



COMMISSION OF THE EUROPEAN COMMUNITIES

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96/0276 (SYN)

Proposal for a  
COUNCIL DIRECTIVE

on limitation of emissions of volatile organic compounds due to  
the use of organic solvents in certain industrial activities

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(presented by the Commission)

## EXPLANATORY MEMORANDUM

### 1. Introduction

#### *The Fifth Action Programme*

1. The proposed Directive aims at reducing emissions of organic compounds due to the use of organic solvents within certain processes and industrial installations. Sustainable development, the major theme of the Fifth Action Programme, requires the definition and implementation of a policy for continued economic and social development without detriment to the environment and natural resources, on which the quality of continued human activity and further development depends. In the past, industrial activities have been considered a main obstacle to achieving a clean environment. Nowadays, in application of the principles of sustainability and subsidiarity, industry has become a partner in the continuous process of achieving a balance between human activity and development and protection of the environment. This implies integration of environmental considerations into all relevant industrial activities. Therefore, industry is among the five target sectors listed in the Community's Fifth Action Programme, and one of the three pillars on which the relationship between industry and the environment should be based is Community controls on production processes.

Volatile organic compounds (VOC), and hydrocarbons in general, belong to the group of target substances mentioned under the "Themes and Targets of the Programme", subchapter 5.2, due to their contribution to the generation of photochemical oxidants. Moreover, the management of industry-related risks covered by subchapter 6.1 calls for the reduction of emissions of noxious substances into air, among which are some organic solvents as well as organic compounds associated with their use and destruction.

#### *Scientific basis*

2. Organic solvents are used in a large number of industrial processes. Due to their volatility, in many of these processes they are emitted either directly into air, or indirectly - generally in the form of organic compounds - after having undergone physical or chemical transformation. A number of organic compounds are directly harmful to human health or to the environment, for instance carcinogens, mutagens or reprotoxic substances. Exposure to such solvents occur mainly in certain industrial and urban areas.
3. Moreover, many solvents undergo chemical reactions in the atmosphere, which cause a number of indirect effects, in particular the formation of photochemical oxidants and their main constituent, ozone. Ozone in elevated air concentrations can impair human health and can damage forests, vegetation and crops, reducing the latter's yield. Ozone is also a potent greenhouse gas. VOC-supported ozone formation occurs in episodes at local and at regional level. In such episodes, precursors and photochemical oxidants transported over long distances are involved.

### *Pollution by tropospheric ozone in the European Community*

4. Pollution by tropospheric ozone is a widespread and chronic problem within the Community. Data submitted by the Member States to the Commission in accordance with the provisions of Directive 92/72/EEC, indicate that during the summer months the threshold level for the protection of human health ( $110 \mu\text{g per m}^3$ , expressed as an average value over eight hours) is exceeded in all the Member States and that in urban environments in excess of 40 million people are estimated to be exposed to potentially harmful concentrations of this aggressive pollutant. With regard to the threshold value for the protection of vegetation ( $65 \mu\text{g m}^{-3}$  expressed as an average value over 24 hours) the monitoring data indicates exceedences in all Member States: in 1995 in over 27% of the Community's rural land area the threshold value for the protection of vegetation was estimated to be exceeded during more than 150 days during the year.
5. In addition to the threshold values for the protection of human health and vegetation, Directive 92/72/EEC also lays down concentration limits for ozone above which the population must either be informed (limit value of  $180 \mu\text{g m}^{-3}$  expressed as the average value over 1 hour) or alerted ( $360 \mu\text{g m}^{-3}$ ) of potential short term health risks. During the summer months of 1994 and 1995 there were over 3000 recorded instances of exceedences of the information warning threshold with values in excess of  $250 \mu\text{g m}^{-3}$  frequently being reported.
6. The effects and costs of ozone pollution on human health and the environment are difficult to quantify. At the concentrations typically experienced during the summer months in the Community, sensitive members of the population can expect to experience symptoms such as sore eyes, sore throats and respiratory problems: indeed during ozone episodes it is advised that vulnerable individuals and in particular the elderly should avoid strenuous exercise. A study on the health costs of road transport in the UK estimated the health impact of the emissions of VOCs from that sector (850 kilotonnes) at 1010 premature mortalities and significant morbidity effects, due to its contribution both to ozone formation and to particulate matter.
7. With regard to its impact upon the environment, ozone pollution is known to affect photosynthesis producing lesions and discoloration of leaves. At the concentrations of ozone which currently prevail during the summer growing season in the Community, production losses may amount to between 5-10%.
8. Concern with regard to tropospheric ozone pollution has given rise to a number of initiatives to reduce emissions of the precursors which give rise to ozone formation. At the international level, within the framework of the UNECE Convention on Long Range Transboundary Atmospheric Pollution, a protocol was adopted in 1993, committing signatories (including 14 EU Member States and the Community) to reduce VOC emissions by 30% by 1999 as compared to 1990.
9. In May 1996 a meeting at ministerial level of 8 countries from north-western Europe (Belgium, Denmark, France, Germany, Ireland, Luxembourg, Netherlands and the UK) plus the Commission took place in London to discuss the problem of ozone pollution. In the ministerial statement arising from the meeting the ministers asked that:  
  
" the CLRTAP [UNECE Convention on Long Range Transboundary Atmospheric Pollution] and the EC to make further rapid progress towards such a framework [a pan-european framework for the prevention and management of ozone episodes] and to put in place the appropriate measures to minimize emissions of ozone precursors at the earliest opportunity including where appropriate:  
  
- reduction schemes and timetables for implementation of the second UNECE CLRTAP NO<sub>x</sub> protocol;

- measures within the EC, as appropriate, to reduce emissions of ozone precursors from the main mobile, stationary and household sources such as the Stage II VOC directive, year 2000 vehicle and fuel standards, a solvents directive, an acidification strategy and an ozone directive and an exploration of the use of financial and fiscal instruments."

In the same ministerial statement it was also recognized that emissions of ozone precursors would probably need to be reduced by significantly more than 60% as compared to current levels in order to reach a situation of virtually no ozone episodes.

10. On 18 June 1996, the Commission adopted a Communication to the Council and the Parliament on "the future strategy for the control of atmospheric emissions from road transport taking into account the results from the Auto-Oil programme" (COM(96) 248 final). This Communication was accompanied by two legislative proposals, one dealing with passenger car emissions and the other with quality standards for petrol and diesel fuel. Further proposals on light commercial vehicles, heavy duty vehicles and inspection and maintenance scheduled for 1997 will complete the package of measures derived from the Auto Oil programme. In its Communication, the Commission indicated that one of its major objectives in reducing emissions from road transport was to bring down the levels of NO<sub>x</sub> and VOCs which are the principal precursors of ozone formation. One of the environmental objectives upon which the Commission has based its future policy on the control of vehicle emissions is the need to reduce man made emissions of NO<sub>x</sub> and VOCs by 70% by the year 2010 as compared to today's levels. The package of legislative proposals resulting from the Auto-Oil programme will achieve this level of emission reductions from the road transport sector. However, without reductions of a similar intensity in the emissions of ozone precursors produced by other sectors, the Community will not achieve satisfactory air quality with respect to ozone, as shown by the modelling work done in preparation of the Auto-Oil Programme.
11. That work made extensive use of the EMEP model developed to support the various protocols which have been established in the context of the 1979 Geneva Convention on transboundary air pollution. On the basis of data relating to emissions of primary pollutants, the detailed chemistry of ozone formation and factors such as temperature, wind speed, intensity of solar radiation etc, the EMEP model can be used to predict ozone concentrations throughout Europe. Having taken into account the expected trends in emissions of primary pollutants the predicted air quality values were then compared with the air quality objectives for tropospheric ozone as laid down in Directive 92/72/EC (see Table 1).
12. Some of the results generated from the EMEP model are given in Table 2. These results are expressed as the percentage of the Community's land area in compliance with the various air quality objectives. It can be seen from this table that further measures to reduce ozone precursor emissions from mobile sources will, on their own, have little effect on the problem. On the hypothetical assumption that in 2010 there are no emissions from road traffic, the 53% of land area in compliance with the 180µg/m<sup>3</sup> target only increases to 73%. This is due to the fact that by 2010 the percentage of, in particular, VOC emissions which is due to mobile sources will have decreased markedly (in 1990 58% of VOCs came from stationary sources and 42% from mobile sources, whilst predictions for 2010 show 73% of the residual emission coming from stationary sources, with only 27% from mobile sources).
13. The Auto-Oil team then approached the problem from a different angle. Rather than make any assumptions about relative decreases in emissions from various sectors, they considered the improvements in compliance with the health levels which could be expected as a result of across-the board decreases from all precursor sources. Table 5 thus also indicates the predicted impact of 50%, 60%, 70%, and 80% emission reductions in both NO<sub>x</sub> and VOCs from all anthropogenic sources as compared to 1990.

14. The nature of ozone formation is such that dramatic reductions from all sources for all precursors are required before complete compliance with air quality standards can be expected. Indeed it is only when an 80% emission reduction (compared to 1990) of precursors from all sources is achieved that over 90% of the EU land area is predicted to have a 1 hour maximum ozone concentration below  $180\mu\text{g}/\text{m}^3$ . With regard to the 99 percentile 1 hour mean  $180\mu\text{g}/\text{m}^3$  standard, across the board reductions in ozone precursor emissions of 60% and 70% correspond to a percentage land area compliance of 95 and 99% respectively. On this basis, the overall emission reduction target for ozone precursors for the Auto-Oil Programme was set at 70% of 1990 levels<sup>1</sup>.

**Table 1**

**Comparative Values: reactive pollutant modelling**

Guidelines	Air Quality Standard	Relevance
Directive 92/72/EEC	$110\mu\text{g}/\text{m}^3$ 8-hour average	Health protection threshold
Directive 92/72/EEC	$180\mu\text{g}/\text{m}^3$ 1-hour average	Threshold level over which information / warnings have to be issued by the authorities to the general public.
WHO Air Quality Guidelines 1995	$120\mu\text{g}/\text{m}^3$ 8 hour average	Protection of health threshold

<sup>1</sup> Already agreed measures will reduce ozone precursor emissions across the EU to nearly a half of those in 1990. Therefore the additional emission reductions required in 2010 to achieve the target of 70% reductions compared to 1990 is equivalent to approximately one third off the predicted 2010 emissions.

**Table 2**

**EU Compliance with Ozone Air Quality Standards**

Scenario	Percentage of EU Land Area (measured in EMEP grid squares) in Compliance with Standards			
	1 h mean 100 percentile	1 h mean 99 percentile	8 h mean 100 percentile	8 h mean 99 percentile
	% < 180 $\mu\text{g}/\text{m}^3$	% < 180 $\mu\text{g}/\text{m}^3$	% < 120 $\mu\text{g}/\text{m}^3$	% < 120 $\mu\text{g}/\text{m}^3$
1990 basecase	37	73	not known	10
2010 Basecase	53	87	5	19
1990 basecase -50%	62	89	8	25
1990 basecase - 60%	73	95	11	28
1990 basecase - 70%	81	99	18	37
1990 basecase - 80%	92	100	26	46

15. The most important conclusions of the Auto Oil modelling for Regional Ozone Pollution are as follows:
- that the emission reductions resulting from already agreed measures will by 2010 bring about a considerable improvement with regard to regional ozone pollution;
  - that to reduce ozone pollution beyond that achieved by already agreed measures will require significant emission reductions of NO<sub>x</sub> and VOCs emissions of the order of 70-80% as compared to 1990;
  - that for the purpose of the Auto Oil programme an emissions reduction target of at least 70% compared to 1990 levels of both total NO<sub>x</sub> and total VOCs across the EU would be used.
  - that further emission reduction measures applied to traffic will, in the absence of parallel measures applied to other sources particularly sources of VOCs, have at most a marginal impact.

