic toxic substances.
6. Cyanides.
7. Metals and their compounds.
8. Arsenic and its compounds.
9. Biocides and plant protection products.
10. Materials in suspension.
11. Substances which contribute to eutrophication (in particular, nitrates and phosphates).
12. Substances which have an unfavorable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc).

These criteria define a relevant substance on the basis of the presence of a certain element, structure, physical-chemical reactivity, biological activity or origin. While biocides and plant protection products are included as a group, medicines are not. They can fall within one of the other 11 categories listed. A further elaboration of this list has resulted in concrete water quality standards in two daughter directives of the WFD, the Groundwater Directive and the Priority Substances Directive (see below). The WFD does not contain a specific provision on regular review or amendment of this Annex. Instead, Article 19 WFD obliges the Commission to keep the WFD regulatory committee informed by presenting each year an indicative plan of measures having an impact on water legislation which it intends to propose in the near future.

<u>Water quality standards based on Directive 2006/11</u>
In a transition period starting in 2000 with the adoption of the WFD and ending in 2013 when the WFD should be fully operational, Directive 2006/11 serves as an additional regulatory regime for water quality standards. It codifies and replaces Directive 76/464/EEC, which was

[101] Art. 16 (2) WFD.

the first directive that regulated discharges of chemical pollutants in water through a combined approach of emission requirements and water quality standards. The list in Annex VIII to the WFD is very similar to the lists established by Directive 2006/11 (the Hazardous Substances Directive). The lists established by Directive 2006/11 distinguishes between dangerous substances which pose a threat to all European waters (List I) and substances which pose a threat to water quality but can be confined to a given area and whose effect depend on the characteristics and location of the water into which such substances are discharged (List II). Discharges of List I substances have to be eliminated, while discharges of List II substances have to be reduced. This Directive applies to inland surface water, territorial waters and internal coastal waters. It does not apply to groundwater, for which a specific Directive was established, Council Directive 80/68/EEC, which will be replaced by Directive 2006/118. The Hazardous Substances Directive has been integrated into the legal framework established by the Water Framework Directive and will be fully repealed in 2013.

Chemical quality standards for surface water: Priority Substances Directive (2008/105/EC)
The purpose of the Priority Substances Directive[102] is to achieve good chemical status for surface water, in conformity with the provisions and objectives of Article 4 WFD. This Directive is also called the Environmental Quality Standards Directive (EQSD). It is a daughter directive of the Water Framework Directive, and is part of the strategy against water pollution included in Article 16 WFD. In line with Article 16 (8) WFD, the first step in this strategy was taken when Decision 2455/2001 drew up a list of 33 priority substances which require attention at EU level because they threaten the environment, and water in particular.[103] Until now no substances used in medicines are included in the priority substances list. In future some of these substances will be included in the list and therefore the Directive will become more important in the area of regulating the effects of human and veterinary medicines (see below). For other substances that are not listed on a European level action should be taken at Member State level. Annex II to the Priority Substances Directive replaces Annex X to the WFD. The Priority Substances Directive provides for the repeal of a number of existing subsidiary directives containing quality standards, which were adopted on the basis of Directive 2006/11/EC.

The Priority Substances Directive only provides for the establishment of environmental quality standards at EU level for priority substances and certain other selected pollutants. The standards are different for inland surface waters and other surface waters. Two kinds of quality standards are established: annual averages, to protect against long-term and chronic effects; and maximum allowable concentration, to afford protection against short-term, direct and acute ecotoxic effects. Member States are under the obligation to ensure that their surface water bodies comply with these quality standards and that the concentrations of certain substances (parts A and B of Annex I) in sediments and biota do not increase. This obligation is one of result. In order to facilitate the establishment of quality standards, frequent consultations take place between the various parties concerned: public authorities, business, scientific institutes and NGOs. The parties draw up guidance documents which may be of assistance in interpreting the WFD, but these guidance documents are not legally binding. The standards set at EU level are ultimately established using the regulatory Comitology procedure.

[102] Directive 2008/105/EC of the European Parliament and the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC and 86/280/EEC and amending Directive 2000/60/EC, OJ 2008, L 348/84.
[103] The list is contained in Decision 2455/2001/EC.

Under Article 16 (4) WFD, the Commission is obliged to review the list of priority substances every four years and come forward with proposals as appropriate. Annex III of the Priority Substances Directive 2008/105 extends the current list of 33 substances with a proposal for a number of other substances for which environmental quality standards will be developed if they are indeed identified as priority substances or priority hazardous substances. The Directive is accompanied by a Communication from the Commission to the Council and Parliament concerning the integrated prevention and control of chemical pollution of surface waters in the Union.[104] The recent proposal for a Directive amending the WFD and the Priority Substances Directive (COM (2011) 876) provides for 15 additional priority substances, stricter environmental quality standards for several substances already listed by the Priority Substances Directive and it introduces biota standards for several already listed substances. This list includes substances which are used in medicines.

In relation to measures to be taken at EU level, the Water Framework Directive provides that, in addition to quality standards on the basis of Article 16(7) WFD, EU emission control measures should be adopted for priority substances as well, on the basis of Article 16(6) and Article 16(8) WFD. The latter have not been included in the Priority Substances Directive, however, as the Commission is of the opinion that there are already enough emission control measures on the basis of other environmental directives. The Commission refers in this context amongst others to the measures prescribed in EU legislation on chemical substances, including the REACH Regulation, the Plant Protection Products Directive, the IPPC Directive and the thematic strategies on marine policy and sustainable use of pesticides. It should be noted that there is no reference to pollution and eventual requirements concerning pollution by medicines.

Chemical quality standards for groundwater: Groundwater Directive (2006/118/EC) [105]
The Groundwater Directive distinguishes between groundwater quality standards – set on Annex I – and threshold values set by the Member States. Threshold values are defined as groundwater quality standards set by the Member States. Both should not be exceeded in order to protect human health and the environment. Annex I to the Groundwater Directive contains quality standards for pollutants in groundwater. As for the quality standards, these include European standards for nitrates, plant protection products, and biocides. There are no quality standards that relate directly to substances relevant for medicines. The Commission has to review the Annexes by 16 January 2013 and thereafter every six years and come forward, if appropriate, with proposals to amend them.

The Groundwater Directive provides that national threshold values must be established by the Member States for pollutants, groups of pollutants and indicators of pollution which, within their territory, have been identified as contributing to the characterization of bodies or groups of bodies of groundwater as being at risk of not achieving the environmental good status objectives of Article 4 WFD. Annex II to the Directive contains a *minimum* list of pollutants and their indicators which the Member States have to consider when they establish threshold values. These are:

1. Substances or ions or indicators which may occur both naturally and/or as a result of human activities: Arsenic, cadmium, lead, mercury, ammonium, chloride and sulphate.

[104] COM(2006) 398 final.
[105] Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration, OJ 2006, L 372/19.

2. Man-made synthetic substances: trichloroethylene, tetrachloroethylene.
3. Parameters indicative of saline or other intrusions: Conductivity.

There is coordination between the Groundwater Directive and the Nitrates Directive,[106] the Plant Protection Products Directive,[107] and the Biocides Directive.[108] The Groundwater Directive establishes that the results of the application of the quality standards for pesticides will be without prejudice to the results of the risk assessment procedures required by the Plant Protection Products Directive and the Biocides Directive. It also obliges the Member States to establish more stringent threshold values if in a given body of groundwater the groundwater quality standards could result in failure to achieve the environmental objectives specified in Article 4 WFD. The Directive states that programmes and measures required in relation to such a threshold value will also apply to activities falling within the scope of the Nitrates Directive. Such coordination rules are lacking regarding the European medicines Directives and Regulation.

Ecological quality standards for surface waters

Ecological standards are a new phenomenon created by the WFD, although certain substances that fall within the scope of the ecological quality standards were before regulated as dangerous substances (and will be until 2013). The Member States must establish ecological standards at the (sub) river basin level for surface water. They relate partly to substances and partly to hydromorphological and biological characteristics. The Member States have to establish them, because waters can be very different from one Member State to another, and even from one type of water body to another. The intercalibration exercise ensures that Member States consult with one another with a view to establishing ecological standards and rendering them comparable across the EU for similar water bodies, thus facilitating Commission control on achieving good ecological status.[109] It is important to note that ecological quality standards include quality standards for certain substances. This is because the objective of good ecological status requires that as far substances may lead to concern at local or river basin or national level, which do not qualify as priority substances at EU level, standards have to be set at national level. Thus national standards have to be set for concentrations of substances of medicines or their metabolites if they are substances of concern.

Quality standards for drinking water: Directive 98/83/EC

Directive 75/440/EEC established quality standards for waters used for the production of drinking water. It applied only to surface waters. Groundwater was apparently considered fit to drink. This omission however was compensated by the establishment of another Drinking water Directive, 98/83/EC, which contained quality standards for the product drinking water. The latter Directive is still in force, while the former was integrated into the Water Framework Directive and its daughter directives and repealed at the end of 2007. The lists of substances on both Directives were very similar. The lists established by Annex I to the Drinking Water Directive (98/83/EC) contain both microbiological and chemical quality standards (called parameters in the Directive) for water intended for human consumption. Member States must adopt values applicable to water intended for human consumption for the

[106] Directive 91/676/EEC.
[107] Directive 91/414/EEC.
[108] Directive 98/8/EC.
[109] See G. Duursema, D. van der Molen en W. Oosterloo, 'Van Praag naar Ommen: formuleren van ecologische doelen voor de Kaderrichtlijn water', *H_2O* 2006-16, p. 37-40..

parameters set out in Annex I, which constitute the limit values. The Commission has to review Annex I at least every five years in the light of scientific and technical progress and has to make proposals for amendments where necessary. There is no explicit regulation for substances that originate from medicines.

The Directive prescribes that Member States have to set values for additional parameters which are not included in Annex I, where the protection of human health within its national territory or part of it so requires. These parameters should, as a minimum, satisfy the general obligation of Article 4 of the Directive that water intended for human consumption must be wholesome and clean and:

> (a) is free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger for human health, and
> (b) meets the minimum requirements set out in Annex I parts A and B.

Thus national standards have to be set for substances of medicines or their metabolites in drinking water when they are not established in the Annex and if they occur in a concentration constituting a potential danger to human health.

The WHO *Guidelines for Drinking-water Quality* refers to medicines.[110] From a legal point of view, it should be noted that this is not a binding document, but it is used all over the world as a point of reference. It does not contain quality requirements specifically for medicines. The WHO bases its policy on its report on Pharmaceuticals in Drinking-water. The report refers to investigative studies that took place in the United Kingdom, the USA and Australia, which have shown that detection in treated drinking-water is rare and if medicines are present, their concentrations are usually well below 0,05 microgram per liter. This is more than 1000 fold below the lowest therapeutic dose. Because these studies suggest a low presence of medicines in drinking water, which appears to constitute a low risk to human health, the report suggests that development of formal guideline values for medicines in the WHO *Guidelines for Drinking-water Quality* is not warranted.[111] The WHO Guidelines advice is that where local circumstances indicate a potential for the occurrence of medicines in drinking water, monitoring should take place to assess exposure. Based on a risk assessment, screening values can then be developed.

6.4 Monitoring, reporting and compliance with water quality standards

Monitoring and reporting

Article 8 WFD provides that Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district. For surface waters, the programmes cover the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential. For protected areas, the programmes are supplemented by the specifications contained in the EU legislation under which the individual protected areas have been established. Guidance documents have been established to improve the quality and uniformity of monitoring. The second report of the Commission on the implementation of the WFD is dedicated to monitoring. [112] The proposal for a Directive amending the WFD and the

[110] World Health Organization, *Guidelines for Drinking-water Quality*, fourth edition 2011.
[111] World Health Organization, *Pharmaceuticals in Drinking water*, WHO Press 2011.
[112] COM PM

Priority Substances Directive (COM (2011) 876) contains provisions to improve the efficiency of monitoring and the clarity of reporting with regard to certain substances behaving as ubiquitous persistent, bioaccumulative and toxic (PBT) substances. It also provides for a mechanism to allow targeted EU-wide monitoring of substances of possible concern to support the prioritization process in future reviews of the priority substances list. This last proposal may be of relevance for substances that originate from medicines and of which the concern is not yet proven but expected.

Compliance

It can be deduced from the case law of the Court of Justice on the directives on bathing water and drinking water that the relevant quality standards have to be considered obligations of result. That is also true for the quality standards for drinking water as regulated in the WFD.[113] This means that if the water quality does not comply with the standards, or if it deteriorates, this is an indication that the directive has not been correctly implemented, unless there is lawful recourse to one of the exemptions contained in the relevant directive. Member States may ensure compliance with quality standards both by taking actual measures and by means of legislation. The water quality approach may entail refusing to issue a permit for discharges into surface water in which limit values have been exceeded, or that existing permits must be made more restrictive or even, in extreme cases, revoked.

