



COMMISSION OF THE EUROPEAN COMMUNITIES

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**REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN
PARLIAMENT**

**Pursuant to Article 16 of Regulation (EC) No 648/2004 of the European Parliament and
of the Council of 31 March 2004 on detergents, concerning the use of phosphates.**

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(Text with EEA relevance)

1. INTRODUCTION

Article 16 of Regulation (EC) No 648/2004 on detergents¹ lays down that “by 8 April 2007, the Commission shall evaluate, submit a report on and, where justified, present a legislative proposal on the use of phosphates with a view to their gradual phase-out or restriction to specific applications.”

1.1. Phosphates in detergents

Phosphates are one of the most commonly-used and abundant ingredients in domestic and industrial detergents. Their function is to combat water hardness in order to allow efficient cleaning by the detergents. The type of phosphate most commonly used is STPP (sodium tripolyphosphate, $\text{Na}_5\text{P}_3\text{O}_{10}$, CAS No 7758-29-4, EINECS No 231-838-7). Overall, STPP is an efficient ingredient in detergents with the following functions:

- efficient sequestering of hardness salts (and keeping them in solution);
- removal and prevention of encrustation on fibres;
- enhancement of the washing process;
- carrier for other detergent ingredients.

The annual consumption of phosphate containing detergents in the EU-25 is about 1.8 million tonnes, a value equivalent to a phosphorous content of about 110,000 tonnes. 90-95% of these are consumed in domestic laundry and dishwashing detergents. For comparison, the use of phosphates in fertilisers is equivalent to around 1.25 million tonnes of phosphorus per year.

There are no concerns over adverse health effects associated with the use of STPP in detergents. Recent scientific evidence² indicates very low acute toxicity of STPP by ingestion or dermal application, while no mutagenic or genotoxic effects have been observed.

Phosphates are essential nutrients as their use in fertilisers indicates. The prime concern over the use of phosphate in detergents is that it can lead to an excess of nutrients in the aquatic environment which, in turn, can lead to problems of eutrophication.

¹ Regulation (EC) No 648/2004 of the European Parliament and of the Council on detergents, OJ L104, 8.4.2004, p.1

² Sodium Tripolyphosphate (STPP) CAS: 7758-29-4 Human & Environmental Risk Assessment on ingredients of European household cleaning products, HERA (2003)

Eutrophication has been defined as: *“the enrichment of water by nutrients especially compounds of nitrogen and phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms and the quality of the water concerned”*³.

Eutrophication is a complex phenomenon in which phosphates frequently, but not always, play the major part. Increasing concerns over the contribution of STTP to eutrophication have lead to a move in many countries towards phosphate-free laundry detergents. Table 1 (Annex) shows the current market share in the EU-25 of phosphate-free detergents. Detergents are mainly discharged to the aquatic compartment via waste water treatment. The proportion of STPP from detergents that enter the aquatic environment varies considerably across the EU Member States depending on the degree of tertiary treatment of waste water. Tertiary treatment is costly and is not required for all sewage discharges (in particular smaller settlements lack appropriate treatment). Phosphate from fertilisers applied to agricultural land is mainly absorbed by crops, but there is some run off to surface waters. A third main source of phosphorus is human metabolic waste.

The main alternatives to STTP in laundry detergents, with a market share of over 60%, are zeolites (mainly zeolite A) which, however, are used in conjunction with increased amounts of other ingredients, such as co-builders and bleach.

Dishwashing detergents are still mainly phosphate-based. With the introduction of phosphate-free laundry detergents, the contribution of dishwashing detergents to the total detergent phosphate release has risen to about 25%.

1.2. EU legislation concerning eutrophication

Several EU Directives have the effect of limiting the concentration of nutrients in surface waters, and thereby help to counter eutrophication:

Directive 91/271/EEC³ concerning urban waste water treatment (UWWTD) under which tertiary treatment (which removes phosphates) is required at waste water treatment plants serving agglomerations of more than 10,000 population equivalents, and which discharge into areas sensitive to eutrophication;

Directive 91/676/EEC⁴ concerning the protection of waters against pollution caused by nitrates from agricultural sources (the Nitrates Directive) under which Member States are required to identify vulnerable zones and to establish and implement action programmes in order to reduce water pollution from nitrogen compounds.

Directive 96/61/EC⁵ concerning integrated pollution prevention and control under which Member States are required to issue permits for certain industrial installations according to the best available techniques (BAT). Annex III of the Directive, the indicative list of the main polluting substances to be taken into account for fixing emission limit values, includes substances which contribute to eutrophication, in particular nitrates and phosphates.