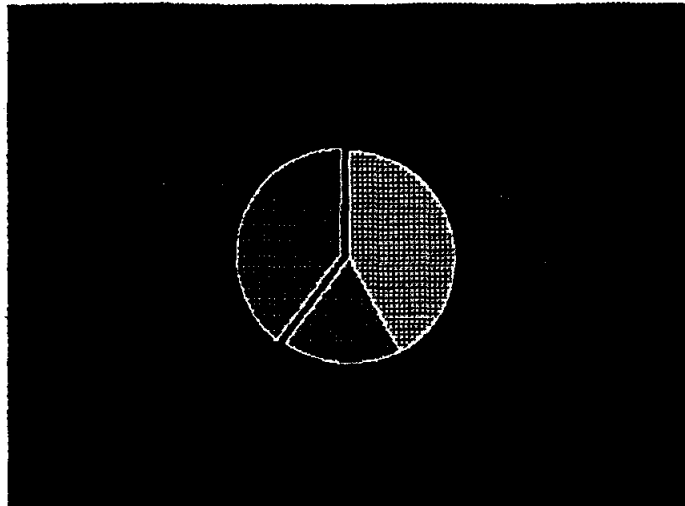
#### *Environmental objectives*

16. The last conclusion was the crucial one in determining that measures for the control of VOC emissions from stationary sources was necessary, and that this initiative, which was already in a high stage of preparation, should be brought forward with all speed. However this Proposal is only one in a series of measures to tackle the problem of tropospheric ozone, which, because of its two precursors, each of which has many different sources, requires action on many different fronts. The Commission will examine carefully the extent of the remaining problem with a view to identifying the most cost-effective set of additional measures, whether at local or at national level, to resolve it.
17. The proposed Directive forms a part of the implementation of the Fifth Action Programme and of a series of measures aimed at an overall reduction of volatile organic compound (VOC) emissions in the Union, to extend the reduction of 30% between the years 1990 and 1999 to which the Commission is committed under the Geneva protocol on VOC reduction. In the long run, based on the scientific evidence currently available, significantly larger VOC reductions, in the range of 70% to 80%, need to be achieved in order to reduce the severity and frequency of ozone episodes.
18. According to CORINAIR '90-figures, the 1990 man-made emission of non-methane VOCs in the European Union are of the order of 12 million tonnes per year, split as shown in Figure 1 below among different sectors:

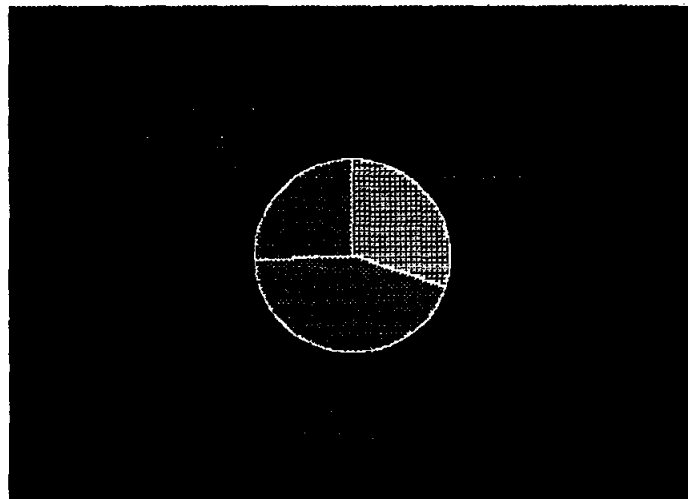
**Figure 1: Total anthropogenic VOC emissions (1990)**

**Total emissions: 12 470 ktonnes**

**Total emissions from Stationary Sources: 3 793 ktonnes**



**Total emissions from  
mobile sources:  
5 615 ktonnes**



**Total emissions from other sources: 3 062 ktonnes**

<i>Agriculture</i>	<i>611 ktonnes</i>
<i>Products</i>	<i>1 490 ktonnes</i>
<i>Extraction and distribution of fossil fuels</i>	<i>961 ktonnes</i>



19. It should be noted that the contribution to man-made VOC emissions from organic solvent use is in the order of 30%, of which around 20% represents industrial solvent use. Industrial solvent use is responsible for around half of industrial VOC emissions. Therefore it is among the most important emitting sectors.
20. Some measures to reduce emissions of organic compounds at the level of the European Union have already been taken. For example, a number of Council Directives require the control of hydrocarbon emissions from passenger cars and light and heavy duty vehicles. Existing measures will reduce vehicle exhaust and evaporative VOC emissions from road transport by about 44% by the year 2010 (economic growth included). And as indicated above the Auto-Oil Programme will, *inter alia*, reduce VOC emissions from this sector by around a further 24% by the year 2010.
21. Additional legislative steps on road traffic emission and the gasoline distribution system have been put in place. For example, the so-called "Stage I" Directive (94/63/EC) aims at reducing VOC emissions over the complex gasoline distribution chain; and the "non-road" vehicle Proposal on which a Common Position has recently been reached aims at reducing, *inter alia*, hydrocarbon emissions from a number of types of mobile machinery and non-road vehicles.
22. A reduction of the emissions from stationary sources of solvent which is commensurate with these but which takes into account the specific characteristics of the sectors involved is therefore necessary. The 57% reduction that this Proposal requires of industry will go beyond its proportionate share of the obligations under the UNECE protocol.
23. According to CORINAIR '90 figures, in the sector of organic solvent use, a large number of sources contribute to the total of emissions. The method of practical application of solvents within these sources differs among the various processes. Therefore specific requirements have to be laid down for the different areas of application. These are, however, kept as simple as possible. Table 3 identifies the subsectors considered:

Table 3

Organic solvent consuming activity	Relative importance of the total emission of the sector "Industrial Solvent use" in %
<u>Paint application</u>	6.3
Paint application: manufacture of automobiles	32.0
Other industrial paint application	
<u>Degreasing and dry cleaning</u>	12.8
Metal degreasing	4.1
Dry cleaning	
	2.1
<u>Chemical products manufacturing or processing</u>	4.5
	1.4
	3.6
Rubber processing	
pharmaceutical products manufacturing	13.4
Paints and inks manufacturing	4.3
Adhesives manufacturing	10.4
	5.1
<u>Other use of solvents and related activities</u>	
Printing industry	
Fat, edible and non-edible oil extraction	
Adhesive coating	
Preservation of woods	

24. These subsectors are responsible for about 60% of the total emissions of organic compounds from the sector organic solvent use, equal to about 2.2 million tonnes (the remainder is essentially domestic use).
25. In determining the extent of reduction that was achievable from this sector, the starting point taken was to determine what is the Best Available Technology for the sectors involved and to calculate what emission reduction could be achieved by those values, and at what cost. On this basis the Commission established these values in the course of 1993 and commissioned a study on their economic impact from the Franco-German Institute for Research on the Environment (IFARE)<sup>2</sup> ("the Karlsruhe report"). It was evident that the result which could be obtained from the application of Best Available Techniques was in the region of a 67% reduction in emissions, compared with 1990, from the installations covered by the Proposal taking the 1990 industrial profile. Factoring in growth over the lifetime of the Proposal would give a reduction in the final year of operation of the Proposal of around 57%, or 1.5 million tonnes reduction. Evidence from a study conducted for the UK Department of Trade and Industry by

<sup>2</sup> "Assessment of the cost involved with the Commission's Draft Proposal for a Directive on the limitation of the organic solvent emissions from the industrial sectors", J Hein, C Kippelen, F Schultmann, T Zundell, O Rentz, Final report August 1994.

ERM economics<sup>3</sup> ("the UK DTI study") indicated that indeed the marginal costs for reduction from the solvent-using sector increase significantly as the reduction target moves upwards from around 55%. The modelling done so far indicates that this reduction is extremely unlikely to solve the ozone problem across Europe, and further measures will almost certainly be necessary.

## II. Costs, benefits and effectiveness

### *Advantages and costs of the Proposal*

26. In principle, there is no doubt that the technology exists to control collected waste gas emissions from processes covered by the proposed Directive to very low levels. In practice, however, the cost of the abatement equipment required to treat extremely high gas flows or very low concentrations to the lowest level is likely to be prohibitive in some cases. Thus in addition to the general emission limit values laid down in Article 5 for special groups of organic compounds, individual emission limit values to be applied to all organic compounds are laid down for the different processes in Annex III(A). In most of the cases, the proposed emission limit values leave a choice of technologies. There are some where values higher than the average have been set to allow particular control options (e.g. adsorption and solvent recovery), and some where the values have been set particularly low, for instance to guarantee the destruction of potentially harmful substances.
27. It is difficult to express the benefit of the measures proposed in terms of money due to the lack of appropriate methodologies for transferring protected values like human health and cultural heritage into economic values. However, it is estimated that a 50% reduction of ozone precursors would result in an increase in compliance with the one-hour mean concentration established under directive 92/72/EEC (on a 99 percentile basis) to around 90% of the Community's land area. This reduction, and progress towards the further goal of a reduction of 70/80% of ozone precursors, can only be achieved by action on all precursor sources, and the Commission is launching or has launched a number of initiatives tackling the main contributors to the problem. However it is not feasible to achieve a reduction of the full 70-80% magnitude from the solvent-using sector over the timescale of the Proposal. It therefore sets as a target the greatest reduction that can currently be achieved in a cost-effective manner, taking into account the urgent need to tackle the tropospheric ozone problem.
28. It is not possible to make a very accurate and exhaustive assessment of the cost involved in implementing the proposed Directive owing to the many uncertainties regarding developments in this sector, e.g. the great variety of the installations concerned, the gaps in knowledge about the technologies in place, and constraints on the choice of operators with regard to the different reduction options given. The costs involved with the implementation of the measures proposed can thus only be estimated. A detailed sector by sector cost study, carried out in cooperation with industry, came to the conclusions set out in Table 4 below (figures assume a depreciation period of ten years):

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<sup>3</sup> Department of Trade and Industry, 'Costs and benefits of the reduction of VOC emissions from Industry', ERM Economics, May 1996

Table 4

Sector	EU total annual sector costs in Mecu/annum
Printing	124
Surface Cleaning	725
New Car Coating	688
New Truck Cabins and New Trucks Coating	484
New Buses coating	80
Vehicle Refinishing	40.5
Coil Coating	5.5
Other coating	726
Wood coating	120
Coating of textiles	4.5 (estimate)
Dry cleaning	102
Wood impregnation	26
Leather coating	44
Adhesive coating	31
Manufacture of coatings	12
Rubber Products	438
Vegetable Oil Extraction	23
Pharmaceutical industry	120

29. To check that the reduction of around 57% was indeed a reasonable reduction to ask of the sectors concerned, the obvious benchmark was the Auto-Oil Programme itself. The detailed marginal cost data used to determine the Auto-Oil controls was not available for this Proposal for all sectors. For this reason neither an optimisation of the pollution control measures taken based on marginal cost analysis, nor a detailed marginal cost comparison with Auto Oil, was possible. In any event, a 'pure' economic analysis of that kind conducted across such a range of sectors would raise other questions, particularly that of an equitable distribution of the costs involved in making the reductions, in which the average cost per tonne reduced compared with the value added for the sector would also be a factor, which industry itself would press to be considered. Thus the main benchmark which has been taken in comparison with Auto-Oil is an aggregated average cost comparison.

30. In total, the annual costs of the Proposal are around ECU 4 billion, equal to around ECU 10 per person per year in Europe. However this figure represents cash costs, and in order to conduct a comparison with Auto-Oil it is necessary to take the ratio of the average annual cost, in net present value terms (ECU 3 billion/a), and the abatement achieved in the final year of operation of the Proposal (1 500 ktonnes). This is equivalent to a cost per tonne of VOC abated of ECU 2/ktonne which compares favourably with the costs of measures being taken by other sectors to combat the ozone problem. In summary, the Auto-Oil Programme produces a reduction of ozone precursors of 2 million tonnes at a cost of ECU 3/ktonne, whereas the current Proposal produces a reduction of 1.5 million tonnes at a cost of around ECU 2/ktonne.

31. However it must be recognised that the industry covered by this Proposal is in general of a very different character to the large industrial organizations involved in the Auto-Oil Programme. As shown in the Business Impact Assessment annexed to this Proposal, in the region of 400 000 enterprises are covered by this initiative, many of them SMEs, for whom cost burdens of this magnitude are significantly harder to bear than for large conglomerates. Therefore every effort has been made in drafting the Proposal to allow as much flexibility as possible to enable the avoidance of high marginal cost measures. An example is the introduction of an "investment protection" clause in paragraph 5.1 of the Proposal which allows installations which have already installed abatement equipment the option to make a reduction equivalent to the additional abatement reduction required by the Proposal from their fugitive emissions, rather than having to reinvest in new process equipment to achieve exactly the same environmental benefit. Further such measures are described under Section III "Subsidiarity".

### *Justification of the instrument chosen*

32. A Directive is more appropriate than a Regulation because it is appropriate to allow flexibility to the Member States in the implementation of the measures to achieve the desired result, for reasons of economic efficiency and in order to allow them to build on existing measures taken. A Directive is more appropriate than a Decision or Recommendation as legislation is required to amend existing national laws.