That is a consequence of the choice to divide the available pollution possibilities, the 'room to pollute', between various different present and future polluters and non-point source water pollution.[114] The relationship between emissions and water quality is not always clear. That means it is also not clear what decrease in emissions, in what location, will have a particular effect. Water quality is not just affected by emissions in the vicinity of surface water, but also be deposition of pollutants, by pollution from other sectors, such as agriculture, traffic and transport, by pollution from outside national boundaries, by natural background concentrations, rate of flow, temporary changes in drainage, sedimentation on the river floor, post leaching subsidence effects, etc. That makes it difficult to comply with water quality standards by means of emission control, while at the same time enabling a fair allocation of possibilities to pollute.

Obligations of best efforts and obligations of result

It is debated in a number of EU Member States whether the environmental objectives and the environmental quality standards should be seen as obligations of best efforts or obligations of result.[115]Any obligation contained in a directive – whether an obligation of best efforts or of result – aims to achieve an objective (Art. 288 TFEU). The difference between the two kinds of obligation lies in the question exactly how far a state must go in order to achieve that

[113] ECJ Case C-32/05, (Commission v. Luxembourg).

[114] See on the allocation of scarce water pollution rights: H.F.M.W. van Rijswick, De verdeling van schaarse waterrechten, in: F.J. van Ommeren, W. den Ouden en C.J. Wolswinkel (eds.), *Schaarse publieke rechten*, Boom Juridische Uitgevers, Den Haag 2011, p. 133-158.

[115] See on this, amongst others: J.J.H. van Kempen, Countering the obscurity of obligations in European environmental law, illustrated by an analysis of Article 4 of the European Water Framework Directive, *Journal of Environmental Law* 2012/3 (forthcoming); Keessen, Andrea M., Jasper J.H. van Kempen, Marleen van Rijswick, Jan Robbe and Chris W. Backes, 'European River Basin Districts: Are They Swimming in the Same Implementation Pool?', *Journal of Environmental Law* , Volume 22, Issue 2, 2010, pp. 197-222; Van Rijswick, H.F.M.W., Gilissen, H.K. & J.J.H. van Kempen, 'The need for international and regional transboundary cooperation in European river basin management as a result of new approaches in EC water law', *ERA Forum*, Volume 11, Number 1, 2010, pp. 129-157

objective and who decides if a Member States has done enough efforts: the Member State itself or the courts who bases its judgments on the obligations and exemptions in a directive.

In the case of a best efforts obligation, Member States are obliged to use appropriate means and measures, and to do their best in order to achieve the objective. According to the EU Court of Justice, serious endeavours, namely the taking of all reasonable measures to achieve the success being sought, require targeted action.[116] If the objective is not achieved, but these requirements have been met, then the obligation is fulfilled. According to the case law, the measures must actually be taken in order to achieve the objective sought. Measures which would have been taken in any case and which in some way or other also promote the goal sought are insufficient. In addition, the measures must form a coherent whole; partial and isolated measures are not enough.[117] It would therefore be wrong to think that an obligation of best efforts implies that a Member State cannot be seriously called to account in relation to that obligation.

As for an obligation of result, here it is crucial that the goal to be achieved must actually be achieved within a certain time. That means that Member States cannot assume they need only endeavour to adopt all reasonably feasible measures, but they must do whatever is necessary to ensure that the goal is actually met within the period prescribed.[118] The Member States must take appropriate measures for this.[119] These are the measures which are necessary in view of the purpose of the directive. But even if the Member State has made great efforts, if the result has not been achieved, then the obligation is not fulfilled.[120] It 'is not therefore sufficient for a Member State to take all reasonably practicable measures to achieve the result imposed by [the directives]',[121] as is the case for obligations of best efforts. No matter how great the efforts taken by the Member State, the question of fulfillment of obligations must be answered on the basis of the results achieved.[122] In this context, failure to achieve the prescribed result is justified if recourse can be had to the exemptions contained in the Directive.

Failure to achieve the required result is also permissible when there is an absolute objective impossibility to do so. The Court of Justice has, however, to date never accepted an appeal on that ground. Constant case law reveals that the condition of absolute objective impossibility is not met where the defendant government merely informs the Commission of the legal, political or practical difficulties involved in implementing the decision, without taking any real steps to achieve the result and without proposing to the Commission any alternative arrangements for implementing the legislation which could have enabled the difficulties to be overcome.[123] Thus far the Court of Justice has never accepted arguments based on internal legal, political or organizational problems.

Achieving good chemical status can be considered an obligation of result. Good chemical status is achieved when all quality standards are met; these quality standards are mainly taken over from existing directives, and have already been found by the Court of Justice to

[116] See e.g. ECJ Case C-418/04, (Commission v. Ireland).
[117] ECJ Case C-418/04, (Commission v. Ireland).
[118] See e.g. ECJ Case C-268/00, (Commission v. Netherlands).
[119] ECJ Case C-96/98, (Commission v. France).
[120] ECJ Case C-316/00, (Commission v. Ireland).
[121] ECJ Case C-60/01, (Commission v. France).
[122] ECJ Case C-316/00, (Commission v. Ireland).
[123] See e.g. ECJ Case C-94/87, (Commission v. Germany), ECJ Case C-499/99, (Commission v. Spain) and ECJ Case C-415/03, (Commission v. Greece).

constitute obligations of result. The obligation to meet these standards thus already existed in the past. Moreover, the Water Framework Directive states that the limits in an environmental quality standard may not be exceeded: that is even included in the definition in Article 2(35). Quality standards are also set in relation to good ecological status, and it may be assumed that these obligations will also be considered obligations of result. The Directive does, after all, contain a number of exemptions, so that account can be taken of the specific nature of ecological aims, since water authorities are to a large extent dependent on natural circumstances in achieving ecological aims.

6.5 Regulation of discharges

Right from the start, water quality law has focused on regulation of pollution, so-called source-based regulation. This is consistent with both the principle of prevention and the principle that pollution should preferably by prevented at the source. In this approach, pollution is prevented or limited by setting requirements for emissions. Emissions may come from point sources, such as large plants, for instance factories or sewage treatment plants for urban wastewater. Emissions can also come from what are called non-point sources of pollution: pollution which is not a result of human activity, or where there is no activity involved which could be subject to a permit condition, such as run-off of polluting substances into groundwater, and pollution caused by animals and birds in the wild. Pollution caused by agriculture, pollution resulting from the use of building materials from which contaminating substances can leach, and traffic pollution are frequently referred to as non-point sources or diffuse pollution, but they are regarded as discharges in European water law.

Terminology

The year 1999 saw two important decisions of the Court of Justice, in answer to questions put by the Administrative Jurisdiction Division of the Dutch Council of State, on the term discharge.[124] They concerned the interpretation of Article 1(2) of the old Directive. The Court defined discharge broadly. As long as the act causing pollution is attributable to a particular person, it constitutes a discharge. The Court of Justice also made a clear distinction between the regime for discharges with a permit requirement under the Dangerous Substances Directive, and the regime for other significant sources of pollution under Directive 86/280, for which programmes and measures must be drawn up. [125] According to the Court, the term 'discharge' does not include the pollution from significant sources, including multiple and diffuse sources, referred to in Article 5(1) of Directive 86/280. The latter should be reduced by using programmes in compliance with Directive 86/280.[126] The escape of pollutants from wooden posts treated with creosote placed in surface water is, according to the Court, not a 'diffuse source' but a discharge. Situations covered by the term diffuse sources seem clear. When an activity causing pollution cannot be attributed to a particular person, then the pollution is caused by 'other significant sources'. In that case, it is in practice not possible to grant an authorization, as it cannot be known who should be granted the authorization.

[124] Case C-231/97, A.M.L. van Rooij v Dagelijks bestuur van het waterschap de Dommel (Precipitation of contaminated steam on to surface water)and Case C-232/97, L. Nederhoff & Zn. v Dijkgraaf en hoogheemraden van het Hoogheemraadschap Rijnland (wooden posts treated with creosote).
[125] Directive 86/280 (Council Directive of 12 June 1986 on limit values and quality objectives for discharges of certain dangerous substances in List I of the Annex to Directive 76/464/EEC, OJ 1986, L 181/16. The Directive was repealed with the entry into force of the Priority Substances Directive, 2008/105.
[126] See ECJ Case C-232/97.

The Court thus takes the question of whether the pollution can be attributed to a particular person as determining whether something is a discharge or a diffuse source. However, that does lead to a 'fuzzy' area for cases where it is not clear whether something is a discharge or a diffuse source. After all, in defining the term discharge, the Court of Justice had assumed that it is the action as a result of which substances are directly or indirectly brought into surface water that determines whether a discharge is concerned. This would mean that the use of medicines or the discharge of substances that originate from medicines should be regulated by means of emissions control. However, this will be extremely difficult to enforce.[127] The case law, European or national, will have to determine further which concrete cases can be considered discharges, and which cases concern diffuse sources of pollution. The distinction is important for the requirement of prior authorization, which only applies to discharges. The WFD however changes the relevance of this distinction.

Discharges, point sources, and diffuse sources in the WFD

Remarkably, the WFD does not make any distinction between point sources and diffuse sources. The definition of emission limit values shows that these are aimed primarily at point sources, which is certainly logical. What is characteristic about pollution from non point sources or diffuse sources is that it is far from easy to prescribe and enforce emission requirements for any particular source. The problem is that emission limit values apply - according to the Directive - at the point where the emissions leave *the installation*. Article 11(3)(g) states that prior regulation must be required for discharges from point sources, whereas according to Article 11(3)(h) this is optional for diffuse sources. For pollution from diffuse sources, measures must be taken to prevent or control the introduction of dangerous substances. Here, there is a clear relationship with product policy including regulations for medicines and the registration and use of certain harmful substances (Art. 11(3)(h)), and also, for instance, with fertilizer policy. This can be seen in the fact that more stringent registration requirements may be adopted for plant protection products, and the rules on fertilizers may also be tightened. It could be stated that Article 11(3)(h) also allows for stricter regulation of the medicines policy. Article 10 WFD also states that the prescribed approach applies to all discharges, and opts for a combined approach for point sources and diffuse sources. To date, however, the Court of Justice has maintained a strict division between 'discharges' and 'diffuse sources'.[128] The definitions based on the earlier directives are repealed by the WFD. That does not mean that the problems associated with those definitions come to an end. The WFD still uses the terms point sources, diffuse sources and other significant adverse impacts on the status of water.

Instruments for source-based policy

Regulation of emissions can take place by requiring a *permit* in which emission limit values are laid down (discharge permits), by *general rules* instead of permits, by setting requirements for certain products (such as pesticides or medicines) or their use, or by regulations on the use of products such as fertilizers which may contain substances from medicines (concerning amounts or the manner in which they may be used). Emission requirements are often established on the basis of the best available techniques or technologies. Source-based approaches to tackle non-point sources of pollution often work with plans or programmes prescribing certain environmental techniques or best practices.

[127] Compare: M.H.M.M. Montforts, H.F.M.W. van Rijswick and H.A. Udo de Haes, Legal constraints in EU product labelling to mitigate the environmental risk of veterinary medicins at use, *Regulatory Toxicology and Pharmaclogy*, Volume 40, Issue 3, December 2004, p. 327-335

[128] ECJ Case C-231/97, ECR 1999, p. I-6355 and Case C-232/97, ECR 1999, p. I-6385.

Most EU environmental directives include emission controls, often each with a slightly different approach. For instance, the Dangerous Substances Directive requires mandatory prior authorization for discharges of pollutants into surface water, as does the Groundwater Directive for discharges into groundwater. The IPPC Directive (Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (Integrated Pollution Prevention and Control)[129] lays down requirements for emissions from large-scale installations (see further the chapter on other environmental legislation). The Urban Wastewater Treatment Directive contains requirements for the collection and treatment of urban wastewater, but also without any specific requirements for the monitoring of regulation of emission containing substances that originate from medicines. Finally, the Nitrates Directive regulates contamination of water by nitrates, amongst other things by setting standards for the use of fertilizers.

The Water Framework Directive integrates these various approaches in its Article 10, and works with a combined approach for point and non-point sources based on:

- emission controls, assuming the best available techniques, as in the IPPC Directive; or
- the applicable emission limit values; or,
- in the case of diffuse impacts - emission controls, including best environmental practices, as contained in various existing directives, such as the Nitrates Directives and the Urban Wastewater Treatment Directive. Emission controls are, according to Article 2(41) WFD, controls requiring a specific emission limitation, for instance an emission limit value, or otherwise specifying limits or conditions on the effects, nature or other characteristics of an emission or operating conditions which affect emissions.
- prescription of more stringent source-related measures if the quality standards that have been established cannot be met using emission controls.