³ Directive 91/271/EEC, OJ L135, 30.5.1991, p. 40

⁴ Directive 91/676/EEC, OJ L375, 31.12. 1991, p.1

⁵ Directive 96/61/EC, OJ L 257, 10.10.1996, p.26

Directive 2000/60/EC⁶, the Water Framework Directive (WFD), has led to an increased focus on eutrophication and to a more holistic approach to water management⁷. Member States must enact programmes of measures to ensure that water bodies throughout the EU reach "good status" by 2015. In cases where WFD monitoring and assessment shows that phosphorus inputs are significantly contributing to eutrophication, Member States must implement measures to address this problem.

1.3. Legislation in Europe concerning phosphates in detergents

Pending harmonisation at European level, the Detergents Regulation allows Member States to maintain existing national measures, or to introduce new ones, to limit the phosphate content of detergents. However, as with any other national measures outside the harmonised area, Member States must notify draft measures in accordance with the provisions of Directive 98/34/EC⁸ and demonstrate that these are both justified and proportionate. The WFD can provide a mechanism whereby Member States can demonstrate through the risk analysis (Article 5) and the establishment of a cost-effective programme of measures (Article 11) that restrictions are justified and proportionate.

Italy, Belgium, Czech Republic, Germany, and the Netherlands have already adopted legislation to reduce or ban phosphates in detergents with the aim of reducing eutrophication. Sweden and France have recently announced their intention to do likewise. Austria, Ireland, Denmark, and Finland rely on voluntary commitments by detergents formulators to phase-out phosphate-based detergents. Seven Member States have only phosphate-free laundry detergents – see Table 1 in the Annex. With this report, the Commission does not intend to put these existing measures into question.

2. COMMISSION ACTION TO EVALUATE THE USE OF PHOSPHATES IN DETERGENTS

2.1. Actions taken before adoption of Regulation (EC) No 648/2004

As one of its first activities with regard to phosphates in detergents, the Commission asked a consultant, WRC, to investigate the costs and benefits of substituting phosphorus⁹ in household detergents with other builders, and to recommend the most appropriate methods of reducing phosphorus concentrations in surface waters. The study, published in June 2002¹⁰, concluded that:

⁶ Directive 2000/60/EC, OJ L327, 22.12.2000, p.1.

⁷ Directives 91/271/EEC, 91/767/EEC and 96/61/EC are "basic measures" under the WFD and must be coordinated and, where necessary complemented to achieve the mandatory objectives.

⁸ Directive 98/34/EC, OJ L 204, 21.7.1998, p. 37

⁹ In environmental reports the term "phosphorous" denotes phosphorous compounds in general.

¹⁰ "Phosphates and alternative detergent builders" available at:
http://ec.europa.eu/environment/water/water-urbanwaste/info/docs_en.htm

- A number of countries have been successful in reducing eutrophication through implementation of measures to reduce their phosphorus loads by 70-90%;
- A ban on the use of phosphate based detergents can achieve a phosphorus load reduction of up to 40%, which however is not sufficient in isolation to result in any substantial improvements in eutrophication;
- Zeolite A was found to be a suitable alternative to STPP. Only minor differences with STPP were observed in overall production cost in terms of energy used and sludge produced in waste water treatment plants, while zeolite A was also found to be non-toxic to aquatic fauna and humans, and manufacturing produces less toxic waste by-products.

The Commission's Scientific Committee on Toxicity, Ecotoxicity and the Environment (SCTEE) gave an opinion¹¹ in March 2003 on the WRC report which identified a number of weaknesses, found that the report's conclusions were not adequately substantiated, and suggested that a more complete literature review might allow the identified weaknesses to be adequately addressed. The weaknesses concerned both the assessment on the impact of STPP on eutrophication, and the lack of knowledge concerning the environmental risks associated with the alternatives to STPP, not only on zeolite A but also the other substances such as polycarboxylic acids that are used in combination with it.

The Commission services followed the suggestion of the SCTEE and collected additional literature data, including HERA risk assessments on STPP and Zeolite A, and requested SCTEE to review issues that had not been adequately treated in the WRC report.

In its opinion of November 2003 the SCTEE concluded that:

- In the absence of measures for reducing the STPP content in detergents, the contribution of this phosphorus source to the total phosphorus load in surface water can be very variable (roughly ranging from 10 to 40%) as a function of different human activities and land use. Therefore, STPP in detergents would produce a significant increase of phosphorus load in surface water and a significant risk for eutrophication in some areas of the enlarged EU;
- The present situation in Europe has substantially changed in comparison with the 1980s, because many European countries have undertaken measures to reduce STPP so that detergent phosphorus is no longer a substantial contributor and other sources contribute a higher percentage to the overall phosphorous load;
- The contribution of phosphate-based detergents to eutrophication is extremely variable country by country as well as in different hydrographic basins as a function of human activities and land use.