### **III. Subsidiarity**

33. The proposed Directive is fully in line with the principle of subsidiarity, and its wider concept of shared responsibility, by mixing actors and instruments at the appropriate levels. It establishes a target for VOC reduction based on the technically and economically feasible reductions in each sector, and Member States are then required to achieve this, either by implementing emission limit values or by establishing national plans containing other measures which will achieve the same reduction. Thus whereas a European approach to reducing emissions of ozone precursors is necessary given the transboundary nature of the problem, the intention of the Proposal is to allow as much flexibility as is compatible with achieving the overall aim. With the national plans Member States would have the following options: to set emission limit values in legislation which are different from those established under the Proposal; to achieve the reduction by means of a negotiated agreement with industry; to achieve the reduction by means of a system of tradeable permits; or to achieve it by a system of taxation. In addition, the Member State can use the national plan to tailor the distribution of reductions required to match its own industrial profile. Any combination of these measures which achieves the desired result is permissible.
34. Moreover, for the individual operator, the Proposal's emission limits allow the achievement of the reduction in the most cost effective way: either by the use of abatement technology, or by substituting high solvent products with low-solvent or solvent-free products. The practical implementation, including the identification of the most cost effective measures, is therefore, to a very large extent, left in the hands of Member States and the operators of the installations concerned. This also holds for many aspects of implementation of the proposed Directive.
35. The principle of proportionality has been incorporated in a number of ways. The types of installations selected and the setting of thresholds mean that installations which, due to the processes they carry out or their relatively small size, emit only small quantities of organic compounds, or which would be very difficult to control because they are so large in number, have been left out from the scope of the Proposal. Proportionality is also applied in the settings of the emission limits which take into account, as far as possible in the frame of a Directive, differences among organic solvent consuming processes when determining technically and economically feasible reductions. A process of long consultation with the interested parties has resulted in controls worked

up over a period of time which, whilst rightly ambitious, are certainly achievable and coincide with the direction in which industry is moving. In addition, there are add-on benefits for the operator. A switch to low-solvent coatings, for example, would reduce the need for costly health and safety or accident prevention measures. Further, it has time and again been demonstrated that industry which invests in the newest (and cleanest) technology reaps a benefit in productivity and in competitiveness.

#### IV. Results of consultations with stakeholders

36. In October 1991 consultation began, in the form of a discussion paper, with the Member States and industry. The first draft of a Proposal was prepared in the beginning of 1992 and distributed to all parties concerned. In total eight formal meetings were held with representatives of the Member States, six of which were joint meetings with industrial representatives<sup>4</sup>. In addition, many informal meetings with individual Member States, industrial associations and other interested parties have also been held in order to exchange views on the Proposal.

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<sup>4</sup> The following industrial associations, firms and consultants, representing the interests of industry, were involved in the consultations:

ACEA - European Automobile Manufacturers Association  
BDI - Bundesverband der Deutschen Industrie e.V.  
Becker Industrial Coatings Ltd  
BFM - British Furniture Manufacturers  
BLIC - Bureau de Liaison des Industries du Caoutchouc des Communautés Européennes  
BP Chemicals  
BPIF - British Printing Industries Federation  
BVD - Bundesverband Druck  
CEAPLI  
CEFIC - European Chemical Industry Council  
CEFIC - Hydrocarbon Solvents Sector Group (a Sector Group of CEFIC)  
CEIB - European Confederation of Woodworking Industries  
CEPE - European Confederation of Paint, Printing, Ink and Artist's Colours Manufacturers Associations  
CETS - Comité Européen des Traitements de Surface  
CITEN - International Committee of Dyeing and Dry Cleaning  
COMITEXFIL - Coordination Committee for the Textile Industries in the EEC  
COTANCE - Confederation des Associations Nationales de Tanneurs et Mégissiers de la Communauté Européenne  
Dollamar & Co.  
ECCA - European Coil Coating Association  
ECSA - European Chlorinated Solvent Association  
EFPIA - European Federation of Pharmaceutical Industries' Associations  
ENVICON - Environmental Consultancy  
ERA - European Rotogravure Association  
ETE - Environmental & Thermal Engineering Ltd.  
EWPM - European Wood Preservative Manufacturers Group  
FEICA - Fédération Européenne d'Industries de Colles et Adhésifs  
FEDES - European Federation for the Flexible Packaging Industry  
FEDIOL - EC Seed Crushers' and Oil Processors' Federation  
FINAT - Fédération Internationale des Fabricants et Transformateurs d'Adhésifs et Thermocliant sur papier et autres supports  
FPA - Flexible Packaging Association  
INTERGRAF - International Confederation for Printing and Allied Industries  
KWL-Verein - Verein der Kohlenwasserstofflösungsmittel-Textil- und Lederreiniger  
ORGALIME - Organisme de Liaison des Industries Métalliques Européennes  
SEFA - Syndicat Européen de l'industrie des Fûts et Acier  
SEFEL - European Secretariat of Manufacturers of Light Metal Packaging  
TSA - Textile Services Association Limited  
UEA - European Furniture Manufacturers  
UEAPME - European Association of Craft, Small and Medium-Sized Enterprises  
UEDA - Union Européenne de l'ameublement  
UNICE - Union of Industrial and Employer's Confederation of Europe  
UNITES - Fédération des Industries de Transformation pour Emballages Souples  
Verband der Lackindustrie e.V./ Verband der Druckfarbenindustrie  
W.E.I. - Western-European Institute for Woodpreservation

37. The Proposal has evolved during the course of these discussions. The major changes that have been made include: greater clarification of the scope of the proposed Directive, improvement of the cost efficiency due to the selection of appropriate sectors and sectorial thresholds, incorporation of national plans, more detailed definition of requirements for individual sectors, and incorporation of alternative sectorial emission reduction systems which provide incentives for other measures than waste gas cleaning. More detailed discussion of the results of the consultation with individual industrial sectors, and in particular of those points where there remain disagreements between industry and the Commission, can be found in the Business Impact Assessment.

#### V. Description of the legislative situation in the Member States

38. More or less legally binding legislation on processes responsible for emissions of organic compounds, or parts of this sector relevant for the proposed Directive, are laid down in nine countries: Denmark, F.R. Germany, France, Italy, Netherlands, Portugal, United Kingdom, Finland, Austria and Sweden. In the other countries most of the installations and processes covered by the proposed Directive require authorization prior to operation. Emission limits are laid down in such cases individually in each permit.
39. In **Denmark** the Danish Environmental Protection Agency published guidelines for the control of air pollution from industrial enterprises, specifying in more detail the general pollution limitation principle expressed in Section 3.3 of the Environmental Protection Act. They apply to all installations included in the list given under Section 5 of the Act. However, the guidelines are not legally binding for local authorities so that they can deviate from the emission limits given as well as from the list of classified installations. It is therefore not clear whether and to what extent processes and industrial installations which fall under the proposed Directive are actually treated in accordance with the guidelines. Moreover, the guidelines are substance-orientated and do not fix emission limits for specific industrial or commercial activities. The emission limit value to be applied mainly depends on the emitted substance and its mass flow. The substances are grouped into three classes (I, II, III) and there are some organic solvents in all three.
40. In the **F.R. Germany**, the Fourth Order implementing the Federal Immission Control Law (Order on Installations Subject to Licensing) contains a list of installations which have to go through a licensing procedure. Many of the installations covered by this Proposal also fall under the Fourth Order.

For these installations, emission limits relevant for this report are laid down in the Technical Instruction on Clean Air, T.A. Luft. T.A. Luft distinguishes between carcinogenic and non-carcinogenic substances, and within each group defines three classes according to the potential hazard of the substances. Different sets of emission limits apply for the groups and classes:

For carcinogenic substances:

Substances of Class I: if mass flow is  $> 0.5$  g/h, the emission limit is  $0.1$  mg/m<sup>3</sup>  
Substances of Class II: if mass flow is  $> 5$  g/h, the emission limit is  $1$  mg/m<sup>3</sup>  
Substances of Class III: if mass flow is  $> 25$  g/h, the emission limit is  $5$  mg/m<sup>3</sup>

For non-carcinogenic substances:

Substances of Class I: if mass flow is  $> 0.1$  kg/h, the emission limit is  $20$  mg/m<sup>3</sup>  
Substances of Class II: if mass flow is  $> 2.0$  kg/h, the emission limit is  $100$  mg/m<sup>3</sup>  
Substances of Class III: if mass flow is  $> 3.0$  kg/h, the emission limit value is  $150$  mg/m<sup>3</sup>

Where mixtures of classes of solvents are present, the more restrictive limits are applied. Manual spray painting is excluded from compliance with the limits set for classes II and III, but in practice these limits are considered as target values by local authorities.

These limits apply to new facilities from 1986, and pre-existing facilities must comply since March 1991. Existing facilities in the former GDR have been allowed an extra year to comply.

Continuous monitoring of VOC emissions is required for installations which exceed the following mass flows:

Substances of Class I:	1 kg/h
Mixtures of Substances of Class I and III:	10 kg/h

Emissions of VOC are expressed as sum of total organic compounds. In addition, specific requirements are made for certain activities such as vehicle coating, printing, dry cleaning and surface cleaning.

41. In France, the act of 19 July 1976 lists some 400 "classified installations", divided into two main categories: installations in class I are subject to authorizations and have to meet certain requirements governed by prefectural decrees. Notification by the owner or operator of installations suffices for the other class. Some of the installations in the act are relevant for the proposed Directive.

No legally binding and generally applicable emission limits for the whole sector of industrial installations using organic solvents are laid down. However, there are emission limits defined for some of the installations and processes regarded in the proposed Directive, such as car-coating, printing, dry cleaning, coil coating and varnishing. Different emission limits can be laid down by local authorities in cases where water-based inks are used. For installations which emit more than 500 kg per day, continuous monitoring is required.

In addition to the provisions outlined above an agreement was signed on 19 February 1986 between the French Government and the coating and varnishing manufacturers to reduce the average content of hydrocarbon solvents in their products and to encourage their use by advertising aimed at the general public and professionals alike.

42. In Italy, trade and industrial processes which cause air pollution are classified into two groups. The first relates to industrial installations which must be located far away from residential areas; the second relates to trade activities. As a rule, the Ministry of Health issues a new list of classified installations every three years. This list contains some installations and cases relevant for the proposed Directive.

Law 203, published in 1988, states that guidelines set by the central government apply to all areas within a region. Regions may produce tighter controls only for specific areas with specific problems. In July 1990 the Italian Minister of the Environment produced guidelines for the control of emissions from a range of industrial processes including some of those falling under the proposed Directive.

As in the case of German TA-Luft the substances are grouped into carcinogenic and non-carcinogenic ones and split into several subclasses. The emission limits depend on the characteristics of substances. For carcinogenic substances the emission limits are as in TA Luft. For non-carcinogenic substances, there are five classes (I to V) for which the following emission limits are laid down:



- Substances of Class I: if mass flow is  $> 25$  g/h, the emission limit value is  $5$  mg/m<sup>3</sup>
- Substances of Class II: if mass flow is  $> 0.1$  kg/h, the emission limit is  $20$  mg/m<sup>3</sup>
- Substances of Class III: if mass flow is  $> 2.0$  kg/h, the emission limit is  $150$ mg/m<sup>3</sup>
- Substances of Class IV: if mass flow is  $> 3.0$  kg/h, the emission limit is  $300$ mg/m<sup>3</sup>
- Substances of Class V : if mass flow is  $> 4.0$  kg/h, the emission limit is  $600$ mg/m<sup>3</sup>

These general requirements apply to all installations of the proposed Directive which are covered by Law 203. More specific requirements are laid down for certain activities, such as car coating and surface coating.

43. In the **Netherlands**, the Air Pollution Act of 1972 requires that no establishment belonging to a list of about 400 installations may be set up or operated without permission to be issued by the provincial authorities. The information required to accompany an application is set out in the 1988 Decree on Air Polluting Plants. Guidelines on emission limits to be set by provincial authorities are given in the "Nederlandse Emissie Richtlijnen - Lucht" (NeR), a paper which is in its concepts in principle identical to the German T.A. Luft. However, the NeR has no legal status but serves only as a basis for consultations between licence applicants and licensing authorities, although binding emission limit values are set out for such sectors as dry cleaning.

The outcome of these consultations is a set of legally binding requirements on industry set out in the programme KWS-2000, which includes emission reduction measures for many of the source categories covered by the proposed Directive.