The Priority Substances Directive does not contain additional permit requirements but adds to the obligations on the basis of the WFD, the obligation to establish *inventories* of emissions, discharges and losses, including maps, which enable the Member States – and the Commission - to evaluate the effectiveness of the measures to regulate these activities. It allows the Member States to designate *mixing zones* adjacent to points of discharge where concentrations of a substance listed under this Directive may exceed the relevant environmental quality standards (see the paragraph on exemptions). The Groundwater Directive also obliges the Member States to set up an inventory, in the context of their use of exemptions. Something similar must also be made in order to comply with the obligation to identify significant and sustained upwards trends and starting points of trend reversals (under Article 5). The Groundwater Directive obliges the Member States to establish a programme of measures to prevent or limit inputs of pollutants, respect the non-deterioration principle and reverse upward trends, but does not specify what kind of measures should or could be included, nor mention any possible references to potential risk that may be caused by the use or discharge of medicines.

European strategies

In order to meet the goals of the WFD, the European Parliament and Council developed strategies against pollution of water and strategies to control and prevent groundwater pollution. In relation to water pollution, a distinction is made between pollutants and hazardous priority substances. For the former, the aim is gradual reduction; for the hazardous priority substances, cessation or phasing-out of discharges, emissions and losses should be

[129] OJ 17 December 2010, L 334/17.,

achieved. A list of hazardous priority substances has been drawn up.[130] The Commission was supposed to make a proposal for emission controls for these priority substances, but did not do so, invoking the subsidiarity principle. It took the view that it would be preferable for the Member States to propose the measures themselves. This was arguably an infelicitous choice, as there are many sources of pollution for which the Member States do not have the power to set rules. That is particularly true for product policy and substances policy, such as particle filters for cars, the admission of active substances for plant protection products, medicines, and feed additives.

6.6 Drinking water

Water used to produce drinking water and drinking water itself require protection for public health reasons. This task has two components. In the first place, the drinking water resources, namely groundwater and surface water, must be protected. Adequate protection of the quality of the water resources reduces the necessity for further purification of groundwater and surface water to allow the water to be used for consumption. The amount of water to be used for the drinking water supply is also of importance. Freshwater is scarce, so sustainable management of freshwater is necessary. This aspect is partly covered by the WFD good quantitative groundwater status goal. The protection of the quality of drinking water resources forms an integral part of the protection of water in general, which is regulated at European level under the Water Framework Directive (WFD) and its daughter directives. Besides the protection and distribution of freshwater, drinking water as such ('at the tap') is also regulated at European level. The Drinking Water Directive (Directive 98/83/EC) establishes certain requirements for drinking water at the tap. The drinking water supply is considered as part of the cycle of water services, which consists of the supply of drinking water and the collection, transport and treatment of wastewater.

Protection of drinking water resources in European law

At European level, the Drinking Water Directive (Directive 75/440/EC) established quality standards for the protection of the sources of drinking water. This Directive has now been integrated into the WFD and lapsed as of 22 December 2007.[131] However, case law of the Court of Justice relating to the Drinking Water Directive 75/440/EEC is still of relevance for a correct interpretation and understanding of the WFD regarding protection of the sources of drinking water and therefore it warrants some attention. The Directive set up a system of European and national quality standards by establishing limit values and target values. Member States had to take all necessary measures to ensure that water conformed to these values and the Directive was to be applied without distinction to national waters and waters crossing the borders of Member States.[132] If the quality of the surface water fell short of the mandatory limit values, it was, in principle, not to be used for the production of drinking water. In exceptional circumstances, such lower quality water could be utilized provided suitable processes were used to bring the quality characteristics of the water up to the level of

[130] Decision 2455/2001/EC of the European Parliament and the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC.

[131] Council Directive 75/440, of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States, OJ 1975, L194/34, amended by Directive 79/869. See extensively Van Rijswick 2008b, p. 132- 141.

[132] ECJ Case C-60/01, ECR 2002, I-05679; ECJ, Case C-266/99, ECR 2001, I-01981; ECJ, Case C-56/90, ECR 1993, I-04109; ECJ, Case C-92/96, ECR 1998, I-00505; ECJ, Case C-337/89, ECR 1992, I-06103; ECJ, Case C-316/00, ECR 2002, I-10527, ECJ, Case C-147/07.

the quality standards for drinking water; such an exception was to be based on a water resources management plan and to be notified to the Commission. If the limit values established by the Directive were exceeded as a result of floods, natural disasters or abnormal weather conditions, the excessive values were not taken into account. The Member States were permitted to set stricter requirements; and the Directive also included a standstill principle. The various quality standards had to be transposed into binding legal rules. In case of non-compliance with the Directive, third parties harmed by this non-compliance had to be able to rely on mandatory rules in order to enforce their rights.[133]

As of 22 December 2007, the system of protection of drinking water resources has been fully implemented in the WFD. The WFD establishes a general system of protection for groundwater and surface water - the resources for the abstraction of drinking water. Nonetheless, the WFD also contains specific provisions regarding drinking water resources. Under Article 6 WFD, all water bodies used for the abstraction of water intended for human consumption have to be included in the register of protected areas. These water bodies must be explicitly identified and monitored (Article 7 WFD). The identification of water bodies differs significantly from one Member State to another. For instance, sometimes only the water abstraction locations are identified, or only the water bodies from which drinking water is abstracted. Meeting the requirements of the WFD is extremely important for the protection of drinking water resources. For each water body used for the abstraction of water intended for human consumption, compliance with the environmental requirements of the WFD – including the quality standards established at European level – must be ensured.[134]

Questions may arise with regard to determining the standards. For instance, the standards for drinking water resources traditionally focus on the protection of human health and the environment. However, the standards in the WFD focus on the chemical and, particularly, the ecological status of water. Research has shown that the standards based on the WFD are not entirely in accordance with the desired standards for drinking water.[135] It follows from the judgment of the Court of Justice in Case C-32/05[136] that the water quality standards for drinking water are obligations of result: the obligations under Article 7(2) WFD (quality requirements under Article 4 and requirements regarding drinking water at the tap) are formulated in a clear and unequivocal manner in order to ensure, in particular, that the water bodies of Member States meet the specific objectives laid down under Article 4 of the Directive. This provision thus, according to the Court, imposes obligations as to the results to be achieved and must be transposed by means of measures having binding force.[137] Member States must ensure the protection of the identified water bodies with the aim of avoiding deterioration in their quality, in order to reduce the level of purification treatment required in the production of drinking water. Member States may establish safeguard zones for those water bodies.

[133] ECJ, Case C 58/89, ECR 1991, I-4983 [02607] .

[134] Based on Art. 16 WFD.

[135] H.F.M.W. van Rijswick en S. Wuijts, *Drinkwateraspecten en de Kaderrichtlijn water, Criteria voor de bescherming van drinkwaterbronnen en kwaliteitsdoelstellingen*, RIVM-rapport 734301028/2007, ISBN-10: 90-6960-160-5, 2007; *Drinking water in river basin management plans of EU member states in the Rhine and Meuse river basins* RIVM-rapport 734301035 (2009).

[136] ECJ, Case C-32/05, ECR 2006, I- 11323 (Commission/Luxembourg).

[137] Ibid. Paras 75 and 76.

European legislation on drinking water at the tap

Water obtained through the application of water treatment must meet the standards set by the Drinking Water Directive 98/83/EC (drinking water intended for human consumption).[138] This Directive has remained in place despite the integration of water law under the WFD. The aim of the Drinking Water Directive is to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is 'wholesome and clean'. The Member States must take the necessary measures to that effect. In accordance with the minimum requirements of the Directive, water intended for human consumption is wholesome and clean if it is free from any micro-organisms and parasites and any other substances in numbers or concentrations which constitute a potential danger to human health; if it meets the minimum requirements set out in Annex I, Parts A and B of the Directive; and if Member States take all other measures necessary to ensure that water intended for human consumption complies with the requirements of the Directive. The measures taken to implement the Directive may in no circumstances have the effect of allowing, directly or indirectly, either any deterioration of the present quality of water intended for human consumption so far as that is relevant for the protection of human health, or any increase in the pollution of waters used for the production of drinking water.

Here, too, quality requirements and corresponding monitoring must be established. Member States must adopt values applicable to water intended for human consumption for the parameters set out in Annex I. Annex I of the Directive lays down the limit values for these. Member States must set values for other additional parameters where this is necessary for the protection of human health within their territories or part thereof. Especially this obligation for the Member States may be of importance with regard to medicines, although also in this respect standard setting and regulation at EU level may be preferable.

Water supplied from a distribution network must comply with the parametric values as set out in the Directive, at the point, within premises or an establishment, at which the water emerges from the taps that are normally used for human consumption. In the case of water supplied from a tanker, it must comply with the parametric values at the point at which it emerges from the tanker; in the case of water put into bottles or containers intended for sale, at the point at which the water is put into the bottles or containers; and in the case of water used in a food-production undertaking, at the point where the water is used in the undertaking. Strict rules apply if the requirements are not met. In case of a risk of non-compliance with the quality requirements, Member States must ensure that appropriate measures are taken to reduce or eliminate the risks, such as advising property owners of any possible remedial action they could take. Member States must ensure appropriate treatment techniques, installation and materials and have to inform and advise consumers.

In 2003, the Commission started the preparation of the revision of the Drinking Water Directive. In December 2005, a strategic document was drawn up based on a broad consultation of parties involved, regarding their experiences with the implementation of the current Directive. This document forms the guideline for the revision.[139] Elements to be covered by the revision are:

– parametric values in the Drinking Water Directive;

[138] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, OJ 1998, L 330/32-54.

[139] Revision of the Drinking Water Directive 98/83/EC, strategic document draft 5. Discussion document circulated in 7th meeting of the Standing Committee of the Drinking Water Directive, European Committee, Brussel 2005.

– harmonization of EU directives relating to water;
– obligations for reporting and information exchange;
– risk management (Water Safety Plans);
– new monitoring and sampling techniques;
– small-scale water abstraction.

Meanwhile it has become clear that the revision will not be as extensive as set out in the strategic documents.

A 'functional assignment' of surface waters intended for the preparation of drinking water has not been included in Directive 98/83/EC nor in the revision. No draft for a new drinking water directive exists yet. It has been particularly hard to agree on the so-called Water Safety Plans, as this would extend the responsibility of drinking water companies to a responsibility for the whole system, 'from the resource to the tap', whereas the companies have no competences for the protection of the resources. The same applies to that part of the distribution network going from the water meter to the tap.

7. Sectoral environmental regulation

7.1 IPPC Directive

Discharges from large-scale industrial installations

In 1996 the IPPC[140] Directive was adopted, which aims at the integrated prevention and control of pollution from certain large-scale installations, in order to achieve a high level of protection of the environment taken as a whole.[141] The Directive marked a development from a sectoral to an integrated approach, so as to prevent pollution being shifted between different environmental spheres. The IPPC Directive has been replaced by Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (Integrated Pollution Prevention and Control).[142] The new directive came into force on 6 January 2011 and has to be implemented in the national legal order of the Member States on 7 January 2013.[143] The amendment integrates the IPPC Directive with six other directives: the Large Combustion Plants Directive, the Waste Incineration Directive, the Solvents Emissions Directive and three directives on titanium dioxide production.

Both the initial and the new Directive oblige the EU Member States to regulate large-scale installations causing pollution, by means of an integrated permit, on the basis of best available techniques, and using as little waste, energy and raw materials as possible. The Directive regulates pollution resulting from the activities listed in its Annex 1. Pollution means emissions into air, water and land. The IPPC-directive is relevant for the production of medicine as Category 4.5. in Annex 1 of the Directive refers to ‘Installations using a chemical or biological process for the production of basic pharmaceutical products’. Activities

[140] IPPC stands for Integrated Pollution Prevention and Control.
[141] Directive 96/61/EC of 24 September 1996 (entry into force: 30 October 1996). Codified as Directive 2008/1/EC of 15 January 2008 (entry into force:18 February 2008); the codification includes all amendments since 1996.
[142] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010, OJ 17 December 2010, L 334/17.
[143] See M.N. Boeve, M. Peeters en M.A. Poortinga, ‘Een nieuwe regeling voor de ambtshalve wijziging van de vergunning in het licht van het richtlijnvoorstel industriële emissies’, *M en R* 2010, p. 77-84.

covered by Directive 91/271/EEC (Urban Waste Water Directive) are explicitly excluded in Annex 1 (see 5.3 a and b, 6.11). Category 6.6, Intensive rearing of poultry or pigs, may be relevant in case veterinary medicines are used within the installation.

The Directive defines pollution broadly: it covers the direct or indirect introduction, as a result of human activity, of substances, vibrations, heat or noise into the air, water or land which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment. The notion of 'emission' is also given a broad scope: it means the direct or indirect release of substances, vibrations, heat or noise from individual or diffuse sources in the installation into the air, water or land. Yet the scope of the Directive is limited insofar as it only concerns emissions coming from 'installations'. An installation is defined as stationary technical unit where one or more activities listed in Annex I are carried out, and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution. Many sources of water pollution are therefore not covered by the IPPC Directive.