¹¹ available at: http://ec.europa.eu/health/ph_risk/committees/sct/sct_opinions_en.htm

Overall, the SCTEE noted that the HERA risk assessment on STPP had not addressed the eutrophication problem and suggested how this could best be done: “... a quantitative assessment of the extent of eutrophication in EU waters in relation to phosphorus load from different sources, and in particular in relation to STPP contribution, could be performed on the basis of existing experimental and modelling information” and “ ... a landscape evaluation with probabilistic outcomes for each landscape scenario” was requested.

2.2. Actions completed since adoption of Regulation (EC) No 648/2004

A further study was performed in line with the SCTEE opinion of November 2003 to obtain quantitative estimates of the effects on eutrophication of switching from phosphate-based to phosphate-free detergents. The study was financed by the industry federation for detergent phosphate manufacturers, CEEP (Centre Européen d’Etudes des Polyphosphates), and performed by a consultant, Green Planet Research, in collaboration with a research organisation, INIA (Spanish National Institute for Agriculture and Food Research and Technology).

The methodology for a probabilistic risk assessment was developed by INIA by September 2005, and was refined in the light of discussions with a group of 17 experts on eutrophication at a workshop held in Madrid in November 2005. The final report entitled “Development of a European Quantitative Eutrophication Risk Assessment of Polyphosphates in Detergents”¹² was published in October 2006 and concluded that:

- additional eutrophication risks related to detergent phosphates are very variable in the different regions of the EU as a result of factors such as the hydrological characteristics, population density and agricultural intensity;
- in both analysed ecoregion types, i.e. (i) Atlantic, Northern and Central European shallow lakes, and (ii) Mediterranean water bodies, the eutrophication risk did not increase linearly at higher phosphorus concentrations;
- the difference between the total eutrophication risk and the risk without phosphate-based detergents is typically around 2-8% based on the Mediterranean effect assessment, and around 0.4-2% based on the Atlantic, North & Central shallow effect assessment.

A further study by RPA (Risk & Policy Analysts Ltd) was commissioned to fill the data gaps concerning the use, properties and environmental impact for a representative range of non-surfactant organic detergent ingredients, and to assess the socio-economic impact of switching from phosphate-based detergents to zeolite-based detergents.

The study found that some of the additional co-builders needed for zeolite-based detergents are also used in STPP-based detergents, though in smaller concentrations. A switch to zeolite-based detergents would therefore not necessarily introduce a greater number of cobuilder substances into the environment, but their concentrations might increase.

¹² available at: http://ec.europa.eu/enterprise/chemicals/legislation/detergents/index_en.htm.

Polycarboxylates and phosphonates were identified as two groups of co-builders that do not readily biodegrade in the environment. The toxicity and ecotoxicity of polycarboxylates is low and they are not considered to be harmful. In contrast, the aquatic toxicity of some phosphonates, e.g. 1-Hydroxyethane-1,1-diphosphonic acid (HEDP) and its salts, may be of some concern. However, there was a lack of environmental monitoring data for this substance, and the environmental risk could not be assessed.

The second part of the study aimed to complement the INIA/CEEP eutrophication study by assessing the overall costs and benefits of a move from STPP to zeolites in detergents, including the health and environmental risks, cost savings for authorities on tertiary waste water treatment plant, and cost increases for manufacturers in reformulating detergents.

The report¹³ entitled “Non-surfactant organic ingredients and zeolite-based detergents”, delivered in June 2006, recommended that:

- the detergents industry should be encouraged to develop phosphate-free detergents for dishwashing machines;
- discussions should be held with the detergents industry to agree a data set (on properties, health and environmental effects) which could be collated and published for the various polymer ingredients;
- the use of phosphate-free detergents should not be encouraged unless all the ingredients can be demonstrated to present no risks to human health or to the environment.

The key benefit of a move to phosphate-free detergents will be to reduce the phosphorus load in the environment which, in turn, may reduce problems of eutrophication. In qualitative terms, the greatest benefits would accrue in those countries with:

- a high phosphate detergent use;
- a low provision of tertiary waste water treatment and
- problems of eutrophication

By applying weighting factors to these three criteria, a single indicator for each country was derived of the potential benefits of a move to phosphate-free detergents – see Table 2 (Annex). This fairly simplistic analysis shows that the potential benefits of a move to phosphate-free detergents vary significantly from country to country.

The costs associated with a move to zeolite-based detergents include:

¹³ available at: http://ec.europa.eu/enterprise/chemicals/legislation/detergents/index_en.htm.