44. In **Portugal** all installations covered by the proposed Directive are subject to authorization procedures. Since 12 March 1993, new installations have to comply with an emission limit value for stack gas emissions of organic compounds of  $50$  mgC/m<sup>3</sup>. Existing installations shall have to comply with this limit value by 1 January 1999.
45. In the **United Kingdom**, the Environmental Protection Act 1990 has introduced Integrated Pollution Control (IPC) for industrial processes with major potential to pollute all three media: air, land and water. Part A processes are enforced by the Environment Agency. A second tier of industrial processes (Part B) where the major potential to pollute is to the air, are subject to Local Authority Air Pollution Control (LAAPC). The industrial sectors controlled by this legislation are defined by the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

Industrial operations using solvents covered by the proposed Directive fall mainly into Part B. Secretary of State's guidance notes are issued to local authorities on the detailed standards (including emission limits) which should apply to each Part B sector. A final deadline is given in each note by which existing processes should be upgraded to the full standards of the note. The upgrading deadlines for these sectors vary, ranging from 1996 to 1999, with the exception of car manufacturing which has a final date of 2001 for existing plants to reach the full new plant standards and an interim date of 1996 for some of the standards to be reached. Nearly all of the sectors under the proposed directive are covered by such a guidance note.

46. In **Finland**, installations with a solvent consumption of more than 50 tonnes/year or where the peak consumption is more than 100 kg/hr must be permitted under the Air Pollution Control Act and Air Pollution Control Decree 1982. Permits are given on a case-by-case basis, with emission requirements and monitoring provisions tailored to the circumstances of the individual site. No general regulations or other requirements for any solvent-using sector have yet been issued.

47. In Sweden, the basic statute is the Environmental Protection Act 1969, which controls air pollution activities. The basis of this act is an individual assessment of environmentally hazardous activities; the Environmental Protection Agency sets out general guidelines, not legally binding, which are taken into account in the permitting process. Activities causing VOC emissions are regulated above thresholds based on a number of factors, depending on the sector: the consumption of VOC, the amount of raw material used, or the production. Some particularly hazardous sectors are regulated without any threshold. For activities where the consumption of VOCs is the trigger, permits are required for installations consuming more than five tonnes/year of halogenated organic solvent, or more than ten tonnes/year of other organic solvent. Notification to the local environmental authority is required for consumption of one to five tonnes halogenated organic solvent per year, or three to ten tonnes other organic solvent per year. The operator is obliged to monitor the operation of the activity, and the enforcement authority can specify in detail the monitoring required in the form of an inspection programme. Again the EPA sets general guidelines for the content of such programmes.
48. In Austria, there are two regulations in place dealing with emissions of solvents. One limits the solvent content in products for domestic and commercial use, and the other sets emission limit values for emissions from solvent-using installations. The emission limit values for plants with a consumption capacity of > two tonnes/annum but less than five tonnes/annum are 50 mgC/m<sup>3</sup> for new installations and 75 mgC/m<sup>3</sup> for existing installations. For installations with a consumption capacity > five tonnes/annum the corresponding values are 20 mgC/m<sup>3</sup> for new plants and 30 mgC/m<sup>3</sup> for existing plants. The products regulation has been in force since January 1996. The emission control regulation will apply from 1999 for new installations and from 2001 for existing installations. It covers installations for the coating of wood, metal and plastic.

## **VI. Choice and justification of legal basis**

49. The legal basis of the proposed Directive is Article 130s of the EEC Treaty because its main effect is to reduce the emissions of volatile organic compounds with a view to improving environmental protection. The provisions of the Proposal do not achieve a complete harmonisation: although emission limits are included in the directive, they are included in order to define implicitly the reduction to be achieved, and Member States are not bound to implement those particular values so long as the reduction is achieved. The proposed action is therefore to be considered principally as an environmental action taken at Community level, in application of Article 130s of the Treaty.

## **VII. Explanation of the provisions of the Proposal**

50. Following the principle of subsidiarity, the proposed Directive is designed to set a context for reduction of emissions of volatile organic compounds from the solvent using sector, with the reductions to be achieved by specific measures taken at national level. It covers twenty four main types of installations and processes, some of them covering a large number of subtypes.
51. The installations and processes covered by the proposed Directive are numerous and diverse, and not all Member States operate all the processes listed. However, in order to avoid the drafting of a large number of individual Directives for the different solvent-using processes, and because only one aspect of the activities (namely, VOC emissions) was being considered, it was decided to incorporate several different types of activities into one Proposal. To that extent the proposed Directive can be considered as a substances-orientated regulation. It defines the reduction required implicitly, by means of emission limits linked to the reductions technically and economically achievable in particular sectors. It then requires that Member States

meet that reduction, either by implementing the emission limits, or by establishing a network of other controls (a national plan).

52. The proposed Directive also establishes controls on solvents which are a risk because of their direct effects on human health. In particular, VOCs which are carcinogenic, mutagenic or toxic to reproduction must be controlled by means of emission limit standards. The national plan alternative cannot apply for these substances given the nature of their potential effects - they must be controlled on an installation by installation basis.
53. With regard to the general aspects, the following items are of relevance for all processes:
- (i) the definition of all relevant terms used in the proposed Directive;
  - (ii) general obligations for new and existing installations, those undergoing major modifications, and those where several processes considered by the proposed Directive are carried out in parallel;
  - (iii) the laying down of general emission limitations and of special provisions for toxic and environmentally relevant substances including stringent emission limit values;
  - (iv) an exchange of information on the possibilities for substitution;
  - (v) general monitoring requirements;
  - (vi) the detailed definition of the emission limitations and the way they have to be calculated;
  - (vii) provisions on compliance with the given limitations;
  - (viii) obligations regarding the drafting of national programmes;
  - (ix) the dates of coming into force and coming into effect of the proposed Directive.
54. The following items are regulated for each process or installation separately:
- (i) the size and type of the installations and processes for which specific requirements of the proposed Directive apply;
  - (ii) limitations for emissions of organic solvents and/or organic compounds;
  - (iii) certain special provisions which take into account circumstances particular to a given sector.
55. The proposed Directive is addressed to Member States which shall take all measures necessary for its implementation.

56. Article 1

The aim of the proposed Directive is to protect public health and the environment from direct and indirect effects of emissions of organic solvents, or organic substances generated due to the use of organic solvents, e.g. due to the abatement measures taken. It does not apply to occupational health conditions. The installations and processes which are covered are listed in Annex I: in order for a process within an installation to come under the proposed Directive, it must fall both within the definition of a process and within the threshold set out for that process in Annex III.

57. Article 2 and Annex II

The principal definitions relevant to the main text of the proposed Directive are given. Most of these are self explanatory.

Of special importance is the definition of organic solvents. Organic solvents are defined by their chemical character (organic compounds as defined in the Article), their volatility, and their characteristics of application. It is assumed that all relevant organic solvents are covered by this definition, including those which are heated before use.

Attention should also be drawn to the definition of consumption, which excludes organic solvents which are recovered for re-use. Therefore, it provides an incentive for the use of recycling which is in general accompanied by substantial emission reductions. The consumption is expressed as total input of organic solvents into an installation or process per 12-month period and is, therefore, an appropriate indicator of the potential environmental problem caused by the installation. For new installations it will be necessary to estimate the consumption, taking into account the nominal capacity, which is an indicator of the designed size of the installation.

The definition of "Installation" is the same as that in the Directive on Integrated Pollution Prevention and Control. As given, it covers all processes which take place at the same site. Special provisions are made in Article 6 for the case where two or more processes operated at the same site fall under the directive.

Finally, the definition of emission limit value requires the operator to reduce air volumes as much as possible, taking into account occupational health and safety requirements, and states that the air volumes added for cooling or dilution shall not be considered when determining the emission limit. This definition makes clear that all unnecessary air volumes should be avoided or deducted so that compliance with the emission limit value, expressed as mass per volume, cannot be obtained by unfair manipulation. In addition to the emission limit value, which relates to stack gas emissions, two other types of emission limitations are defined, "Fugitive Emission Limit Value" and "Emission Requirement". These are used in order to limit the emission of the process as a whole, rather than simply those from the stack, thus taking into account those emissions which are not captured, and which are normally not regulated, but which make up a significant proportion of the total emission.

58. Article 3

This Article obliges Member States to ensure that all new installations are either registered or authorized and meet the requirements of the proposed Directive. Installations which are required to obtain a permit under Directive 96/61/EC on integrated pollution prevention and control ("the IPPC Directive") do not of course have to apply again for authorization to operate. In Annex I of the that Directive, a threshold of 150 kg/hour consumption capacity of organic solvents, or 200 tonnes/year consumption capacity, is laid down. Installations below that threshold must at least be subject to a registration procedure under the present Proposal. In accordance with the principle of subsidiarity, it is left to Member States to determine which installations outside the scope of the IPPC Directive should be subject to authorization, and which to registration.

59. Article 4

This Article requires that, as a rule, existing installations have to meet the requirement set for new installations as far as authorization to operate and emission limitations are concerned, but within a transition period from the date of coming into force until the date of compliance with Directive 96/61/EC of 24 October 1996 on integrated pollution prevention and control. In a few cases (e.g. concerning the coating of

vehicles) the requirements for existing installations are less stringent than those for new ones.

It can be safely assumed that there are, in principle, no technical obstacles to meeting the emission requirements set out in this Proposal because the techniques to do so are available. Cost is the limiting factor. Taking into account the fact that in many cases investment in new production technology will be necessary in any case within the transition period given, for instance to maintain a high level of competitiveness, the timetable for compliance for existing installations is a reasonable one.

Paragraph 3 treats those cases where an installation undergoes a substantial change, including the case where one comes under the proposed Directive for the first time as a result of a substantial change. In these cases, that part of the installation which undergoes a substantial change must satisfy the requirements for a new installation. This formulation is chosen to ensure that when an operator upgrades, he does so to the level required of new installations. The requirement applies only to the part of the plant which is being upgraded (which is undergoing the substantial change) in order to avoid a perverse disincentive to upgrade which might result if investment in one part were to trigger complete reinvestment in the whole installation.

#### 60. Article 5

This Article sets out the requirements regarding emission limitations under the proposed Directive.

Paragraph 1 sets out the obligations for individual installations. They must either meet the emission limits set out in Annex III(A), or meet the requirements in the reduction scheme set out in Annex III(B) which are designed to produce a reduction in emissions equivalent to that which would result from application of the emission limit values. However as stated previously, the reduction scheme does not apply for those substances with direct health effects, for which emission limit values must always be established, regardless of the reduction option taken under the proposed Directive. However to take account of the situation where an installation has recently invested in abatement equipment and would otherwise be required to reinvest precipitately, a provision is included that, so long as the emissions will be no higher than would otherwise have been the case, an installation can derogate from the values in Annex III(A).

In paragraph 2, special provisions are made for the case that two or more processes, which exceed individually the thresholds of the annex, are carried out at the same installation, in order to make clear which controls apply. The provisions made allow the operator to adopt the most cost efficient emission reduction option which meets the requirements for the total emissions of the installation.

Paragraph 3 provides that fugitive emission guide values are respected in so far as technically and economically feasible. These have been established for certain sectors where, because of the nature of the process, there is insufficient confidence that installations can meet the requirements to justify their being made mandatory.

Paragraph 4 provides that those installations not using the reduction scheme should operate under containment where possible, in order that they can capture and destroy the largest proportion of their emissions. It also provides that the residual emissions from installations are released in such a way that public health and the environment are safeguarded.

Paragraph 5 requires that the use of solvents containing substances with a high potential to cause very serious effects to public health should be avoided, and that they should be replaced, as far as possible, by less harmful substances within the shortest possible delay. Criteria to identify these substances are laid down in Directive 67/548.

Paragraph 6 sets down stringent emission limits for these substances. However, compliance with these limits can in many cases be avoided by substitution, because in most of the processes covered their use is not essential. Setting provisions for these solvents is, therefore, partly a precautionary measure which should prevent their being introduced. Since trace amounts may exist in some of the solvents, the Proposal specifies volume flows below which the emission limits do not apply.

Paragraph 7 lays down general emission limit values for halogenated substances suspected of being a direct threat to public health or the environment in general, and for which more stringent requirements are appropriate.

Paragraph 8 requires that all appropriate measures are taken to minimise emissions during startup and shutdown.

Paragraph 9 deals with the eventuality that the controls established by the proposed Directive are shown by a risk assessment to be inappropriate, and provides for the revision of the limit, in such a case, by a comitology procedure.