Best available techniques

The discharge of substances from large industrial installations requires a (water) permit. This provides that in the interests of achieving a high level of protection of the environment, conditions necessary to prevent the adverse effects the establishment may have on the environment or, if this is not possible, to limit or reverse them as far as is possible – preferably at the source – must be attached to the permit. Article 14 of the new IPPC stipulates that permit requirements must be based on 'Best Available Techniques' (BAT), without prescribing any specific technique or specific technology. BAT conclusions shall be the reference for setting the permit conditions. BAT conclusions' means a document containing the parts of a BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures.When a permit is granted, the technical characteristics of the installation, its geographical location and the local environmental conditions must be taken into account. Article 3 of the new IPPC Directive contains a number of important definitions.

For example, 'Best Available Techniques' (BAT) means the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole. 'Techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned. 'Available' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator. 'Best' techniques are those most effective in achieving a high general level of protection of the environment as a whole. When deciding what the best available techniques are, special consideration must be given to the points listed in Annex III of the Directive.

BREF documents

BREFs – in full Best Available Techniques Reference Documents – are established on the basis of Article 13 of the new IPPC Directive, and serve the purposes of information exchange between Member States and the branches of industry concerned. They are prepared by the European IPPC Bureau in Seville, which organizes the exchange of information.[144] The Bureau forms a technical working group (TWG) made up of representatives of Member States, industry and non-governmental organizations (NGOs). The European Commission ultimately adopts the BREFs. There are vertical as well as horizontal BREFs. Vertical BREFs relate to a specific industry, e.g. BREF for Refineries, BREF for Organic Bulk Chemicals, or the BREF for Large Combustion Plants. Horizontal BREFs relate to areas for special attention which are found in several industries, e.g. the BREF for Monitoring or the BREF for Cooling Systems. The 2010 IPPC Directive introduces BREF Conclusions. The conclusions are adopted by the same procedure as applies for BREF Documents.

BAT conclusions must be the reference for setting the permit conditions. The competent authority may set stricter permit conditions than those achievable by the use of the best available techniques as described in the BAT conclusions. It is obliged to do so if this is necessary to achieve environmental quality standards. In specific cases, it may also set less strict emission limit values. Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to: the geographical location or the local environmental conditions of the installation concerned; or the technical characteristics of the installation concerned. These less strict emission limit values may not exceed the emission limit values set out in the Annexes to the Directive, where applicable. The competent authority has in any case to ensure that no significant pollution is caused and that a high level of protection of the environment as a whole is achieved.

7.2 Nitrates Directive

Water pollution from agricultural sources constitutes an important problem as regards water quality because it constitutes a diffuse source of pollution, which is harder to control than a point source pollution. Intensive use of manure and fertilizer result in eutrophication of freshwater and of marine waters. Eutrophication is caused not only by agricultural pollution, but also by inadequate treatment of urban wastewater (which has led to the establishment of the Urban Waste Water Directive). Eutrophication is harmful to public health and the ecological status of water, and can have adverse consequences for recreational use of water. This problem is addressed by the Nitrates Directive (91/676/EEC). Other legislative instruments also contain measures to reduce nitrate pollution in water. These are in particular the Water Framework Directive, the Groundwater Directive, the Marine Strategy Framework Directive and the OSPAR Convention.

The Nitrates Directive does not address the issue of medicines contained in manure or urine. Its main focus is on the regulation of pollution by nitrates. Other substances that may occur in manure should theoretically be regulated with instruments based on other water directives. However, it might follow from the case law of the European Court of Justice that the Nitrates Directive has nevertheless to be used when it comes to pollution originating from manure other than nitrates. (see also the section on the general legal framework). This can be deduced

[144] http://eippcb.jrc.es

from the Spanish slurry case.[145] The Court of Justice had to decide in an infringement case whether the Spanish authorities should have regulated the pig farms and the spreading of manure on land under the Groundwater Directive because they cause groundwater pollution. The Court stated that it could not interpret the existing general rules for the protection of groundwater so that they replace the specific rules for slurry established by the Nitrates Directive.[146] It is uncertain whether this case law continues to apply in view of the coming into being of the Water Framework Directive. The Water Framework Directive established a combined approach for tackling water pollution, including diffuse pollution, which consists of combining water quality standards with emission standards and control measures.

Hence it might be the case that the Nitrates Directive also constitutes the overriding legal framework to address pollution of soil and/or groundwater with medicine residues resulting from spreading of manure containing medicines, even though the Nitrates Directive only aims to address nitrate pollution in order to prevent eutrophication. Currently, the guidance regarding environmental risk assessment of veterinary medicines prescribe the use of the 170 kg/ha/year rule of the Nitrates Directive to calculate the risk to the environment and to establish only risk mitigation measures which comply with Good Agricultural Practices. A required deviation from the good agricultural practices to mitigate environmental risks constitutes a factor for expected non-compliance with the risk mitigation measure (see above). An option that could be considered in so far as the measures that can be taken under the Nitrates Directive do not adequately prevent or limit water pollution from medicines for veterinary use used by husbandry animals, is to amend the Nitrates Directive to address this issue.

Water pollution by nitrates from agricultural sources

The Nitrates Directive was adopted on 12 December 1991, and had to be implemented within two years.[147] The objective of the Nitrates Directive is to reduce *nitrate pollution* and prevent further pollution. To this end, Member States are required to take measures concerning the storage and application on land of all nitrogen compounds and concerning certain land management practices, also referred to as good agricultural practices. The Nitrates Directive applies not only to livestock manure, but defines as a fertilizer any substance containing a nitrogen compound or nitrogen compounds utilized on land to enhance growth of vegetation; it may include livestock manure, the residues from fish farms and sewage sludge. For the purposes of the Directive, pollution is the discharge, directly or indirectly, of nitrogen compounds from agricultural sources into the aquatic environment, the results of which are such as to cause hazards to human health, harm to living resources and to aquatic ecosystems, damage to amenities or interference with other legitimate uses of water. This means that originally the scope of the nitrates Directive is limited to pollution by nitrates and does not contain the regulation of other harmful substances that may be in manure, like substances that originate from medicines.

[145] ECJ of 8 September 2005, C-121/03.

[146] We have some reservations as to whether it is correct for the rules concerning water to be totally sidelined if contamination by slurry is involved – the Court very generally states that in the event of contamination by fertilisers, the protection of water shall be based on the Nitrates Directive – all the more so since the Nitrates Directive includes no reference in this regard and slurry also contains contaminating substances other than nitrates. See also: H.F.M.W. van Rijswick, The relationship between the Water Framework Directive and other environmental directives, with particular attention to the position of agriculture, *Journal of Water Law*, 2007, p. 193-203.

[147] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources, OJ 1991, L375/1.

Scope of application

The Nitrates Directive applies to those waters in which standards from other water directives are or could be exceeded, if the action required by the Nitrates Directive is not taken. These are:

- surface freshwaters, in particular those used for or intended for the abstraction of drinking water, where the waters contain or could contain more than the concentration of nitrates laid down in Directive 75/440[148] (the threshold value is 50 mg);
- groundwaters, where they contain or could contain more than 50 mg/l nitrates;
- natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters that are found to be eutrophic or in the near future may become eutrophic.

Member States must designate these areas as vulnerable zones.[149] It is not sufficient to designate only waters intended for the abstraction of drinking water.[150] The Nitrates Directive refers directly to water quality requirements (threshold values) in other water directives, but does not adopt these threshold values as a quality requirement itself.

Action programmes

Depending on their choice for designation of areas or their entire territory, Member States must establish action programmes in respect of designated vulnerable zones or their entire territory. Action programmes consist both of mandatory and additional measures with which it should be possible to achieve the objectives of the Directive. An action programme is a plan or programme within the meaning of the Strategic EIA Directive.[151] Mandatory measures are those measures which Member States have prescribed in their codes of good agricultural practice (established under Art. 4) and the measures mentioned in Annex III of the Nitrates Directive.

These measures include: rules for the amount of manure that can be applied to the land, expressed as an amount of nitrogen that can be applied per hectare per year (170 kg N per year per hectare); rules on the manner in which fertilizer may be applied to the land; provisions on balanced application of fertilizers to ensure no more nitrogen is applied to the land than needed by the crops; provisions on the storage capacity for livestock manure for each farm; and, finally, additional measures to be taken in particularly vulnerable zones. Under the designated areas option, the codes of good agricultural practice are implemented by farmers on a voluntary basis in non-designated areas (Art. 4(1)(a)). In order to meet the obligations of the Nitrates Directive, it is not sufficient to take the measures required, because the measures must also result in achieving the objectives of the Directive. Member States must take such additional measures or reinforced actions as they consider necessary if it becomes apparent at the outset or during an action programme that the measures referred to in Article 5(4) will not be sufficient for achieving the objectives specified in Article 1 (Art. 5(5)).

[148] Directive 75/440 has been repealed and replaced by the Water Framework Directive and Directive 2008/10/EC.

[149] Keessen, A.M., Runhaar, H.A.C., Schoumans, O.F., Van Rijswick, H.F.M.W., Driessen, P.P.J., Oenema, O., and Zwart, K.B., The need for flexibility and differentiation in the protection of vulnerable areas in EU environmental law: the implementation of the Nitrates Directive in the Netherlands, *Journal for European Environmental and Planning Law*, 8.2 (2011), p. 162-185.

[150] ECJ, Case C-69/99, 2000 ECR, p. 1-10979 (Commission v. United Kingdom).

[151] ECJ Joined Cases C-105/09 & C-110/09, preliminary references from the Belgian Conseil d'Etat on the scope of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.

Departures from the rules of the Nitrates Directive

Under paragraph 2(b) of Annex III, after the first action programme, Member States may, under certain conditions, fix different amounts from the nitrogen load referred to in the Directive. However, these amounts must be fixed so as not to prejudice the achievement of the objectives specified in Article 1. If a Member State wants to allow a different amount, it must justify this on the grounds of objective criteria, of which the Directive gives a number of examples (not an exhaustive list). The examples given concern situations which will produce a smaller nitrate load, such as crops with long growing seasons or high nitrogen uptake, or soils with exceptionally high denitrification capacity. Member States must notify the Commission of such departures from the rules, in which case a derogation may be granted to t them.

7.3 Urban wastewater treatment Directive

The *construction* of the sewerage systems around the beginning of the 20th century led to an enormous improvement in public health. The quality of the environment and specifically that of surface water also improved as a result of the fact that discharges into the public sewer are *treated*. The objective of the EU Directive on urban wastewater treatment is to protect surface water against the adverse effects of urban wastewater discharges (in particular eutrophication).[152] The Directive imposes requirements for the discharge of urban wastewater into public sewers and surface water. Under Article 5, Member States must ensure that, for agglomerations of more than 10000 population equivalents,[153] collecting systems are provided for urban wastewater discharged into waters that have been identified as sensitive areas. The issue of excretion of medicines and discarding medicines through toilet flushing is not addressed by the Directive.

The Directive lays down requirements down for the treatment of wastewater. Collecting systems for urban wastewater are to be provided, which must satisfy the requirements of Annex I.A. regarding the design, construction and maintenance of sewerage systems. These systems must use the best practicable technology, taking into account financial and economic aspects. Consequently, the treatment of wastewater – and thus the extent to which medicines are removed from wastewater - differs within the EU. However, it should be noted that as long as there are no obligations to treat waste water in a way that remnants of medicines should be removed from the waste water, most Member States will not do this voluntarily, since this requires additional and expensive treatment.