- Disruption of the phosphate supply chain. Six EU manufacturers of STPP would be significantly affected.
- A need for detergent formulators to reformulate/re-brand detergents (more complex and difficult for smaller formulators) with an average cost of 20,000 € per formulation.
- A potential increase in risks to humans and/or the environment. Costs of additional testing due to the need for further assessment of risks.

The Detergents Working Group discussed the two reports in November 2006 and found that the RPA report provided useful information on the costs and benefits of moving to phosphate free detergents.

Concerning the INIA report, it was noted in particular that:

- the data used for modelling was rather limited and that results were available for only two generic geographic scenarios;
- the modelling was limited to river basins (and lakes) whereas eutrophication in the EU is also a problem in the coastal and marine environment, e.g. in the Baltic, the North, the Black and the Adriatic Sea.
- The ongoing MARE/HELCOM project for the Baltic and to the UNDP-GEF project on the Danube basin should also be taken into account before final conclusions are drawn on the effects of phosphate-based detergents on eutrophication in the EU.

The UNDP-GEF Danube Regional Project funded by the United Nations Office for Project Services (UNOPS) to develop recommendations for the reduction of phosphorus in detergents in the Danube River Basin, has generated detailed data on phosphate concentration and eutrophication in the Danube. The final report¹⁴ concludes:

“Whilst it is recognised that other actions, such as improved urban waste water collection and treatment, as well as ‘good agricultural practices’ are necessary complementary actions, the study has shown clearly that there is ample scope for contributing to a successful resolution of the problem of eutrophication, by replacing phosphate detergents with phosphate-free detergents, thereby reducing the total phosphate burden”.

The policy recommendation to countries of the Danube River Basin is therefore to proceed with national legislation and/or further voluntary agreements to replace phosphate-based detergents to protect the Danube and Black Sea from eutrophication while awaiting the outcome of the Commission’s evaluation of the need for measures at EU level. This was reiterated at the recent High-Level Meeting of all 16 Danube and Black Sea Countries and the European Commission in a Declaration on Water Protection¹⁵. In the absence of harmonised Community action, this approach appears to be justified and proportionate.

¹⁴ UNDP/GEF report at Danube River is available at: http://www.undp-drp.org/drp/activities_1-8_detergents.html

¹⁵ http://www.icpdr.org/icpdr-pages/water_protection_declaration.htm

2.3. Actions still ongoing in April 2007

2.3.1. Further evaluations by SCHER

The latest RPA and INIA reports were submitted to the Scientific Committee for Health and Environmental Risks (SCHER) in November 2006 for opinion.

The mandate requested SCHER to assess the overall scientific quality of the reports and comment on their methodology and the assumptions used in particular:

- the quality of the conceptual model;
- the accuracy and validity of the estimations, results and conclusions;
- whether the use of phosphates in detergents contributes significantly to eutrophication at EU level.

Concerning the RPA report SCHER was asked to give an opinion on:

- whether a move to phosphate-free detergents would increase health & environmental risks;
- the risks associated with co-builders, including polycarboxylates and phosphonates.

Two working groups have been set up and an opinion is expected not before the end of May 2007.

2.3.2. Commission activities under the Water Framework Directive

The WFD requires Member States to achieve good ecological and chemical status of surface water by 2015. A Guidance Document¹⁶ provides a harmonised methodology for assessing the risk of eutrophication in the context of EU policy. All Member States have reviewed the environmental impact of human activity on the status of surface and groundwater and reported to the Commission in 2005¹⁷. The reports show that eutrophication is still a major problem and that in many river basins, pollution from phosphorus arises from a number of different sources. Member States must prepare a programme of measures by December 2009 in order to achieve the WFD objectives which may include, where justified, mandatory or voluntary agreements to limit phosphates in detergents. According to the WFD, such measures have to be cost-effective and proportionate.

¹⁶ available at:
http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/13_eutrophication

¹⁷ WFD reports available at:
http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/implementation_documents_1&vm=detailed&sb=Title

An intercalibration process is ongoing to make the understanding of 'good ecological status' in all Member States more comparable and consistent with the definitions of the WFD and therefore harmonise the assessment procedures to determine eutrophication risk. Work is ongoing to establish the boundaries of 'good ecological status' applicable to all national classification systems.

The intercalibration exercise will use several thousand datasets from at least 1500 representative monitoring sites (Commission Decision 2005/646/EC¹⁸) across Europe.

The Commission is currently preparing a Decision on publishing the results of the intercalibration exercise which should be adopted in late 2007 in accordance with Article 21 of Directive 2000/60/EC.