61. Article 6

This Article provides for an exchange of information between Member States and industry on the potential for substitution of organic solvents. The crucial criteria here are fitness for use and environmental profiling, and a discussion on these matters at European level is necessary to deal with the complexity of the issues and to ensure comparability of approach across the Community.

62. Article 7

This Article lays down requirements for the monitoring of emissions, requiring adequate demonstration of compliance with all the provisions of the proposed Directive. In general, the monitoring methods and, where necessary, sampling and measurement procedures should be defined by Member States. To give this responsibility back to Member States is in line with the principle of subsidiarity and the provisions of the IPPC Directive. However for installations with a large pollution load it is appropriate that continuous monitoring of the emissions takes place, and the Article makes provision for this.

63. Article 8

This Article specifies the way in which compliance with the emission limitations has to be checked. Firstly, paragraph 1 makes clear that the emission limit value refers either to the total mass of organic carbon or to the sum of the mass of the individual compounds. To limit the mass of individual compounds has the advantage that the emission limits are of comparable stringency, irrespective of the compound, and has, therefore, been chosen to check compliance with emission limit values of organic substances which fall under Article 5(5) and 5(7). However, this requirement substantially complicates monitoring, so that in most cases monitoring by measurement of total organic carbon is sufficient.

Secondly, paragraph 2 defines the statistical rule to be applied within the compliance check in the case of continuous measurements. In general, the emission limit value should not be exceeded within eight hours of actual operation. Since many of the processes are of discontinuous nature the moving average over eight hours has been chosen as indicator. Moreover, under item (ii), the rule provides some flexibility for the operator to deal with unexpected short-term changes in the operating conditions of the installation or the process.

Paragraph 3 lays down compliance rules for periodic measurements, including a minimum number of individual readings per measurement campaign.

Paragraph 4 sets out those parameters with respect to which a solvent management plan is useful to determine compliance, and refers to the guidance on the use of such a plan set out in Annex IV. No statistical evaluation is proposed, but rather that compliance must be demonstrated to the satisfaction of the competent authority. Annex IV itself sets out in detail the way in which the plan can be used in each case. The methodology is provided as guidance rather than made mandatory because of the newness of the concept. Paragraph 5 provides for the amendment of these provisions by comitology in the light of the exchange of information on the solvent management plan.

64. Article 9

This Article defines in a general way the actions necessary in case of non-compliance. In particular, it provides that the operation of the installation is prohibited if necessary, that is, if compliance cannot be restored within an acceptable time frame. It provides also that sectors which do not achieve their targets under a National Plan are required to comply with the emission limit values of the proposed Directive.

65. Article 10

This Article obliges Member States to collect the information necessary to monitor implementation of the proposed Directive. In the light of the complexity of the sectors covered, more than in many other Directives, the submission of detailed information is necessary in order to guarantee a harmonized implementation by Member States. The obligation to publish the reports prepared is a significant addition to transparency.

66. Article 11

This Article sets out standard provisions regarding access to information.

67. Article 12

This Article provides Member States with the option to achieve the same goal as would be achieved by implementation of the emission limit values of the Proposal, but by means tailored to their own national circumstances and set out in a national plan. The plan also allows the option to use alternative instruments to achieve the Proposal's goal; such instruments would of course have to be compatible with any general European-level requirements on their use, and the Member State must demonstrate that they would produce the required reduction. Member States would also have the option of varying the reduction required between sectors to achieve the most economically efficient reduction profile for their industrial circumstances. In this sense, the national plan allows a potential disharmonisation of conditions of competition (although to a far lesser extent than quality objective legislation, for instance, due to the fact that very similar reductions have to be made by all). But this slight disharmonisation is justified in view of the increased efficiency which national plans would allow.

Member States which choose to take the option of applying national plans are exempt from applying the ozone-related emission reductions in the Proposal. However all the other requirements, relating for example to permitting, monitoring and enforcement, continue to apply. The requirements relating to control of emissions responsible for direct health effects also continue to apply.

Member States making use of the provisions of the paragraphs 1 and 2 also have to meet a number of supplementary obligations. They must establish a national authority which collects and evaluates the information relevant for the verification of the national plans. The plans must also identify and meet interim reduction targets to ensure that adequate progress is being made towards achievement of the goals set. Finally, the reports on implementation of the national plan submitted under Article 10 of this Proposal will be assessed by the Commission. The Commission intends to

convene a forum of experts drawn from Member States to assist it with this task. In case of an identified violation of the provisions laid down in paragraph 1, the Council shall be informed and the Member State concerned must take corrective measures. In the case of the original design of the plan, if the Member State fails after the period required to correct the plan in such a way as to make it demonstrably viable, that Member State shall be required to implement the emission limits of the proposed Directive on the same timetable as all other Member States.

68. Article 13

The Article lays down the establishment of an advisory Committee which shall assist the Commission in the following tasks:

- (i) modification to the directive to take account of risk assessment of any of the substances controlled under the proposed Directive according to Article 5(9);
- (ii) modifications to the directive consequent on the exchange of information on experience with the solvent management plan under Article 8(5).

69. Articles 14, 15 and 16

Standard text concerning the coming into force of the proposed Directive and its transposition into national law.

70. Annex I

This defines the activities which come under the proposed Directive.

71. Annex II

This defines the terms used in the proposed Directive. See commentary on Article 2.

72. Annex III

This sets out the basic reduction requirements of the proposed Directive. These are of three kinds:

- emission requirements expressed in solvent emissions related to the amount of product produced; this approach has a number of advantages, in particular that it can be met either by substitution or by abatement;
- traditional emission limits, which can only be met by abatement; and
- a reduction plan designed to allow every installation the option of making its reductions by other means than abatement, and particularly by substitution.

These are considered separately below.

73. Annex III(A)

This sets out emission controls for the sectors covered by the directive, varied according to the size of installation where appropriate, and according to new and existing installations if necessary. Where possible, the emission controls are expressed in terms of mass of solvent emitted per unit product, because this value can be met either by substitution or by abatement, and it is a principle of the proposed Directive that the operator should be able to choose the cheapest option. This kind of emission control also automatically accords credit to those operators who have made a previous effort to control emissions, which a straightforward percentage reduction in emissions, for instance, would not do. These kinds of emission controls are provided for dry



cleaning, for wood impregnation, for leather coating, for footwear manufacture, for wood and plastic lamination, for vegetable oil extraction and for vehicle coating.

For all other sectors, limits are expressed in terms of stack emission limit values and fugitive emission limit or guide values. These values must both be met, but the meeting of a stack emission limit value, which is expressed as a concentration of solvent and not as a solvent load (total quantity emitted) can only be met in general by abatement. This is because substitution, in reducing the quantity of solvent used, drastically reduces the initial concentration of solvent in the waste gases and the total amount emitted, but the concentration in the waste gases will still in general be higher than the emission limit value. For this reason, a means had to be found by which those installations subject to these controls could make an equivalent reduction by substitution. This is the aim of the reduction scheme which forms Annex III(B).

#### 74. Annex III(B)

The main aim of the emission reduction scheme is to allow an operator to make the same reduction as would be made by applying the emission limit values, but to do it by substitution. Accordingly, the reference point for reduction must be the amount of solvents which would be emitted were no abatement to be done and were full-solvent applications used; and the reduction required of the operator must be the same percentage reduction as would be achieved by applying the emission limits to that starting scenario. Such an approach should also take account of progress already made by the operator towards reducing his emissions. In addition, a transitional period should be given over which the operator reduces his emissions, to take account of the fact that in some cases substitutes may still be under development.

##### *Practice*

The first point concerns the time frame for making the reductions. They are to be made in two stages: the reduction to the final target emission has to be made within six years for new installations and 7 years for existing installations; with an interim reduction target, where the installation has to get down to within 1.5x target emission, within two and a half and five years respectively.

Point (ii) concerns the calculation of the reference emission, which must correspond as closely as possible to the emission which would have resulted had normal high-solvent coatings been used to do the same job under non-abated conditions. The assumption used to make the calculation is that the solid transferred onto the product would be the same in a high-solvent and in a low-solvent application, which is reasonable. Thus if the current solid content of materials is known, and the solid/solvent ratio of standard coatings in the field is known, the "annual reference emission" of solvents can be calculated by multiplying them together.

Point (iii) concerns the calculation of the target emission. This involves multiplying the annual reference emission by the reduction factor which would be achieved by applying the emission limits of Annex III(A). This reduction factor would be the unabated proportion of emissions - that is, the fugitive emission (which by definition is unabated) together with the residual solvent emitted from the stack after complying with the stack emission limit. This is calculated as follows:

The fugitive emission is expressed simply by the fugitive emission limit value. The calculation of the unabated proportion of the stack emission limit requires an estimation of the abatement efficiency corresponding to the emission limit value. For most installations that value is around 95% (leaving around 5% unabated emissions) but for some smaller installations the efficiency is lower, at around 85% (15% of unabated emissions). The emissions that would have resulted from application of the emission limits are thus the fugitive emission limit value (already expressed as a percentage) plus the 5% (or 15%) unabated stack emissions.

75. Annex IV

This Annex provides detailed definitions and requirements to be met by the solvent management plan. The purpose of the plan is explained. Inputs and outputs are defined. Guidance is then given on the use of the solvent management plan in determining compliance with the four elements of the proposed Directive listed in paragraph 8(4): fugitive emission and guide values; product-based emission limits; the reduction scheme; and the requirements of Article 5(2)(ii)(b). In addition, the plan can enable the operator to identify reduction options; this is a useful by-product of the solvent management plan, but it is not proportionate to require the effort and expense of conducting one simply for this reason, hence the fact that the obligation of the Directive relates to expressing compliance, and the solvent management plan is simply one way of doing so.

**VIII. Fiche PME: The impact of the Proposal on business, with special reference to Small and Medium-Sized Enterprises**

*Title of Proposal:* Limitations of emission of organic compounds due to the use of organic solvents in certain processes and industrial installations.

*Reference Number (Repertoire):*

1. *Taking account of the principle of subsidiarity, why is Community legislation necessary in this area and what are its main aims?*

Community legislation is necessary in this area in order to contribute to the protection of public health, in particular with regard to the exposure to photochemical oxidants and toxic organic compounds. For this purpose significant reductions of emissions of organic compounds have to be achieved. These reductions are required particularly for that proportion of the solvent-emitting sector which is outside the scope of the IPPC Directive.

2. *Who will be affected by the Proposal?*

*Sectors*

The Proposal affects professional, mainly industrial, consumers of organic solvents. Organic solvents are volatile and evaporate into the environment if no measures are taken. These emissions contribute significantly to total emissions of organic compounds within the EC. Since organic solvents are used in many different industrial sectors, the number of installations affected is considerable. However, after intensive discussion with industry and Member States, thresholds for the different sectors have been selected so that only the most relevant sizes of installations are covered.

In determining the thresholds, the Commission looked in particular for evidence of diminishing returns of reduction as the size of the installations affected decreased on the basis of the cost-benefit study done on the Commission's first set of Proposals by Karlsruhe University.

## *Sizes*

The size of installations affected varies depending on the sector. The thresholds are expressed in terms of solvent consumption and the relationship between that figure and the size of an installation in socio-economic terms is very much a function of the characteristics of each particular sector. However a rough calculation of the number of SMEs affected can be done assuming that the cutoff point in Annex I of the IPPC Directive (a consumption capacity of organic solvents of 200 tonnes a year) separates large installations from small and medium size ones. On that assumption, the number of small and medium size businesses affected is of the order of magnitude of several hundreds of thousands.

A more detailed discussion of the implications of the Proposal for each of the sectors covered is given below.

## *Car coating*

ACEA submitted that the emission limits for vehicle coating discriminate against producers of small cars, because they are expressed in terms of  $g/m^2$ . The discrimination is due partly to the fact that solvent consumption for cleaning is a fixed amount per vehicle, regardless of its size, and partly to the fact that the ratio of painted coat to electrocoat is larger for smaller vehicles. However our position, which ACEA appreciates, is that it is appropriate in an instrument of this kind to adopt the same approach to emission controls for all car manufacturers. On this basis we have explored with ACEA the possibility of using for all processes the Swedish approach, where the limit is partly a fixed amount per vehicle and partly a surface-area-related emission. In principle this formula gives an equitable basis on which to calculate the emissions for any car, whatever its type. However the point at which equivalence is determined between the existing limits and the new approach is a vexed one. The Commission was and is prepared to consider a more equitable means of calculating the emission reduction required of each category of car manufacture, but whilst as an absolute imperative retaining the contribution of the car coating sector to the emission reduction achieved by the Proposal at its current level. However in discussions, no agreement could be achieved on proposals to this effect, and the previous limits have therefore been retained. It should be noted, however, that systems of exactly the same form as the current one are applied at the moment over the whole range of car sizes, for instance in the UK. Therefore the current approach is perfectly workable in practice.