Pollution of surface water as a result of sewer overflows also falls within the scope of this Directive. In this regard also the Directive on the assessment and management of flood risks ('Floods Directive') is relevant, as it gives a broad interpretation of the definition of floods. Flooding as a result of overflow from sewerage systems also falls within the scope of the definition of floods. Measures preventing floods from the public sewer are part of the flood risk management plan. As the overflow from sewerage systems is non treated waste water, the environmental damage is larger. In case remnants of medicines may cause significant risks, it could be recommended to include this risk in the flood risk management plans. Only when wastewater escapes from a sewerage network maintained by a statutory sewerage undertaker

[152] Council Directive 91/271 of 21 May 1991 concerning urban waste-water treatment, OJ 1991, L135/40.
[153] Defined in Article 2 of the Directive: 1 p.e. (population equivalent) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day.

pursuant to the Directive on urban wastewater, it constitutes waste within the meaning of Directive 75/442 on waste, even where such water is accidentally spilled.[154]

8. Soil

Soil has not, to date, been subject to a specific protection policy at Community level and it appears that this situation will not change in the foreseeable future. However, soil pollution that will lead to pollution of groundwater is regulated under the regime of the Water Framework Directive (see paragraph 6 on water legislation). Nevertheless, the European initiatives in this ambit deserve attention because they could potentially be relevant for the regulation of emissions to the soil of medicines, in particular for veterinary use. In 2006 the Commission published the Thematic Strategy for Soil Protection. [155] In the opinion of the Commission a comprehensive EU strategy for soil protection is required. The overall objective is protection and sustainable use of soil. Guiding principles are the Prevention of further soil degradation and the preservation of its functions and the restoration of degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.[156]

The Thematic Strategy considered that action is needed on a local, national and community level. Actions on a EU level are required for five reasons: soil degradation affects other environmental areas for which Community legislation exists, the distortion of the functioning of the internal market, transboundary impact, food safety, and the international dimension. The Strategy therefore included the drafting of framework legislation with protection and sustainable use of soil as its principal aim. A Framework Directive was considered the best means of ensuring a comprehensive approach to soil protection whilst fully respecting subsidiarity. Member States would be required to take specific measures to address soil threats, but the Directive would leave them ample freedom on how to implement this requirement. This means that risk acceptability, the level of ambition regarding the targets to be achieved and the choice of measures to reach those targets are left to Member States.[157]

A proposal for a Framework Directive was published simultaneously with the Thematic Strategy.[158] The proposal only provided for actions on a Member State level. First of all Member States have to identify risk areas where defined soil degradation processes occur (Article 6(1)). Effects on soil caused by human or veterinary medicines are not included in the list of degradation processes. Then, in order to combat these processes, programmes of measures should be drawn up. Based on Article 9 of the proposal Member States shall take appropriate and proportionate measures to limit the intentional or unintentional introduction of dangerous substances on or in the soil. Member States have to identify the sites in their national territory where there is a confirmed presence, caused by man, of dangerous substances of such a level that Member States consider they pose a significant risk to human health or the environment. These substances could include medicines. The European

[154] ECJ Case C-252/05, (The Queen on the application of: Thames Water Utilities Ltd v. South East London Division, Bromley Magistrates' Court).
[155] Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the regions, Thematic Strategy for Soil Protection, COM(2006)231 final
[156] See page 5 of the Communication.
[157] See page 7 of the Communication.
[158] Proposal for a Directive of the European Parliament and of the Council establishing a framework for the protection of soil and amending Directive 2004/35/EC, COM(2006) 232 final

Commission may adapt the technical Annex I (art.18(1)) concerning the identification of areas at risk.

The proposed Directive obliged the Member States to ensure that the contaminated sites listed in their inventories are remediated. Remediation shall consist of actions on the soil aimed at the removal, control, containment or reduction of contaminants so that the contaminated site, taking account of its current use and approved future use, no longer poses any significant risk to human health or the environment. Member States are to set up appropriate mechanisms to fund the remediation of the contaminated sites for which, subject to the polluter pays principle, the person responsible for the pollution cannot be identified or cannot be held liable under Community or national legislation or may not be made to bear the costs of remediation. Article 14 of the proposal requires all Member States to draw up a National Remediation Strategy, including at least remediation targets, a prioritization, starting with those sites which pose a significant risk to human health, a timetable for implementation, and the funds allocated by the authorities responsible for budgetary decisions in the Member States in accordance with their national procedures.

Meanwhile it has been decided not to proceed with the proposal. However, the Commission may propose soil legislation again.

9. Analysis

Water pollution by medicines is a complex problem that requires action both at EU level and at national level by various actors. First, it will be analyzed what the medicine regulators, water authorities and other competent authorities can take do to prevent and limit water pollution by medicines under the current European legal framework. Second, it will be analyzed whether the current European legal framework can or should be amended to prevent and reduce water pollution by medicines.

1. What medicine regulators can do

If a medicine poses a risk for the environment, which is either clear from monitoring data or from the environmental risk assessment, it depends on two variables which action can be taken by the medicines regulators to minimize or eliminate the risk for the environment. These variables are

(1) by whom the medicine is used: human use or veterinary use and
(2) the type of procedure that is followed: centralized or decentralized.

<u>Medicines for human use</u>

Since 2005 an environmental risk assessment is part of the procedure and can reveal environmental risks. Under Regulation 726/2004 and Directive 2001/83 medicines are respectively authorized under the centralized and the decentralized procedure. Both procedures prescribe an environmental risk assessment. As a consequence of this assessment, mitigation measures may be imposed on the authorization holder. These measures are giving information to users in the labeling, packaging or accompanying leaflet on how to minimize risks to the environment related to the use of a medicine.

The centralized procedure involves both the European Medicines Agency (EMA) and the Member States, who can voice their opinion – also regarding environmental aspects - during the procedure. Once a centralized authorization is issued, it is applicable in the entire EU. The

Member States do not have the power to refuse the marketing of the product or to change the decision. They can however challenge the decision – because of environmental aspects - before the European Court of First Instance and in appeal before the Court of Justice. Since environmental risks are not weighed in the risk/benefit balance of medicines, it seems unlikely that environmental risks can lead to refusal of the authorization of the medicine. They can however lead to the imposition of mitigation measures concerning the use phase.

When a Member State has issued an authorization, another Member State is entitled to recognize this decision and simply grant authorization. It may refuse recognition on limited grounds. Environmental grounds are not included in the list of grounds to justify non-recognition. This seems the logical consequence of the exclusion of environmental grounds in the risk benefit balance that takes place during the authorization of medicines. In case of non-recognition, the Member States first have to try to informally solve the dispute. If that does not help, the arbitration procedure is followed, which is the same regulatory procedure as the centralized authorizations procedure. Perhaps the arbitration procedure may also be followed when a Member State refuses recognition on environmental grounds.

Also in the arbitration procedure the Member States can voice their opinion but are ultimately bound by the Community decision that settles the non-recognition dispute. The Member States involved (i.e. the Member States where an application for authorization has been filed and the Member States willing to voluntarily recognize the authorization) have to implement this Community decision in their own authorization decision. They can however challenge this decision before the Court of First Instance and in appeal before the Court of Justice. If the arbitration procedure is not followed and a Member State refuses recognition on environmental grounds, the Commission can bring an infringement procedure against this Member State before the Court of Justice. As stated above, such a procedure is unlikely to lead to withdrawal of the authorization due to environmental concerns but only to imposition of (informative) mitigation measures.

Thus, the medicines regulation does not foresee that Member States refuse recognition or application of authorizations on environmental protection grounds. The only purpose of the environmental risk assessment seems to be to obtain information on the expected effects on the environment and prescribe mitigation measures. These mitigation measures consist of provisions on environmentally friendly use of medicines in the authorization. These provisions are directed at the authorization holder and are not binding for third parties like the prescribers or users of medicines, unless rules for other legal regimes impose enforceable obligations on those who prescribe or use medicines. In the Netherlands, such rules have not been established for medicines for human use.

Medicines for veterinary use

Regulation 726/2004 and Directive 2001/82 aim to harmonize the legislation on the authorization of veterinary medicines within the EU. The procedures include an environmental risk assessment. Environmental risks weigh as risks in the risk/benefit balance that determines the authorization of the medicine. In case a centralized procedure is followed, the Member States can voice their opinion during the authorization procedure but once the decision is issued they do not have the power to refuse the marketing of the product or to change the decision. They can only challenge it before the Court of Justice. When another Member State has issued an authorization, a Member State can refuse recognition on limited grounds (risk/benefit balance). Since environmental risks are included in the risk/benefit balance, the Member States can refuse recognition on environmental grounds.

In case of non-recognition, the Member States first have to try to informally solve the dispute. If that does not help, the arbitration procedure is followed, which is the same regulatory procedure as the centralized authorizations procedure. In the arbitration procedure the Member States can voice their opinion but are ultimately bound by the Community decision that settles the non-recognition dispute. The Member States involved (i.e. the Member States where an application for authorization has been filed and the Member States willing to voluntarily recognize the authorization) have to implement this Community decision in their own authorization decision. They can however also challenge the decision before the Court of Justice.

Since environmental grounds are included in the risk/benefit balance that determines authorization and the proposed mitigation measures are based on it, environmental grounds can lead to withdrawal of the authorization of a veterinary medicine or amendment of the mitigation measures. These mitigation measures consist of provisions on environmentally friendly use of medicines in the authorization. They are directed at the authorization holder and are not binding for third parties, unless rules for other legal regimes impose enforceable obligations on those who prescribe or use medicines. In the Netherlands, such rules have been established for medicines for veterinary use.

Transparancy and public participation

More attention to transparency and public participation may facilitate solving regulatory challenges that arise as a consequence of clashes between Directives and Regulations. The regulatory challenge of limiting water pollution caused by the use of medicines which benefit from free movement on the internal market cannot be solved in a simple way. The health benefits of medicines may continue to override environmental concerns, just like their free movement may continue to override any perceived needs for setting stricter national standards due to environmental or more indirect health requirements following from polluted water. Thus, the question is how the environmental impact of medicines can be minimized within the present, European regulatory framework. It is therefore imperative to consider introducing governance techniques. This is an attractive option although it does not guarantee better water protection, because governance techniques can help solving this regulatory challenge without resorting to major changes of the applicable European legislation.[159] We will give recommendations on the change of EU legislation below.

In its present form, the environmental risk assessment of medicines encourages preventive action by users on the basis of information on the label or in the information leaflet. National legislation can ensure that compliance with this information becomes a binding obligation for all users or for certain groups of users and for doctors and veterinarians. Therefore, it does not do justice to the potential value of the environmental risk assessment to simply propose amendments to the current legal framework. Much could be achieved if the authorities would involve the stakeholders, e.g. drinking water companies, hospitals and veterinarians. Their involvement could be achieved by employing governance instruments: making information publicly available and creating opportunities for public participation.[160] These governance instruments can also be used to involve various administrative authorities in decision-making when their involvement is beyond their competences but of interest to them. It will be seen to

[159] It could become an example of the use of not so new governance instruments in European law. See: C. Scott, 'Governing Without Law or Governing Without Government? New-ish Governance and the Legitimacy of the EU', (2009) *European Law Journal*, 160-173.

[160] Governance is here used in the sense of how the government interacts with society. See: A.M. Kjaer, *Governance*, (2004) Polity Press.

what extent governance instruments and regulation can contribute to solving the conflict or at least to reducing the tension between European water and medicines legislation.

Access to information

So far, the environmental information is not necessarily made public by authorization holders or medicine regulators. However, the Aarhus Directive may under certain cirmustances force the authorities to give access to environmental information after having balanced the commercial interests of the authorisation holder against the interest of open access to the environmental information concerned. Making publicly known what the environmental risks are of certain medicines may be beneficial because it will raise awareness among a range of stakeholders.[161]

Exchange of information

Current legislation does not regulate the exchange of information between medicine regulators and water authorities. For instance the water authorities could use this information to monitor the presence of medicines, to oblige the operators of waste water treatment facilities to use adequate waste water treatment or to establish an environmental quality standard.[162] That would have the positive effect of reducing the efforts of the drinking water companies to deliver clean and safe drinking waters or to make clear what substances need special attention. The potential or actual use of this information by the authorities might encourage pharmaceutical companies to go green and develop medicines which are better absorbed by the bodies of their users and better degradable in the environment.[163,164]

Public participation

Participation of stakeholders in the European decision-making process on the implementation of risk/benefit analyses and the necessary risk mitigation measures may render the risk mitigation measures more effective. These stakeholders include the competent authorities in the field of medicines, water authorities, farmers, doctors, veterinarians, patient associations, drinking water companies, environmental associations and consumers. Stakeholders could participate in the discussion how the environmental risks (and the other risks) should be balanced against the benefits of the medicine, which risk mitigation measures are feasible and could easily be implemented. This might improve compliance with the conditions of use by doctors, veterinarians and users. Achieving voluntary compliance of the conditions of use is essential under the current legal framework, because the current risk mitigation measures cannot be enforced unless national legislation has created binding obligations on use. The marketing authorization – including the information on the label or the accompanying leaflet - of medicines only binds the holder of the authorization. In the case of product authorizations, the holder is either the producer or the importer. The users of the product are not the holders of the authorization and can therefore not be bound by the authorization, unless national legislation provides otherwise.[165]

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[161] This is called community control. See: C. Scott, 'The Governance of the European Union: The Potential for Multi-Level Control', (2002) *European Law Journal*, p. 59-79.

[162] M.H.M.M. Montforts, H.F.M.W. van Rijswick, A.A. Freriks, A.M. Keessen, S. Wuijts, *The relationship between product registration and water quality legislation, medicines, veterinary medicines and feed additives*, (in Dutch, English summary) (2006) RIVM Report 601500003/2006.

[163] See: http://www.teleosis.org/gpp-actions.php.

[164] Thus creating a hybrid of regulation and governance. See: C. Scott, 'The Governance of the European Union: The Potential for Multi-Level Control', (2002) *European Law Journal*, p. 59-79.

[165] M.H.M.M. Montforts, H.F.M.W. van Rijswick and H.A. Udo de Haes, Legal constraints in EU product labeling to mitigate the environmental risks of veterinary medicines at use, (2004) *Regulatory Toxicology and Pharmacology*, 327-335.