2.3.3. *MARE/HELCOM project on the Baltic Sea Area*

This project assesses various policy options (including use of “phosphate-free detergents”) in order to improve water quality in the Baltic Sea Area. A scenario in which phosphate-free detergents are used in all Baltic countries while maintaining waste water treatment at the same level as in the year 2000 shows less improvement than a scenario in which use of phosphate-based detergents is maintained but waste water treatment is improved in line with the Urban Waste Water Treatment Directive. A combination of improved waste water treatment with the use of phosphate-free detergents would decrease nutrient loads and thereby improve the marine environment more than either of these measures taken alone.

3. SUMMARY AND CONCLUSIONS

The Commission has taken a significant number of steps to establish the knowledge base needed to evaluate the impact of the use of phosphates in detergents on eutrophication, as required by Article 16 (1) of Regulation 648/2004.

Building on the results of an earlier study on the impact of phosphates contained in detergents on eutrophication by WRc in 2002, and on opinions of the Commission's Scientific Committee in March and November 2003, two further studies were carried out to fill the data gaps identified in the Committee's opinions. The results of those two further studies were discussed with delegates from Member States and industry at a meeting of the Detergents Working Group in November 2006, and have then also been submitted to the Commission's Scientific Committee for an opinion, which is currently still pending.

According to reports submitted in the context of the WFD, eutrophication remains one of the most important threats to fresh and marine waters. Significant improvements in understanding have been achieved over the past years. However, in April 2007 the state of knowledge concerning eutrophication is still developing rapidly, and extensive additional data on water quality assessment throughout the EU is expected shortly through the inter-calibration exercise of the Water Framework Directive.

¹⁸ Commission Decision, 2005/646/EC, OJ L 243, 17.9.2005, p. 1.

A decision on whether restrictions on phosphates in detergents are justified at EU level will be taken once sufficient evidence has been acquired and various policy options have been assessed in consultation with the Detergents Working Group. In particular, justification for harmonised measures should await the outcome of the opinion of the Commission's Scientific Committee on the already completed studies. The Commission will initiate an impact assessment in 2007 with the aim of concluding it in 2008, if possible, depending on the forthcoming Scientific Committee opinion and the extent of the open issues identified. . The Commission will present a legislative proposal without delay once a decision is taken that restrictions are justified.

Pending a decision, the Commission recalls that Member States may proceed with measures to replace phosphate-based detergents where this can be justified on environmental grounds (e.g. on the basis of the WFD). Member States wishing to introduce "technical regulations" falling under Directive 98/34/EC will have to notify the Commission and justify that these measures are in accordance with the requirements of the Directive.

ANNEX

Table-1 Degree to which EU-25 Member States are Phosphate-Free* in laundry detergents		
<i>Member State</i>	<i>Population (millions)</i>	<i>% Phosphate-free</i>
Belgium	10.4	100
Czech Republic	10.2	35
Denmark	5.4	80
Germany	82.5	100
Estonia	1.3	20
Greece	11.0	50
France	59.9	50
Ireland	4.0	100
Italy	57.8	100
Cyprus	0.7	20
Latvia	2.3	20
Lithuania	3.4	20
Luxemburg	0.4	100
Hungary	10.1	30
Malta	0.4	20
Netherlands	16.2	100
Austria	8.1	100
Poland	38.2	15
Portugal	10.4	30
Slovenia	2.0	95
Slovakia	5.4	20
Spain	42.2	40
Finland	5.2	90
Sweden	9.0	85
United Kingdom	59.5	55
EU-25	456.0	66

* The term “phosphate free” indicates compliance with national legislation limiting phosphate content (not necessarily zero).

(RPA Report 2006, <http://ec.europa.eu/enterprise/chemicals/legislation/detergents>)

Table-2 Benefits of Moving to Phosphate-Free Detergents		
Score	Description	Member States
>10	<i>Maximum Benefits</i>	Czech Republic, Poland, Spain, Latvia, Lithuania, Portugal, Slovakia
5-10	<i>Some Benefits</i>	Greece, Cyprus, Estonia, UK, Luxembourg, Hungary, Belgium, France
1-5	<i>Few Benefits</i>	Denmark, Finland, Austria, Sweden, Ireland, Slovenia, Italy, Netherlands, Germany
0	<i>No Benefits</i>	Malta

A “score” indicator of which EU-countries would benefit most from a move to P-free detergents, based on three factors: (1) annual per capita consumption of detergent phosphate (2) percentage of population provided with tertiary water treatment (3) extent of concern over eutrophication

(RPA Report 2006, <http://ec.europa.eu/enterprise/chemicals/legislation/detergents>)