## *Wood impregnation*

In the course of consultations with Protim Solignum and CEI Bois, they raised a number of points, principally:

- the fugitive emission limit for wood impregnation;
- the threshold for the industry;
- the inclusion of creosote within the definition of solvent;
- the addition of new factors for wood and plastic lamination.

On the fugitive emission limit for wood impregnation, we have accepted the industry's argument that due to the technical specificities of the sector a limit comparable to the 20-30% asked of most other sectors effectively implies zero fugitive emissions. It has thus been raised to 45%.

The threshold for the industry was lowered from 45 tonnes/year to 25 tonnes/year. Evidence from the Karlsruhe report demonstrates that a decrease in the threshold to this level would abate 21.3% more tonnes of VOC at a cost increase of 21.7%. Thus according to this data, which was based on information provided by the industrial sectors concerned and singled out for particular praise for its completeness, the average cost per tonne abated is no higher for these plant than for large plant. On those grounds it was concluded that the firms caught by a 25 tonne threshold would not find the controls significantly harder to cope with than their larger counterparts, and no convincing evidence has been put forward to contradict this opinion.

Both Protim Solignum and CEI Bois raised the issue of the inclusion of the volatile component of creosote within the definition of "solvent". The volatile component of creosote is not technically a solvent, but as a volatile emission it is as much an environmental problem as any other VOC emission. Its technical role in the product is in that sense irrelevant. Accordingly, there is no reason why creosote should not be subject to the same controls as any other wood impregnation material. In order to ensure that these controls do not penalise the use of low-volatility creosotes, the Proposal provides an alternative control in the form of an emission factor (emission of solvent per tonne of product) to cover the case of substitution by low-solvent substitutes.

### *The rubber industry*

The consultations with BLIC concentrated on the thresholds for the industry. BLIC proposed in discussions to raise the threshold to at least 15 tonnes/year. The data provided on the effect that this would have on the emissions from and costs to their industry showed that the additional solvent emissions would total 7550 tonnes, while the costs saved would total UKL 41 250 000 capital costs and UKL 4 262 000 in annual running costs. Calculating the costs per tonne abated for this section of industry (by using the Net Present Value final year costs divided by the reduction achieved, as for all other such calculations in this Memorandum) yields ECU 1.17/ktonne, which is considerably lower than the average annual costs of abatement for the Proposal. However subsequent evidence provided by the sector showed convincingly that the costs for small companies within the sector were at least twice as high as those for larger companies. For this reason it was decided to raise the threshold for this sector from five to ten tonnes of solvent consumption per year.

### *Dry cleaning*

The Commission received representations on the dry-cleaning sector from UEAPME, CINET and TNO Cleaning Techniques Research Institute.

The Karlsruhe report stated that observance of a limit value of 20 g/kg would reduce the emissions of the sector by 37 000 tonnes to 31 000 tonnes, by the use of closed-circuit machine technology. A limit of 10 g/kg, implying the use of so-called "new generation closed-circuit machines" would increase the costs induced by the Proposal by 150%. By moving to an emission of 10 g/kg from 20 g/kg, the residual emission will be halved, therefore the extra reduction would be in the region of 15 000 tonnes, or an increase over the previous reduction (37 000 tonnes) of around 40%.

The Commission recognises the significant extra cost burden of the new controls. For this reason it has moved to a uniform emission limit of 20g/kg for all dry cleaning installations under the Proposal, which can be met by closed circuit machines at a reasonable level of capital expenditure.

A further change which has been made concerns the provision that a more lax emission limit should apply for machines once they are more than three years old. The continued high performance of an installation is dependent on careful operation

and maintenance, and not on capital expenditure. Therefore it seems reasonable to require that any installation should be able to maintain its initial performance for considerably longer than three years. For this reason, the Commission considered that a requirement to operate at the initial emission limit for the whole lifetime of the installation was reasonable, and the option to operate at a lower emission limit after a given period of time has been removed.

### *Wood coating*

UEA has made a number of submissions concerning the furniture industry, the main one being a request to move the threshold for the industry from 15 tonnes to 25 tonnes. They state that this would result in a reduction of costs of around 25% and an increase in emissions of 20%. The ratio between these is close to one, indicating that there is no significant increase in costs per tonne abated below the 25-tonne threshold that would justify the proposed alteration. This is also shown by the almost linear nature of the graph of costs/emissions versus threshold size in UEA's second submission.

UEA state that for medium-sized companies the costs of compliance as a proportion of turnover are twice those for large companies. However, it is not clear why this should be so given the above evidence that the costs per tonne abated are comparable. In that case, the discrepancy must result from variation in profit per unit, which might have been expected to be also broadly comparable from a medium installation to a large installation. It is certainly difficult to see why that should vary so markedly as is implied by the figures cited by UEA.

It is interesting to compare this situation with the earlier adjustment that DGXI made to the threshold for this industry, the move from 5 tonnes to 15 tonnes consequent on the Karlsruhe report. The report showed that the move would reduce costs by some 40% for an increase in emissions of 13%, a ratio of 3:1 rather than the 1:1 ratio for the current alteration. Those figures were dramatic evidence of diminishing returns and the threshold was altered accordingly.

### *Vehicle refinishing*

The initial investigation done in the Karlsruhe report on the impact of the Proposal on the vehicle refinishing sector found that for both small and medium installations the measures were likely to result in net savings, of around ECU 18 000/a for a small installation and around ECU 62 000/a for a medium installation. The savings result from reduced paint/solvent consumption due to three compliance measures - enclosed gunwash, the introduction of high volume low pressure (HVLP) spray guns and switching from conventional coatings to high solid coatings. It should be noted that these three measures achieve compliance with the Proposal, on the basis of all available data, given the provision in the reduction scheme that reductions in total solvent emissions due to improvements in housekeeping and application efficiency (such as those from the gunwash and HVLP) can count towards the reduction required. On this basis, there is obviously no question of introducing a threshold for the sector, as every element of it reaps a net financial benefit.

However the UK DTI study came forward with slightly different figures for the cost impact on the sector, amounting to costs per tonne reduced of ECU 350/tonne (calculated, as for all other such costs, on an NPV basis). This is slightly inaccurate, as the study on which it was based<sup>5</sup> ("the UK DOE study") shows. That study states that the capital cost of compliance with the Proposal (gunwash plus HVLP plus high-solids) amounts to ECU 5 250 one-off cost, and the annual savings resulting for

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<sup>5</sup> Aspinwalls and NERA, "Evaluating the costs of implementing the proposed EU solvents directive and the scope for using economic instruments", 1996

the installation total ECU 4 100. Therefore the investment will almost pay for itself in the first year, with net savings accruing thereafter.

Most of the cost savings result from the introduction of HVLP; the switch to high-solids paint is cost-neutral apart from retraining (around ECU 1 000 one-off cost). Given the significant cost gain to the installations from the first element it seems reasonable to require the essentially cost-neutral product switch, which will produce an additional reduction of emissions in the region of 30%. The net savings accruing from the measures as a whole continue to justify the decision not to introduce a threshold.

### *Printing*

Several international printing federations, coordinated by INTERGRAF, have made substantial representations on the Proposal. The main representations concerned the threshold for small printing installations, the stack emission limits and the fugitive emission limit values for installations other than publication rotogravure.

On the threshold issue, the Karlsruhe report showed that with the original threshold of five tonnes/a solvent consumption, the control costs for small installations (in general, those lying between 5 and 15 tonnes/a consumption) ranged from three times to eight times those of the larger installations, depending on the type of technology considered. For this reason the threshold for application of the Proposal to printing installations was shifted to 15 tonnes/annum.

As regards fugitive emissions, the problem is that a large proportion of the fugitive emissions came from the isopropanol used in the fountain solution, and from the cleaning emissions, both of which are very difficult to capture. A number of options for meeting the fugitive emission limits under the proposal were investigated, including encapsulation, substitution and waterless offset, but it was concluded that none offered sufficient guarantee of reductions in emissions in the time period specified by the Proposal to justify the setting of a mandatory fugitive emission limit value. For heatset web offset there is the additional problem that low solvent content inks are used, only a proportion of which is evaporated (all evaporated solvent from the ink being 100% captured). The rest remains in the product, is not volatile at room temperature, and is not considered a fugitive emission. Therefore the fugitive emissions (comprising part of the isopropanol and the cleaning solvent emissions) although not disproportionately high in absolute terms, forms a large percentage of the total emissions. For these reasons, guide values were adopted for all sectors except publication rotogravure, which as a homogeneous sector of large-scale, enclosed installations is in a different position to the others.

As regards the stack emission limits, the comment was made that the reduction of the stack emission limit from 150 mgC/m<sup>3</sup> to 100 mgC/m<sup>3</sup> would prejudice solvent recovery abatement options with respect to incineration, and that the greater energy consumption of incineration relative to recovery made this a dubious environmental decision. This point has been taken on board by the provision that existing equipment meeting an emission limit of 150 mgC/m<sup>3</sup> can be derogated from the new emission limits so long as the total emissions of the installation are no greater than would otherwise have been the case (Article 5(1)).

### *Coatings manufacture*

CEPE made representations to the Commission on a number of matters, mainly the concentration emission limit for the sector. The essence of their argument was that due to the fact that very low airstream rates were used in order to minimise evaporation and retain as much solvent as possible, the mass emission of solvent from the coatings sector for a given concentration emission limit would be low compared to that of a coating user. Focus in reducing solvent emissions is in any case on containment

rather than abatement, because abatement requires collecting emissions in an air stream of positive flow rate, and the mere act of passing such an air stream over a process increases evaporation and the potential emission. In addition, the costs of abating very low flow rates increase steeply for abatement below 150 mgC/m<sup>3</sup>, up to seven-fold, and the industry quoted an example of an installation where the capital cost of emissions reduction below that level worked out as ECU 346 000/tonne. Given this evidence of the unacceptable nature of the effects of a tighter limit, it was decided to retain the limit for this sector at 150 mgC/m<sup>3</sup>.

FEICA, the association of european adhesive manufacturers, has commented not so much on the values they are asked to meet as on the need to specify at European level the accuracy to which the value should be measured. On that point, it became obvious in the course of development of the proposal that the novelty of the concept of fugitive emission limit value and of methods of determining them was such that no accuracy constraints could be established at European level at this stage, and that adequate demonstration of compliance in that respect must be left to the competent authority to decide.

#### *Adhesive coating*

The main comments received from FINAT on adhesive coating concerned the fact that the original emission limit specified for the sector of 50 mgC/m<sup>3</sup> would prejudice the option of solvent recovery in favour of incineration. The products from the industry and the production processes which are used differ from plant to plant, as do the abatement options favoured. An emission limit value of 50 mgC/m<sup>3</sup> would make solvent recovery in many cases impossible, or at least very unattractive. It was agreed that solvent recovery was a solution to be preferred to incineration, and therefore a dual emission limit was introduced, which allows a choice of options.

Certain sub-sectors initially included in the adhesive coating sector have now been singled out in Annex III(A), namely footwear manufacture and wood and plastic lamination (discussed above under wood impregnation). The reason for this is that for these subsectors an emission factor can be specified, ie, an emission control expressed in terms of solvent emission per unit product. The advantage of controls expressed in this way is that they can be met either by substitution or by abatement, thus removing the need for a reduction scheme and the associated problem of determining the equivalence of the reduction. The values were derived from the controls currently in place in the UK and we are confident that they are strict but achievable.

#### *Coil coating*

The Karlsruhe report concluded in its investigation on the emission controls proposed for the coil coating sector that the overall costs imposed by the thresholds and emission limits in Annex III(A) of the Proposal are low due to the technology already installed in most of the coil coating installations, and that compliance should not create major problems for the industry. The industry organization ECCA has in the past accepted this, and the controls on that industry have not changed since the Karlsruhe study was done. The industry has recently made representations regarding the requirement for continuous monitoring for stacks emitting a mass flow of more than 10kg/hour and to which abatement equipment is connected. This is a very large mass flow, and it is reasonable that where potentially very high emissions could result from non-compliance with the emission limit value of the Proposal the installation should monitor compliance continuously.