Access to court

The European medicines legislation has not introduced provisions on access to an administrative court for other interested parties than the authorization holder if they want to challenge the authorization and the underlying risk/benefit assessment,Therefore an authorization granted through the centralized procedure cannot be directly challenged by a third party before the Court of Justice. For authorizations granted in a decentralized or mutual recognition procedure, the national regime of the Member States determines whether third parties can challenge authorizations before a national court.

Amendment of the European medicines legislation

The risk of medicines causing water pollution was recognized when in 2003 an environmental risk assessment was introduced in the European medicines legislation to understand and mitigate the environmental risks of medicines. The environmental risk assessment has its limitations however. Three issues prompt for action.

1. Environmental risk assessments are only mandatory for medicines that entered the market after 30 October 2005, when the environmental risk assessment was introduced. Therefore, environmental risk assessments do not have to be made for many widely used medicines already on the market before that date. Extension to all medicines currently in use would increase the knowledge about the environmental risks they pose, but could be too far reaching. We suggest the introduction of an environmental risk assessment when current authorizations will be extended/ prolonged.

2. The environmental information resulting from the environmental risk assessment hardly plays a role in the authorization of human medicines. While the environmental risks are weighed in the risk-benefit balance of veterinary medicines, they are excluded from playing a role in the risk-benefit balance of medicines for human use. The assessment also serves to devise risk mitigation measures. The lack of coordination between the water and medicines regulation diminishes the usefulness of the environmental risk assessment of medicines and may place the achievement of good chemical or ecological water status and compliance with water quality standards for medicinal substances at risk.[166] This could be improved by:

(1) including an obligation in the medicines legislation to take other Community legislation into account in the authorization procedure to facilitate control measures regarding the use of medicines;
(2) including an obligation in the medicines legislation that monitoring data regarding water and soil pollution have to be used in the evaluation of the authorization after it has been granted and can lead to revision of the risk mitigation measures or withdrawal of the authorization;
(3) introducing provisions in the medicines legislation which ensure that national legislation provides that the provisions on environmentally friendly use become binding for third parties instead of only the authorization holder. These third parties should include prescribers, owners of animals and patients.

3. The environmental information resulting from the environmental risk assessment may remain with the medicines regulator as the medicines legislation does not oblige to make this information to be made public. National regulators disclose this information on request after having weighed the interests as required by the Aarhus Regulation and Directive (see above). In the current legislation there is no provision for the exchange of information between

[166] J.H. Vos en M.J.M. Janssen, *Options for emission control in European legislation in response to the requirements of the Water Framework Directive*, RIVM report 601300003, 2005.

medicine regulators and water authorities. In our opinion including such a provision would be advisable.

Various grounds justify amendments to the current legal framework for the regulation of medicines to better reflect environmental risks associated with medicine approval and use. European action seems warranted because water pollution caused by medicines is a common problem and not a problem specific to one Member State. It can be justified on the basis of the precautionary principle, the principle that pollution should be rectified at the source and the integration principle. Furthermore, water pollution has often transboundary effects because most river basins cross Member States borders. The WFD envisages such amendments as it proposes that the Member States request the assistance of the Commission when they are confronted with problems they cannot solve themselves.[167] The Commission may also act of its own initiative, if monitoring data reveal serious or widespread water pollution with a substance originating from a medicine for human or veterinary use. It may then prioritize the inclusion of an environmental quality standard for this substance on the Annex of the Priority Substances Directive or the Groundwater Directive.[168] The Commission may also devise a strategy to combat pollution from medicines in the absence of alarming monitoring data, as it is entitled to devise a strategy for a certain group of substances.[169]

National legislation regarding medicine

Under the current legal framework, only national legislation can create obligations on use that bind others than the authorization holders. In the absence of European legislation on use, the Member States are competent to regulate the use of medicines. Their discretionary room is limited however because regulation on use should be compatible with the Treaty. This includes compatibility with the free movement clauses. Therefore, regulation on use should not cause an unjustifiable restriction of the free movement of goods. It does not suffice that environmental protection constitutes a legitimate aim, as the regulation should also be proportionate and should not result in a complete prohibition of the product.[170] Recent case law of the ECJ suggests that this is more easily said than done.[171]

Inspiration on how to regulate use in compliance with EU obligations can be drawn from various cases in which the Court of Justice had to find a solution for such problems. It should be noted that these cases do not see on the use or regulation of emission of medicines. In the *Nederhoff* case, the Court settled a conflict between Directive 76/464 (the old Hazardous Substances Directive) and Directive 76/769 (the Hazardous Substances Directive).[172] The conflict arose when the Netherlands limited the placing of wooden posts treated with creosote in surface water because intensive use would result in water pollution above the

[167] Art. 12 WFD.
[168] Art. 16 WFD.
[169] Art. 16 (9) WFD.
[170] E.g. M. Dougan, 'Minimum Harmonization and the Internal Market', (2000) *CMLRev*, pp. 853-885 and S. R. Weatherill, 'Pre-emption, Harmonisation and the Distribution of Competence to Regulate the Internal Market' in C. Barnard and J. Scott (eds), *The Law of the Single European Market, Unpacking the Premises,* (2002) Hart Publishing, 41-76.
[171] T. Horsley, Case C-110/05 *Commission v Italy*, Judgment of the Court (Grand Chamber) of 10 February 2009, Case C-142/05 *Aklagaren v Percy Mickelson and Joakim Roos*, Judgment of the Court (Second Chamber) of 4 June 2009, Case C-265/06 *Commission v Portugal*, Judgment of the Court (Third Chamber) of 10 April 2008, [2008] ECR I-2245, (2009) *CMLRe*v, 2001-2019. See also: C-473/98 *Kemikalieninspektionen v Toolex Alpha* [2000] ECR I-5681.
[172] C-232/97 *Nederhoff en Zn* [1999] ECR I-6385. See: H.F.M.W. van Rijswick, EC Water Law in Transition: the Challenge of Integration, in: H. Somsen et al (eds), *Yearbook of European Environmental Law*, (2003) Oxford University Press, 249-304 and H.F.M.W. Van Rijswick, *De kwaliteit van water*, (2001) Kluwer.

environmental quality standards of the Hazardous Substances Directive. Consequently, despite the status of creosote as an authorized biocide for use on wood, authorizations for use were only granted in the Netherlands if no alternatives were available. The ECJ declared that the Water Directive takes precedence over the Biocides Directive because the former protects water quality in particular, while the latter concerns the free movement of goods and the marketing of substances and products. Moreover, Article 1 of the Biocides Directive states that other Community law should be taken into account. Therefore, the Biocides Directive allowed for the imposition of stricter conditions for use in the Dutch authorization.

Such an obligation to take other Community legislation into account is lacking in the European medicines legislation, and medicines are not authorized country by country as was the case with biocides at the time of the *Nederhoff* case. However, an obligation to take other Community legislation into account could be introduced. In the absence of such specific provisions in the medicines legislation, it may not be possible to adopt the *Nederhoff* line and oblige the authorities to take action when the good status obligation or specific environmental quality standards are not met due to water pollution with medicines.

There is another reason why a Member State willing to tackle water pollution caused by medicines cannot simply impose stricter environmental rules regarding the authorization of medicines through the national body of rules that implement the European regulation of medicines for human or veterinary use. Whether a stricter national measure is permissible depends on the content and the purpose of the European medicines legislation and of the various Treaty provisions that might be invoked as a justification for measures to protect the environment, in particular Article 36 TFEU (ex Article 30 EC) and Article 114 TFEU (ex Article 95 EC). In any event, Article 36 TFEU cannot be used as a justification, because the medicines legislation (based on Article 114 TFEU) completely harmonizes the authorization procedure for medicines and does not leave room for setting stricter environmental standards in the authorization procedure.[173] It does not make sense for a Member State to take unilateral action by withdrawing the authorization of a medicine, because it cannot withdraw Commission authorizations and the mutual recognition regime established by the medicines legislation ensures that recognition of authorizations for medicines for human use issued by other Member States cannot be refused on environmental grounds. Only recognition of authorizations for veterinary medicines can be refused on environmental grounds.

It appears unlikely that the safeguard clause of Article 114 TFEU (ex Article 95 EC) can be successfully relied on to prohibit the sales, prescription or use of a medicine that poses a risk to the environment or alter the authorization, for instance by imposing the obligation to add additional information on environmentally friendly use on the label or package leaflet. The safeguard clause of Article 114 TFEU allows the Member States to impose stricter environmental measures provided that the Commission has stated that its conditions are met.[174] Three conditions determine whether the Commission will approve a new measure. The first condition is that the new national measure has to be based on new scientific evidence. 'New' refers to scientific evidence obtained after the entry into effect of the European legislation. Since the environmental requirements were introduced in 2003, that could be difficult, but this condition could be met by submitting recent monitoring results. The second

[173] Cf. S. R. Weatherill, 'Pre-emption, Harmonisation and the Distribution of Competence to Regulate the Internal Market' in: C. Barnard and J. Scott (eds), *The Law of the Single European Market, Unpacking the Premises*, (2002) Hart Publishing, 41-76.
[174] Case C-512/99 *Germany* v *Commission* [2003] ECR I-845 and Joined Cases C-439/05 P and C-454/05 P *Land Oberösterreich and Austria* v *Commission* [2007] ECR I-7141.

condition concerns the reason for the introduction of the measure. This condition is met, because the national measure concerns the protection of the environment. The third condition is that the national measure is necessary to tackle a problem specific for that Member State. This condition seems not to be met, since medicines may cause water pollution in all Member States. However, in view of the *Dutch diesel vehicles* case, some Member States might be able to successfully argue that this condition is met if conformity with the good status objectives or specific environmental quality standards cannot be achieved in their waters due to medicine pollution. In that case, the water legislation will prevail over the medicines legislation and could result in the imposition of stricter environmental measures, provided that they are proportionate to aim of preventing or limiting water pollution caused by medicines.[175]

2. What the water authorities can do

When medicines occur in surface water or ground water, the authorities competent for water quality protection have to determine whether there is a problem, i.e. whether substances occur in alarming concentrations and/or in exceedance of water quality standards. If that is the case, the question is how this problem should be tackled. The drinking water companies are stakeholders in the sense that (their and other) adequate treatment should prevent the occurrence of medicines in drinking water. They need the help of the competent authorities to prevent the occurrence of medicines in the sources of drinking water either through preventive measures or through purification of waste water.

The water quality legislation regulates both at the European and the national level the contamination of surface water and groundwater with dangerous substances. The qualification of substances is diverse and differs from directive to directive. While the WFD states that its list of substances is indicative, other directives do not contain such an explicit statement. Arguably, their lists of substances are indicative as well and may include medicinal substances or metabolites from medicines. Medicines for human and veterinary use describe the purpose for which certain chemical substances are used. Depending on their characteristics, medicines can be brought under the substances mentioned in List I or List II of the Hazardous Substances Directive (applicable until 2013) and under the regime for the good chemical or ecological status of the WFD, as further elaborated in the Priority Substances and Groundwater Directive and the substances listed in the Annex to the Drinking Water Directive.

Regulation on the basis of the European water legislation only applies to medicines and their metabolites which qualify as substances listed on the Annexes to one or more water directives. If this is the case and the product has not been explicitly excluded from regulation by the water directives, it should be assumed that the discharges or contamination from diffuse sources should be regulated by the European water directives. This concerns in particular the WFD and her daughter directives: the Priority Substances Directive and the Groundwater Directive (and until 2013, the Hazardous Substances Directive). Generally speaking, these directives regulate water pollution by means of permits with emission standards and other control measures combined with environmental quality standards, in order to achieve water quality standards and objectives. A Member State which does not achieve the water quality standards has to invoke an exemption, as established by the WFD and her daughter directives, the Priority Substances Directive and the Groundwater Directive.

[175] See: Pal Wenneras, 'Towards an Ever Greener Union? Competence in the Field of Environment and Beyond', (2008) *CMLRev*, 1645-1685.

Two regimes apply to substances mentioned at the Annexes to a water directive. For certain substances mentioned at an Annex to a water directive, water quality standards and emission limit standards have been established at the European level in Annexes to water directives. These standards have to be transposed into national law. It is obvious that this transposition does not leave the Member States room for discretion. For other substances, a different regime applies. They are only mentioned in the annexes, while the establishment of water quality standards and emission limit standards is left to the Member States. Many medicines contain substances which potentially fall within this regime. These substances – and hence discharges or diffuse pollution – should be regulated by the Member States if they occur in a (sub) river basin at levels which constitute a risk to human health (drinking water) or the achievement of the WFD goals good chemical status and good ecological status.

Three problematic situations

Regarding the ability of water authorities to take action against water pollution by medicines, three problems can be discerned.