#### *Coating of winding wire*

This sector was initially included in other coating and given a stack and fugitive emission limit, but the industrial organization representing the sector, Europacable, approached the Commission with evidence that an emission factor could be specified

for the sector which would be considerably tighter than the effect of the emission limits. The emission limits which would otherwise have applied (50 mgC/m<sup>3</sup> stack limit and 20% fugitive limit) are equivalent to an emission factor of around 19 g/kg product. The newly introduced controls are considerably tighter than this, at 10 g/kg product for installations producing thin wire and 5 g/kg for all other installations. The difference for different wire dimensions is due to the fact that the smaller the diameter of a wire, the larger the proportion of its weight a coating of a constant thickness will represent, and therefore the more solvent will be used relative to the weight of the final product, in applying that coating.

#### *Other coating*

This sector is something of a catch-all, covering as it does any coating activity within the scope of the Proposal not otherwise dealt with in Annex III(A). The only representation that the Commission has received on this issue was from the aerospace industry, which intends to use the exemption scheme under Annex III(B) of the Proposal but was concerned that in that scheme the solvent content of the coatings concerned was not accurately stated. Their concern has been taken on board by changing the assumed solvent content of aerospace coatings from 60% to 70% (equivalent to a solvent:solid ratio of 1:2.33 rather than 1:1.5 as previously).

#### *Leather coating*

The values applicable to the leather coating industry were modified in the course of discussion to take into account the potential difficulties of medium-sized enterprises. Small installations are excluded by the lower threshold of 10 tonnes/year. For the medium-sized enterprises the emission factor to be observed is 85 g/m<sup>2</sup> rather than the 75 g/m<sup>2</sup> applicable for large installations (above 25 tonnes/year consumption). We believe that this suitably takes account of the specificities of SMEs.

#### *Surface cleaning*

ECSA has commented on the implications of the controls in the Proposal on installations using R40 chlorinated solvents for surface cleaning.

ECSA raise the issue of the rationale for applying tighter controls for these solvents. The rationale is that the solvents carry the risk phrase R40 and are thus potential carcinogens, and that the more potentially hazardous the substance is, the tighter the controls that should apply to it. ECSA refer to epidemiological studies which they consider show that the solvents in question are controlled under the Proposal with unreasonable strictness. However it is precisely to allow for such developments in epidemiology that the link between the controls and the application of the R40 risk phrase was made. If the epidemiological data is sufficiently convincing to merit the removal of the R40 risk phrase, the tighter controls will no longer apply to the substances in question.

ECSA further comment on the marginal costs of achieving the emission limits under the Proposal. However they do not propose altering the limits, but rather adjusting the threshold, reintroducing the 1 kg/hr threshold present in early drafts which would effectively raise the tonnage threshold from 1 tonne/annum to 2 tonnes/annum. The rationale for this would appear to be that in this way a larger proportion of surface cleaning installations would be able to reduce their solvent consumption to the point where they fell out of the scope of the Proposal by the simple expedient of installing a collection chamber system. However it should be noted that the threshold of the Proposal is already higher than in many Member States. Only installations using more than 1 tonne solvent per year fall within the scope of the Proposal, and a large proportion of the small surface cleaning installations are thus excluded.



In addition, the emission limit values in the Proposal do not require the extremely high marginal cost solution (single sealed chamber) which ECSA identifies. The UK DTI study provides data showing that substitution by aqueous cleaning systems (with 100% reduction in solvent emissions) can be effected at a third of the marginal cost of the single sealed chamber, for those installations which would be affected by ECSA's proposed threshold change. And it must also be remembered that even that marginal cost is based on a whole process switch, whereas in many cases a more effective, and still cheaper, option would be to switch a sufficient proportion of the process to aqueous cleaning to bring the installation out of the scope of the Proposal altogether. For these reasons, we consider the current threshold to be a reasonable one.

### *The pharmaceutical industry*

The pharmaceutical industry is responsible for significant emissions of solvents. The Karlsruhe study identified emissions of the sector at 60 tonnes/year, comparable with the majority of other sectors covered by the Proposal. This is a significant emission and it cannot simply be ignored.

However in discussions with the industry, the Commission appreciated its concerns that the form of the emission controls applied to it (in particular the concentration limits to be met from stacks) were perhaps not appropriate to the specificities of the sector. This is because a pharmaceutical installation typically has a large number of stacks each of which emits discontinuously. Thus a control geared more towards the mass of emissions from a particular installation than towards their concentration would be the most appropriate methodology. The Commission therefore requested the industry at the beginning of July to propose an alternative methodology based on mass emission limits, as the Commission did not have the expertise to do so. To date the industry has not submitted any such proposal, and thus the admittedly imperfect concentration controls have had to be retained.

### *Vegetable oil extraction and fat and oil refining*

FEDIOL is broadly content with the values in the current Annex III of the Proposal, but has commented on the status of installations consuming more than 600 tonnes/a solvent, requesting that these be considered as small installations. The Commission considers at present that there is no real justification for this.

A further point raised by FEDIOL concerned the situation of small installations engaging in batch extraction of, generally, speciality oils, which cannot for technical reasons meet the emission limit values specified for the bulk processing installations. The Commission has accepted the industry's representation that batch processing of exotic seeds requires a higher emission limit than other processes, and has thus increased the emission limit for the extraction of oil from "other seeds" (i.e. seeds other than those separately identified in Annex III) from 1.5 kg/tonne to 3 kg/tonne.

### **3. *What will business have to do to comply with the Proposal?***

As far as new installations are concerned, business will either have to:

- apply environmentally friendly processes; or
- use low-polluting preparations; or
- use available abatement technology.

The techniques necessary for compliance with the provisions of the Proposal are either already marketed or are scheduled to appear on the market within the coming years. Wherever the latter situation obtains, additional time periods for compliance have been provided in the Proposal. In principle, existing installations have to comply with the same requirements as new installations; however, in some cases the requirements are somewhat less stringent in order to take into account the special situation of a sector.

A further requirement is that all installations have to demonstrate compliance with the limit values of the Proposal, which implies monitoring of emissions. Monitoring of emissions from stacks which at the final point of discharge emit more than 10kgC/hr after abatement has to be done continuously. Monitoring of emissions from other releases can be done periodically.

In practical terms, operators of installations falling under this Proposal will have to:

- select, taking into account guidance on substitution, the reduction option most suitable for their installations;
- implement this option, whether in the design stage or by retrofitting;
- quantify the flow of organic solvents within the installation, in order to determine whether they exceed the thresholds for inclusion within the Proposal and, where appropriate, to demonstrate compliance with the emission controls proposed;
- maintain the equipment and verify the quality of preparation in such a way that permanent compliance with the requirements of the Proposal is achieved.

#### 4. *What economic effects is the Proposal likely to have?*

##### *Employment*

The measures should stimulate job creation in industrial sectors dealing with the design and manufacturing of environmentally-friendly technology and products, as well as in those dealing with the verification of their proper use. The exchange of information on substitution should promote the adoption of innovative VOC control options. Every effort has been made to adjust the thresholds and controls from sector to sector and by size of installation in order to avoid major direct negative effects on the employment in the sectors covered by the Proposal. For all the sectors under the proposed Directive the additional costs are reasonable and proportionate taking into account the measures being required of other sectors in relation to the ozone problem.

##### *Investment and creation of new business*

The Proposal requires operators of existing installations to invest in process modification, new preparations or abatement technology. For the same reasons the operators of new installations will have to bear additional investment and running costs compared to an uncontrolled situation. The estimated annual costs of the implementation of the proposed Directive of about ECU 3 to 4 billion per year, to be shared by several ten thousands of installations, will in practical terms all be reinvested in this sense. A significant proportion of these costs will represent additional business opportunity for suppliers of abatement and control techniques as well as producers of substitute products, and therefore will simply represent a transfer from one sector of economic activity to another. The quantification of this positive effect can only be done on the basis of a set of wide ranging assumptions which are extremely difficult to verify. The effect on the industry directly affected by the proposal is also difficult to determine in any concrete fashion. It is possible that by adopting process-integrated solutions which have a positive effect on both environmental emissions and process efficiency certain sectors will reap a benefit from

implementing the Proposal's requirements. A first mover advantage over installations in other parts of the world which later become subject to similar constraints is also possible. However it cannot be discounted that the offsetting benefits will not balance the costs for certain installations and sectors, leading to a net cost burden. It should be remembered, however, that the effects on competitiveness, even in this case, are likely to be very minor compared with other factors such as labour costs and productivity.

The timetable for the investment has been designed in such a way that in practical terms it stretches over a period of about 7 years, avoiding peak investments. It can be expected that most of the costs, from the point of view of the operator, will be covered by higher prices. However, for most of the sectors the potential price increase will be very small given that the additional costs are in general in the range of a few per cent, if that, of the total costs of a product. In addition experience shows that industry which invests early in new technology can achieve a significant first-mover advantage. There are also knock-on benefits of solvent limitation measures, for instance in reduced health and safety costs, reduced insurance premiums for industrial accident. The Proposal as such should not, therefore, have negative repercussions on the generation of new businesses in the sectors concerned, and may well have positive effects with regard to the establishment of new businesses in the environmental "clean technology" sector.

#### *Competitive position of businesses*

As stated above, great efforts have been made to adjust the controls in the light of evidence on how they will affect the competitive position of industry. The additional costs represented by the current Proposal as a proportion of the costs of the products manufactured by the sectors covered is estimated to be low enough that few if any negative effects on the competitive position of businesses should arise, whether at local, national or international level. On the contrary, the development of environmentally friendly processes and preparations should in the long run strengthen the position of the sectors covered, as well as that of their suppliers, given that environmental protection is becoming a major policy all over the world.

#### **5. *Does the Proposal contain measures to take into account the specific situation of small and medium-size firms?***

The above discussion identifies several ways in which, in close cooperation with industry and Member States and in consultation with small business fora, general provisions have been incorporated which take into account the specific situation of small and medium-size firms. In particular:

- (i) wherever appropriate, thresholds for the applications of the Proposal have been laid down in order to avoid the inclusion of very small installations;
- (ii) in most cases the requirements laid down for new and existing small installations are less stringent than those fixed for medium size installations.

These provisions either exclude small or medium-sized installations or reduce the investments required from operators of such installations and stretch them over significantly longer time periods.

Proposal for a  
COUNCIL DIRECTIVE

on limitation of emissions of volatile organic compounds due to  
the use of organic solvents in certain industrial activities

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THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130s(1) thereof,

Having regard to the proposal from the Commission<sup>6</sup>,

Having regard to the Opinion of the Economic and Social Committee<sup>7</sup>,

Acting in accordance with the procedure laid down in Article 189c of the Treaty<sup>8</sup>, and in cooperation with the European Parliament,

1. Whereas the the European Community Action Programme on the Environment approved by the Council and the Representatives of the Governments of the Member States meeting within the Council by resolutions of 22 November 1973<sup>9</sup>, 17 May 1977<sup>10</sup>, 7 February 1983<sup>11</sup>, 19 October 1987<sup>12</sup> and 1 February 1993<sup>13</sup> stress the importance of the prevention and reduction of air pollution;
2. Whereas in the resolution of 19 October 1987 the importance of Community action to concentrate, *inter alia*, on implementation of appropriate standards in order to ensure a high level of public health and environmental protection is emphasized;
3. Whereas the European Community and its Member States are parties to the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the control of emissions of volatile organic compounds in order to reduce their transboundary fluxes and the fluxes of the resulting secondary photochemical oxidant products so as to protect human health and the environment from adverse effects;
4. Whereas pollution due to volatile organic compounds (VOCs) in one Member State often influences the air and water of other Member States; whereas in accordance with Article 130R of the Treaty action at Community level is necessary;
5. Whereas, because of their characteristics, the use of organic solvents in certain processes and industrial installations gives rise to emissions of organic compounds into the air which can be harmful for public health; and/or contributes to the local and transboundary formation of photochemical oxidants in the boundary layer of the troposphere which cause damage to natural resources of vital environmental and economic importance and, under certain exposure conditions, has harmful effects on human health;

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<sup>6</sup> OJ No

<sup>7</sup> OJ No

<sup>8</sup> Opinion of the European Parliament of ..... (OJ No.....). Council Common Position of ... and Decision of the European Parliament of .....

<sup>9</sup> OJ No C 112 , 20.12.1973, p. 1.

<sup>10</sup> OJ No C 139, 13.6.1977, p. 1.