The first problem is that medicinal substances are present but go unnoticed as water quality standards for these substances have not been set and hence they are not monitored. This situation can occur because in the absence of systematic monitoring, the seriousness of the pollution with medicines is unknown. While biocides and plant protection products are included as a group deserving attention, medicines are not. They can fall within one of the other 11 categories listed in the Annex to the WFD. A further elaboration of this list has resulted in concrete water quality standards in two daughter directives of the WFD, the Groundwater Directive and the Priority Substances Directive. Consequently, for many substances environmental quality standards are not set, emission limit standards are not set and control measures are not taken. In the absence of routine and systematic monitoring of concentrations of medicines or metabolites, the competent authorities are not aware of the presence of such substances and hence the need to establish water quality standards and emission standards and to take control measures.

The analysis of the characteristics of the river basin, as prescribed by the WFD, should diminish this problem if carried out in accordance with Guidance document number 3.[176] In order to assess the presence of medicinal substances and consider the need for the establishment of water quality standards, first a risk assessment should take place, taking into account in particular usage patterns of medicines for human use and medicines for veterinary use, toxicological data and the method of waste water treatment. As long as no chemical quality standards have been set, these substances do not count for achievement of good chemical status. Yet even if on a European level no standards have been set for substances contained in human and veterinary medicines, Member States have to assess whether these substances might endanger water quality and thus hamper achievement of the WFD good water status goals, in particular good ecological status, and they are under the obligation to establish standards themselves for substances which may have an adverse effect on water quality.

[176] Guidance document 3 Analysis of Pressures and Impacts, available at http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/gds03simpresspolicyssum/_EN_1.0_&a=d; See also: S. Wuijts, M.C. Zijp, H.F.R. Reijnders, Drinking water in river basin management plans of EU Member States in the Rhine and Meuse river basins, RIVM report 734301035/2010, 2010.

The proposal for a Directive amending the WFD and the Priority Substances Directive (COM (2011) 876) contains provisions to improve the efficiency of monitoring and the clarity of reporting with regard to certain substances behaving as ubiquitous persistent, bioaccumulative and toxic (PBT) substances. It also provides for a mechanism to allow targeted EU-wide monitoring of substances of possible concern to support the prioritization process in future reviews of the priority substances list. This proposal may be of relevance for substances that originate from medicines and of which the concern is not yet proven but expected.

The second problem is what should be done once substances are listed on the Priority Substances Directive or the Groundwater Directive and water quality standards are set at the European level for substances occurring in a medicine for human or veterinary use (which is currently not the case). Once listed, the standard set should be met to achieve good chemical water status. Meeting those water quality standards requires taking measures and establishing emission standards. The problem that occurs here is that the responsibility for water quality management is shared by many public authorities. At the European level, directives establish water quality goals and instruct the Member States on how they should be achieved. Yet they leave the Member States considerable discretion regarding the way they implement the obligations from directives into national law as long as the results imposed by the directive remain achievable. The WFD aims to solve this problem as it integrates water management through a combined approach. This means that once substances are listed and water quality standards are established, the corresponding emission standards and control measures have to be established as well to achieve the water quality objectives.

The Water Framework Directive integrates these various approaches in its Article 10, and works with a combined approach for point and non-point sources based on:

- emission controls, assuming the best available techniques, as in the IPPC Directive; or
- the applicable emission limit values; or,
- in the case of diffuse impacts - emission controls, including best environmental practices, as contained in various existing directives, such as the Nitrates Directives and the Urban Wastewater Treatment Directive. Emission controls are, according to Article 2(41) WFD, controls requiring a specific emission limitation, for instance an emission limit value, or otherwise specifying limits or conditions on the effects, nature or other characteristics of an emission or operating conditions which affect emissions.
- prescription of more stringent source-related measures if the quality standards that have been established cannot be met using emission controls.

The obligation regarding pollution from diffuse sources that measures must be taken to prevent or control the introduction of dangerous substances establishes a clear relationship with product policy. This can be seen in the fact that among the measures mentioned in Article 11 WFD are featuring more stringent registration requirements for plant protection products and tightening the rules on fertilizers. It could be stated that Article 11(3)(h) WFD also allows for stricter regulation of the medicines policy. The Priority Substances Directive adds to these obligations on the basis of the WFD, the obligation to establish *inventories* of emissions, discharges and losses, including maps, which enable the Member States – and the Commission - to evaluate the effectiveness of the measures to regulate these activities.

In so far as the Member States need EU support for taking control measures – which may be the case with medicines pollution (see below) - the current legal framework does not necessarily result in European action. The WFD provides in Article 16 (6) that the Commission has to submit proposals for control measures. It has to identify the appropriate cost-effective and proportionate level and combination of product and process controls for

both point and diffuse sources and take account of Community wide uniform emission limit values for process controls. In the absence of agreements six years after the establishment of a substance in the first list of the Priority Substances Directive and five years after the inclusion of a substance subsequently included in this list, the Member States have to take action. Then they should establish environmental quality standards for all surface waters affected by discharges of those substances that are listed and implement controls on the principal sources of such discharges, based on (inter alia) consideration of all technical reduction options.

The third problem is that when a substance only poses problems in some river basins, water quality standards will not be set at EU level but instead have to be set at the national level or the river basin level. This issue applies in particular to substances which lead to concern regarding achievement of the good ecological status. Indeed for such substances, ecological quality standards should be set at the river basin or national level. Thus national standards have to be set for concentrations of substances of medicines or their metabolites if they are substances of concern in their river basin and European standards have not been set for them. Then the Member States sharing the river basin are also responsible for establishing the corresponding emission standards and control measures.

The presence of medicines can result in an issue which cannot be resolved at Member State level, for instance over setting uniform water quality standards, emission limit standards or taking effective control measures in the entire river basin. Article 12 WFD provides that a Member State may then report the issue to the Commission and the other Member States concerned and may make recommendations for the resolution of it. The Commission has to respond to reports or recommendations within six months. In the absence of a provision in the WFD granting the Commission the power to settle such disputes with a binding decision, the decision of the Commission is not binding. The Commission can however propose legislation to solve the issue or take other actions to solve it, for instance through its contribution to guidance documents or by bringing infringement proceedings against a Member State for non-compliance.

3. What the regulators of drinking water can do

With regard to the presence of medicines in drinking water, there is no explicit regulation for substances that originate from medicines. The lists established by Annex I to the Drinking Water Directive (98/83/EC) contain both microbiological and chemical quality standards (called parameters in the Directive) for water intended for human consumption. Member States must adopt values applicable to water intended for human consumption for the parameters set out in Annex I, which constitute the limit values. The Commission has to review Annex I at least every five years in the light of scientific and technical progress and has to make proposals for amendments where necessary. Until European standards have been set in the Annex to the Drinking Water Directive, national standards have to be set for substances of medicines or their metabolites in drinking water and if they occur in a concentration constituting a potential danger to human health. The WHO Guidelines advice is that where local circumstances indicate a potential for the occurrence of medicines in drinking water, monitoring should take place to assess exposure. Based on a risk assessment, screening values can then be developed.

Amendment of the Water Directives

The water directives do not require extensive amendments to address the problem of water pollution with medicines. The WFD should be amended in order to ensure that attention is devoted to the problem of water pollution by medicines and that the environmental risk

assessment of medicines plays a role in the assessment of substances to be placed on the list of the Priority Substances Directive or the Groundwater Directive. This coordination already occurs with regard to the Plant protection products Directive, the Nitrates Directive and the Biocides Directive. It requires an amendment of Article 11 (3), which would then mention the medicines legislation, and Article 16 (2) (a) WFD. The WFD should include the medicines directives and regulation in the list of legislation established by Article 16 (2) (a) WFD. In a similar vein the Priority Substances Directive and the Groundwater Directive should be amended to take medicine pollution into account.

The Drinking Water Directive should also take medicine pollution into account. In order to enable information exchange between the product regulators, the water authorities and the drinking water companies, both the WFD and the Drinking Water Directive should include provisions on disclosure of the monitoring data, so that these data can be used by medicines regulators in the evaluation of marketing authorizations. Without provisions to that effect in the water legislation, uncertainty about the balance between openness and the commercial interest in confidentiality may prevent the monitoring data of the water authorities and the drinking water companies from being published, thus reducing the required openness of this information to access on request.

4. What the competent authorities for waste water treatment can do

Urban Waste Water Directive

When the authorities responsible for the treatment of urban waste water are confronted with medicine pollution caused by the use of medicines, they are not obliged to take action. The Urban Waste Water Directive only obliges them to take action to reduce organic matter and nutrients of urban waste water to certain levels. Microcontamination of waste water is not included in the legal framework. If a medicinal substance is mentioned in the Annexes to the Water Framework Directive and/or the Priority Substances Directive and the relevant environmental quality standards are exceeded, an effective control measure is to establish emission limit values on the basis of the Priority Substances Directive for the discharges of urban waste water treatment facilities. On this legal basis, emission limit values can also be set for the discharges of waste water by hospitals and houses for the elderly. Thus, in the absence of any amendments of the Urban Waste Water Treatment Directive, the Priority Substance Directive can provide the legal basis for the authorities responsible for the treatment of urban waste water to reduce the discharge of medicinal substances or metabolites from urban waste water treatment facilities.

Amendment of the Urban Waste Water Directive is therefore not necessary to address this issue. However, the complexity of this combined legal framework can be reduced by amending the Urban Waste Water Directive. Microcontaminants could then be introduced as a separate category for which emission control measures have to be taken.

5. What the competent agricultural authorities can do

Nitrates Directive

When soil contamination and groundwater contamination occur as a consequence of the use of veterinary medicines, the Nitrates Directive does not oblige any authorities to take action because it only regulates nitrates. Contamination of manure and urine with microcontaminants is not part of the regulatory framework established to limit the pollution of water with nitrates.

The Nitrates Directive therefore does not provide the legal basis to impose measures to limit water and soil pollution by medicines for veterinary use under the Code of Good Agricultural Practices. Since these substances are present in manure and urine, existing control measures may also have beneficial or negative side effects regarding the presence of these substances.

In view of the Spanish slurry case, it is not certain whether the Water Framework Directive and its daughter directive, the Groundwater Directive, is applicable to tackle emissions from manure and urine which result in groundwater pollution. It is assumed that the Priority Substances Directive is not relevant because medicines for veterinary use used by food producing species mostly pollute ground water. Arguably, this situation is different from the situation at hand in the Spanish slurry case, where both directives wanted to regulate the same substance – slurry – for the same purpose: to limit groundwater pollution by nitrates. By contrast, the presence of medicines in slurry results in groundwater pollution by medicines. Moreover, the coming into being of the Water Framework Directive may set the Spanish slurry case aside, as it prescribes a combined approach to water pollution. It thus establishes a link between the water quality standards on the one hand and emission standards and control measures on the other hand.

If the Groundwater Directive is indeed applicable, the question is whether it provides suitable instruments to address pollution by medicines for veterinary use. Pollution occurs through the spreading of manure (and urine) on lands. This typically causes diffuse pollution, which is hard to pinpoint to a single farmer and therefore hard to control. Simply establishing emission limit values for manure to be spread on land may therefore not bring the desired results. Another option are more specific measures, such as waiting periods after certain medicines for veterinary use have been used. Such regulation on use of veterinary medicines however easily coincides with the approach taken to reduce nitrate pollution under the Nitrates Directive and may therefore be annulled by the ECJ with reference to the Spanish slurry case. It should be noted in this regard that the environmental risks are assessed taking the 170kg/ha/year norm of the Nitrates Directive as a point of departure. Similarly, when risk mitigation measures are considered, their being in line with the Nitrates Directive determines their suitability to effectively address the environmental risks.

If the Nitrates Directive is the only legal framework to address soil and groundwater pollution caused by veterinary medicines, then the Nitrates Directive should be amended to address this emergent issue in order to ensure that additional measures can be imposed by the Code of Good Agricultural Practice to further prevent or limit water pollution by medicines. It should be noted that the Code of Good Agricultural Practice is only mandatory in areas assigned by the Member States as vulnerable areas (because the agricultural activity in the area causes significant agricultural water pollution) or on the territory of Member States which apply the Nitrates Directive on their entire territory without designating certain areas as vulnerable. In non-vulnerable areas, compliance with the Code of Good Agricultural Practice is only on a voluntary basis.

6. What the competent authorities for the IPPC Directive can do

Under the current legal framework (both the initial Directive and Dir. 2010/75) only the production of medicines falls within the scope of the IPPC Directive. Organizations or companies using human or veterinary medicines are not mentioned in Annex I of the Directive. Although the IPPC Directive applies to the intensive rearing of poultry and pigs, and veterinary medicines are used in this context, the Directive does not specifically address the potential impact for the environment of medicinal substances. The Directive requires

emission standards for polluting substances and in this respect relates to the Water Directives (see above). However, it should be noted that the IPPC Directive only requires emission standards for 'installations'. The diffuse emission of veterinary medicines by manure/urine spread over the land does not fall within the scope of the Directive. Furthermore, it should be noted that all activities that fall under the scope of the Urban Waste Water Directive are explicitly excluded from the scope of the IPPC Directive. However, Member States may in their national legislation require similar standards for non-IPPC installations.

7. What the competent authorities for soil protection can do

Currently, there is no soil legislation on a EU level. Only recently it has been decided not to proceed with the proposal for a European soil Directive. It makes sense to develop EU soil legislation to complement the Groundwater Directive because this could contribute to the regulation of emissions to the soil of medicines for veterinary use. The current – withdrawn - proposal for a Framework Directive did not specifically mention effects on soil caused by human or veterinary medicines. These products can however be considered to be included in so far as they qualify as dangerous substances. Until European legislation has been established, the competence to take measures against the pollution of soil with medicines remains with the Member States. Soil pollution by medicines can thus only be regulated by national soil legislation, if that is in place.

10. Conclusions and recommendations

The current legal framework for the regulation of medicines and water quality enables tackling water pollution by medicines, but could be improved to better address this issue. At the EU level, a first start to ensure that coordinated action will be taken is to develop a Commission Communication on water pollution with medicines and what regulatory action can be taken to prevent and limit this. This communication could also outline any amendments necessary to EU legislation to better tackle this issue. For the sake of clarity, the conclusions and recommendations have been organized around the life-cycle of medicines.

<u>Production</u>

The IPPC directive applies to factories that produce medicines and regulates their discharges. The Directive requires emission standards for polluting substances and in this respect relates to the standards established by or pursuant to the Water Directives. The GMP directive does not address environmental concerns, but could be amended to green the production of medicines.

<u>Authorization</u>

With regard to the authorization of medicines, only the EU can take measures to address the environmental impact of medicines, because the authorization of medicines has been totally harmonized at EU level. Since 2005, the environmental risk assessment is part of the authorization procedure for medicines. In the absence of clear transition provisions, medicines already authorized by then do not have to be assessed. Their impact on the environment is therefore not studied in the context of their authorization. On the basis of the environmental risks, authorization for a medicine for veterinary use can be refused or mitigation measures can be prescribed. By contrast, the environmental risks are not weighed in the risk/benefit balance that determines authorization of medicines for human use and therefore authorization cannot be refused on environmental grounds, although mitigation measures can be prescribed in the authorization. In order to obtain environmental risk assessments of all currently used

medicines, a provision should be introduced in the medicines legislation to carry out environmental risk assessments of all medicines currently in use, at the time of extending the authorization.[177]

Prescription and use

The medicine legislation prescribes mitigation measures regarding the use of medicines if their use presents a risk to the environment. The holder of the authorization is obliged to inform doctors and users about the mitigation measures. The European legislation has however not created an obligation to implement these mitigation measures in a way that they bind the users and those who prescribe medicines. While national legislation can fill this gap, a uniform European regime can be created by including such an obligation.

Waste

Water pollution with medicines constitutes a concern for water authorities when it endangers water quality and hence the achievement of their European good status obligations. In the absence of European standards, national authorities may not be aware of the presence of medicines in water. In so far as medicine pollution threatens the ecology, national authorities have to set water quality standards and devise control measures. In so far as substances pose a concern for good chemical quality in most river basins, they should be listed on the Annexes to the Priority Substances Directive or the Groundwater Directive. The proposal for a Directive amending the WFD and the Priority Substances Directive (COM (2011) 876) contains provisions to improve the efficiency of monitoring and the clarity of reporting with regard to certain substances behaving as ubiquitous persistent, bioaccumulative and toxic (PBT) substances. It also provides for a mechanism to allow targeted EU-wide monitoring of substances of possible concern to support the prioritization process in future reviews of the priority substances list. This last proposal may be of relevance for substances that originate from medicines and of which the concern is not yet proven but expected. In order to ensure that the environmental risk assessment of medicines plays a role in the assessment of substances to be placed on the list of the Priority Substances Directive or the Groundwater Directive, the WFD should be amended. The amendment should propose inclusion of the medicines directives and regulation in the list of legislation established by Article 16 (2) (a) WFD and should list medicines for human and veterinary use as a group in Annex VIII to the WFD.

In so far as substances have been included on the Annex to the Priority Substances Directive, the EU should establish water quality standards or - if that does not timely happen - the Member States. In addition, control measures have to be taken. The Commission has to submit proposals for appropriate cost-effective and proportionate control measures and combination of product and process controls for both point and diffuse sources. If the Commission does not act, the Member States have to devise control measures. The WFD envisages that if quality standards cannot be met through emission controls, more stringent source-related measures should be taken.

Medicines for veterinary use are excreted via manure and urine. They can contaminate the soil. There is no European soil legislation, so this issue can only be addressed by national soil legislation if that is in place. If a new proposal for soil legislation is drafted, the risk of soil pollution with medicines and measures to prevent or limit this risk should be explicitly

[177] M.H.M.M. Montforts, H.F.M.W. van Rijswick, A.A. Freriks, A.M. Keessen, S. Wuijts, *The relationship between product registration and water quality legislation, medicines, veterinary medicines and feed additives*, (in Dutch, English summary) (2006) RIVM Report 601500003/2006.

mentioned. With regard to agricultural pollution, the Nitrates Directive does not address pollution with medicines for veterinary use, but existing control measures may have beneficial side effects regarding the presence of these substances. In view of the Spanish slurry case, it the Nitrates Directive could be the exclusive legal framework to deal with this issue as the Court held that that the Groundwater directive cannot add measures to those established under the Nitrates Directive. However, this case was settled before the coming into being of the Water Framework Directive, which prescribes a combined approach to tackle water pollution. It thus links water quality standards with emission standards and control measures. In so far as substances have been included on the Groundwater Directive, measures have to be taken to either prevent (most dangerous substances) or limit their discharges into groundwater and thus achieve the WFD goal of good chemical status. If the Nitrates Directive is the only applicable directive, then it should be amended to address this emergent issue and ensure that measures can be imposed by the Code of Good Agricultural Practice.

The Urban Waste Water Directive does not address pollution with medicinal substances for human use. Since the Priority Substances Directive applies to urban waste water treatment installations and will require them to take action to prevent or reduce pollution with medicinal substances listed on the Annex to the Priority Substances Directive, amendment of the Urban Waste Water Directive is not necessary to address pollution with medicinal substances. However, the complexity of this combined legal framework can be reduced by amending the Urban Waste Water Directive. Microcontaminants could then be introduced as a separate category for which emission control measures have to be taken.

Presence in drinking water

There is no explicit regulation of medicinal substances. Measures taken to prevent the presence of other undesired substances, such as pesticides, may also reduce the presence of medicinal substances. As long as no European standards have been set, national standards have to be set if medicinal substances occur in a concentration constituting a potential danger for human health. Especially this obligation for the Member States may be of importance with regard to medicines, although also in this respect standard setting and regulation at EU level may be preferable.

Access to information

In order to enable information exchange between the product regulators, the water authorities and the drinking water companies, provisions should be included in the medicines legislation on access to the environmental information contained in the reports and the summaries of these reports[178] and the water legislation should include provisions on disclosure of the monitoring data, so that they can be used by medicines regulators in the evaluation of marketing authorizations and by water authorities to facilitate the monitoring of medicinal substances and the establishment of adequate control measures. Without provisions to that effect in the medicines and water legislation, uncertainty about the balance between openness and the commercial interest in confidentiality prevents the environmental risk assessment of the product regulators and the monitoring data of the water authorities and the drinking water companies from being published, thus reducing the required openness of this information to access on request.

[178] The absence of information exchange duties between officials of different policy fields seems to be a common omission in European legislation. See: A.M. Keessen, *European Administrative Decisions. How the EU Regulates Products on the Internal Market*, (2009) Europa Law Publishing.

Current legal framework for tackling medicine pollution

Stages	EU regulation	National regulation
Production	IPPC Directive and the Water Directives regulate discharges from factories.	National legislation can regulate discharges not specifically addressed by the Directive
Authorization	Since 2005 the authorization procedure prescribes an environmental risk assessment. This risk is weighed in the risk/benefit balance of medicines for veterinary use. The medicine legislation does not prescribe publication of the results of the environmental risk assessment or the report itself.	No competence left for national legislation.
Prescription and use	EU: The medicine legislation prescribes mitigation measures, which are only binding on the holder of the authorization.	National legislation can create a binding obligation for third parties, but only a European regulation can ensure uniformity and limit transboundary water pollution.
Waste/ water pollution	1. Medicines are not (yet) placed on the list of the WFD, PSD or GWD. The proposal for a Directive amending the WFD and the PSD, contains provisions to allow targeted EU-wide monitoring of substances of possible concern to support the prioritization process in future reviews of the priority substances list. 2. Once substances have been included on the Annex to the PSD or GWD, the EU should establish water quality standards and control measures.	1. In the absence of European standards, national authorities may not be aware of the presence of medicines in water. 2. In so far as medicine pollution threatens the ecological or chemical water status, national authorities have to set water quality standards and devise control measures. 3. In so far as substances have been included on the Annex to the Priority Substances Directive and the EU has not timely established water quality standards or control measures, the Member States have to do so. 4. National authorities can set additional standards for the chemical status of surface and ground waters in case substances are a problem at national or subriver basin level.
Waste/soil pollution	There is no European soil legislation.	National soil legislation – if in place - can address soil contamination by veterinary medicines.
Waste/ manure	1. The Nitrates Directive does not address pollution with	Member States determine the extent to which the measures of

	medicines for veterinary use. 2. Due to the Spanish slurry case, the Groundwater Directive does not apply, unless the entry into force of the WFD results in a departure from this case law.	the ND are mandatory on their territory.
Waste/ waste water	1. The Urban Waste Water Directive does not address pollution with medicines. 2. The Priority Substances Directive applies to urban waste water treatment installations.	Member States can impose additional emission limit values, but only a European regulation can ensure uniformity and limit transboundary water pollution.
Drinking water	There is no explicit regulation of medicinal substances, but drinking water must be 'wholesome and safe'.	As long as no European standards have been set, national standards should be set if medicinal substances occur in a concentration constituting a potential danger for human health, according to the WHO.

Proposed amendments

Stages	**EU regulation**	**National regulation**
Production	No need for amendments	No need for amendments.
Authorization	The medicine legislation should be amended to obtain environmental risk assessments of all currently used medicines. The medicine legislation should be amended to prescribe publication of the results of the environmental risk assessment or the report itself.	No competence left.
Prescription and use	EU: The medicine legislation should be amended to ensure that the implementation of risk mitigation measures becomes an obligation that binds third parties.	National legislation can create a binding obligation for third parties, but only a European regulation can ensure uniformity and limit transboundary water pollution.
Waste/ water pollution	The WFD should be amended to include the medicines directives and regulation, e.g. in Article 16 WFD and Annex VIII.	National legislation can establish water quality standards for medicinal substances.
Waste/soil pollution	If a new proposal for soil legislation is drafted, the risk of soil pollution with medicines and measures to prevent or limit this risk should be explicitly mentioned.	National soil legislation – if in place - can address soil contamination by veterinary medicines.
Waste/ manure	If the Nitrates Directive is the only applicable directive, then it should be amended to address	No competence left.

	this emergent issue and ensure that measures can be imposed by the Code of Good Agricultural Practice. If the WFD is amended, specific attention must be paid to the relationship between the WFD and the Nitrates Directive, including the applicability of the WFD standards for manure and the additional substances that may be part of the manure (including medicines).	
Waste/ waste water	1. The Urban Waste Water Directive does not address pollution with medicines. 2. The Priority Substances Directive applies to urban waste water treatment installations. The complexity of this combined legal framework can be reduced by amending the Urban Waste Water Directive and including microconta-minants as a separate category for which emission control measures have to be taken.	National legislation can establish emission limit values that apply to waste water treatment installations.
Drinking water	European quality standards should be set if necessary to safeguard sustainable use.	As long as no European standards have been set, national standards have to be set if medicinal substances occur in a concentration constituting a potential danger for human health according to the WHO.

11. Annexes

Overview

An overview of the European legislation which contain measures to reduce the environmental pressure of medicines for human or veterinary use. This includes:

- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy (WFD), OJ 2000 L327/1.
- Directive 2008/105/EC of the European Parliament and of the Councilon environmental quality standards in the field of water policy, OJ 2008 L 348/84.
- Groundwater Directive
- Dangerous Substances Directive
- Nitrates Directive
- Waste water Directive
- Proposal for a Directive of the European Parliament and of the Council establishing a framework for the protection of soil and amending Directive 2004/35/EC, COM(2006) 232 final
- Regulation 726/2004 of the European Parliament and of the Council laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency, OJ 2004 L 136/1.
- Directive 2001/83 of the European Parliament and of the Council on the Community code relating to medicinal products for human use, OJ 2001 L 311/67
- Commission Directive 2003/94 laying down the principles and guidelines of good manufacturing practice in respect of medicinal products for human use and investigational medicinal products for human use, OJ 2003 L 262/22.
- Directive 2001/82 of the European Parliament and of the Council on the Community code relating to medicinal products for veterinary medicinal products, OJ 2001 L 82/1.

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