<sup>11</sup> OJ No C 46, 17.2.1983, p. 1.

<sup>12</sup> OJ No C 328 , 7.12.1987, p. 1.

<sup>13</sup> OJ No C 138, 1.2.1993, p. 1.

6. Whereas the high incidence of high tropospheric ozone concentrations in recent years has triggered widespread concern regarding the impact on public health and the environment;
7. Whereas, therefore, preventive action is required to protect public health and the environment against the consequences of particularly harmful emissions from the use of organic solvents and to guarantee citizens the right to a clean and healthy environment;
8. Whereas emissions of organic compounds can be avoided or reduced in many processes and installations because potentially less harmful substitutes are available or will become available within the coming years; whereas, where appropriate substitutes are not available, other technical measures should be taken to reduce emissions into the environment as much as economically and technically feasible;
9. Whereas the use of organic solvents and the emissions of organic compounds which have the most serious effects on public health should be reduced as much as technically feasible;
10. Whereas installations and processes which fall under this Directive should at least be registered if they are not subject to authorization under Community or national legislation;
11. Whereas organic solvents are used by many different types of installations and processes so that - in addition to general requirements - specific requirements must be defined, and at the same time, thresholds for the size of the installations which have to comply with this Directive;
12. Whereas a high level of environmental protection requires the setting and achievement of emission limits for organic compounds and appropriate operating conditions - in accordance with the principle of best available techniques - for certain industrial installations and processes using organic solvents within the Community;
13. Whereas operators should reduce emissions of organic solvents, including fugitive emissions, and of organic compounds; whereas a solvent management plan is an important tool to verify this; whereas, although guidance may be given, the solvent management plan is not developed to the stage where a Community methodology can be established; whereas the Commission should take account of developments in the use of such plans to establish such a methodology where appropriate;
14. Whereas in some cases Member States may exempt operators from complying with the emission limit values because other measures, such as the use of low-solvent or solvent-free products, provide alternative means of achieving equivalent emission reductions;
15. Whereas existing processes and installations should be adapted so that, within an appropriate period, they meet the emission limit values established for new installations and processes; whereas that period should be consistent with the timetable for compliance with Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control<sup>14</sup>;
16. Whereas emission limiting measures adapted before entry into force of this Directive should be taken into account in an appropriate way;

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<sup>14</sup> OJ No L 257, 10.10.1996, p. 26.

17. Whereas in many cases small and medium-sized, new and existing installations may be allowed to comply with somewhat less stringent requirements to maintain their competitiveness;
18. Whereas the relevant parts of existing installations which undergo substantial change must meet the new installation standards for the substantially changed equipment;
19. Whereas monitoring of emissions is required, including the application of measurement techniques, to assess the mass concentrations or the quantity of the pollutants whose release into the environment is permitted;
20. Whereas Member States have to establish a procedure to be followed and measures to be taken in case of exceedance of the emission limitations;
21. Whereas Member States should take appropriate measures to promote the developments of best available techniques to minimize emissions of organic solvents and organic compounds into the environment;
22. Whereas Member States should report to the Commission on the implementation of this Directive;
23. Whereas certain Member States have already adopted measures to reduce VOCs which may not be compatible with the measures in this Directive; whereas alternative approaches to reduction may allow the objectives of this Directive to be achieved more effectively than by implementing uniform emission limit values; whereas, therefore, Member States may be exempted from compliance with the emission limits, if they implement a national plan, which will, within the timetable for implementation of this Directive, lead to an at least equal reduction in emissions of organic compounds from these processes and industrial installations;
24. Whereas the Commission and the Member States should collaborate in order to ensure that information on the implementation of this Directive and on the progress of substitution options is exchanged,

HAS ADOPTED THIS DIRECTIVE:

## Article 1

### Aim and Scope

The aim of this Directive is to prevent or reduce the direct and indirect effects of emissions of volatile organic compounds to the environment, **in particular to air**, and the potential risks to public health, by providing measures and procedures to be implemented for the industrial activities defined in Annex I, in so far as they are operated within the thresholds bands listed in Annex III(A).

## Article 2

### Definitions

For the purposes of this Directive the following definitions shall apply:

#### Authorization

- means a procedure by which the competent authority grants authorization to operate all or part of an installation, by means of a written decision or decisions.

### Competent authorities

- means the authorities or bodies responsible under the legal provisions of the Member States for carrying out the obligations arising from this Directive;

### Contained conditions

- means an installation operated in such a way that the emissions can be collected, and are therefore not entirely fugitive.

### Emission

- means any discharge of substances or preparations from an installation or process into the environment.

### Emissions, Fugitive

- means any uncaptured emissions of volatile organic compounds into air, soil and water as well as, unless otherwise stated in Annex III, solvents contained in the product. It includes uncaptured emissions released to the outside environment via windows, doors, vents and similar openings.

### Emission Guide Value

- means an emission control which should not be exceeded as far as technically and economically feasible.

### Emission limit value

- means the maximum quantity of a gaseous organic compound or a group of gaseous organic compounds contained in the waste gases from an installation, which is not to be exceeded under normal operating conditions. If not specified differently in Annex III, it shall be calculated in terms either of mass of total organic carbon or of mass of individual organic compounds per volume of the waste gases, assuming standard conditions for temperature and pressure. Gas volumes which are added to the waste gas for cooling or dilution purposes, shall not be considered when determining the mass concentration of the pollutant in the waste gas.

### Emission requirement

- means any type of numerical emission requirement other than emission limit values, fugitive emission limit values or fugitive emission guide values.

### Fugitive Emission Limit Value

- means the limit, expressed as a percentage of the solvent input to the installation, which the quantity of volatile organic compounds emitted in the form of fugitive emissions is not to exceed.

### Fugitive Emission Guide Value

- means the limit, expressed as a percentage of the solvent input to the installation, which the quantity of volatile organic compounds emitted in the form of fugitive emissions is not to exceed as far as technically and economically feasible.

### Installation

- means a stationary establishment operating one or more of the activities specified in Annex I. It includes the production machines and all auxiliary equipment necessary for the operation of the process or processes which is located at the same site.

### Installation, Existing

- means an installation which is in operation or, in accordance with legislation existing before the date on which this Directive is brought into effect, an installation authorized or in the view of the competent authority the subject of a full request for authorization, provided that the installation is put into operation no later than one year after the date on which this Directive is brought into effect.

### Installation, New

- means an installation which makes its first full request for authorization after the date on which this Directive is brought into effect or which is brought into operation more than one year after the Directive comes into effect.

### Operator

- means any natural or legal person who operates or controls the installation, or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the installation has been delegated.

### Organic compound

- means any compound containing at least the element carbon and one or more of hydrogen, halogens, oxygen, sulphur, phosphorus, silicon or nitrogen, with the exception of carbon oxides and inorganic carbonates and bicarbonates.

### Organic solvent

- means any volatile organic compound which is used alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials, or is used as cleaning agent to dissolve contaminants, or as a dissolver, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or a plasticiser, or as a preservative. For the purpose of this Directive the fraction of creosote which exceeds the threshold given for the vapour pressure under the particular condition of use shall be considered as an organic solvent.

### Registration

- means a procedure, specified in a legal act, involving notification to the competent authority by the operator of the intention to operate an installation or process coming under the scope of this Directive. The competent authority must acknowledge receipt of the notification.

### Substances

- means chemical elements and their compounds, as they occur in the natural state or as produced by industry, whether in solid or liquid form in the form of a gas or vapour.

### Substantial Change

- for a small installation, means an increase in the nominal capacity of more than 25%.



- for an installation falling within the scope of Council Directive 96/61/EC of on integrated pollution prevention and control, means the definition specified within that Directive
- for all other installations, means an increase in the nominal capacity of more than 10%.

#### Volatile Organic Compound (VOC)

- means any organic compound having at 293.15K a vapour pressure of 0.01kPa or more, or having a corresponding volatility under the particular conditions of use.

Certain technical terms defined in Annex II.

### **Article 3**

#### **Obligations applying to new installations**

Member States shall adopt the necessary measures to ensure that, before being put into operation, all new installations which are not already permitted under Directive 96/61/EC undergo registration or authorization so far as the activities within the scope defined in Article 1 are concerned and that new installations comply with the requirements set out in Articles 5 to 9 of this Directive.

### **Article 4**

#### **Obligations for existing installations**

Member States shall adopt the necessary measures to ensure that:

1. All existing installations which are not already permitted under Directive 96/61/EC undergo registration or authorization by the time of the first compliance date in Annex III(B) to this Directive;
2. Existing installations comply with the requirements set out in Articles 5 to 9 not later than 30 October 2007;
3. Where an installation undergoes a substantial change, or comes within the scope of this Directive for the first time as a result of a substantial change, that part of the installation which undergoes the substantial change shall be treated either as a new installation or as an existing installation provided that the total emissions of the installation do not exceed those that would have resulted if it had been treated as a new installation.

### **Article 5**

#### **Emission Limits**

1. Member States shall take the appropriate measures, either by specification in the conditions of the authorization or, for installations subject to a registration procedure, by general binding rules, to ensure that paragraphs 2 to 9 are complied with.
2. All installations shall comply with the emission limit values, fugitive emission limit values and other emission requirements laid down in Annex III(A), or the requirements of the reduction scheme specified in Annex III(B). The reduction scheme does not exempt installations discharging substances specified in paragraphs 6, 7 and 8 from fulfilling the requirements of these paragraphs. Certain installations with abatement equipment already in operation on the date prescribed for transposition of this Directive shall enjoy a derogation from the emission limit values in Annex III(A),

provided that the total emissions of the installation do not exceed those that would have resulted if all the requirements of Annex III(A) were met. The scope and nature of this exemption is specified in Annex III(A). However, for installations not using the reduction scheme, any abatement equipment installed after the date prescribed for transposition of this Directive shall meet all the requirements of Annex III(A).

3. Installations where two or more activities are carried out, each of which exceeds the thresholds in Annex III(A) shall:
  - (a) as regards the substances specified in paragraphs 6 and 8, meet the requirements of those paragraphs for each process individually;
  - (b) as regards all other substances, either:
    - (i) meet the requirements of paragraph 2 for each process individually; or
    - (ii) have total emissions not exceeding those that would have resulted if point (i) had been applied.
4. The fugitive emission guide values given in Annex III(A) shall be complied with, as far as technically and economically feasible.
5. Those processes and installations not making use of the reduction scheme under Annex III(B) shall operated under contained conditions unless this is technically or economically not feasible, and emissions arising from all processes and installations under this Directive shall be discharged in such a way as to safeguard public health and the environment.
6. Substances or preparations which, because of their content of volatile organic compounds classified as carcinogens, mutagens, or toxic to reproduction under Directive 67/548/EEC<sup>15</sup>, have labels containing the R phrases R45, R46, R49, R60, R61, are replaced as far as possible by less harmful substances or preparations within the shortest possible time.
7. For significant discharges of the organic compounds referred to in paragraph 6, that is, discharges where the mass flow of the sum of the compounds causing the labelling referred to in paragraph 6 is greater than or equal to 10 g/h, an emission limit value of 2 mg/m<sup>3</sup> shall be complied with. The emission limit value refers to the mass sum of the individual compounds.
8. For significant discharges of halogenated organic solvents which have labels containing the risk phrase R40, that is, discharges where the mass flow of the sum of the compounds causing the labelling R40 is greater than or equal to 100 g/h, an emission limit value of 20 mg/m<sup>3</sup> shall be complied with. The emission limit value refers to the mass sum of the individual compounds.
9. All appropriate precautions shall be taken to minimize emissions during start-up and shut-down.
10. Where a risk assessment is carried out in accordance with Council Regulation (EEC) No 793/93<sup>16</sup> or Council Directive 88/379/EEC<sup>17</sup> of any of the substances causing the labelling R40, R60 or R61 which are controlled under this Directive, the Commission, in accordance with the procedure referred to in Article 13 of this

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<sup>15</sup> OJ No 196, 16.8.1967, p. 1.

<sup>16</sup> OJ No L 84, 5.4.1993, p. 1.

<sup>17</sup> OJ No L 187, 16.7.1988, p. 14.

Directive, shall consider the conclusions of the risk assessment and shall modify the controls on those substances as appropriate.

## Article 6

### Substitution

1. The Commission shall ensure that an exchange of information between Member States and the sectors concerned on the use of organic substances and their potential substitutes takes place, in an administratively efficient way, to consider the questions of fitness for use, potential environmental effects and the costs and benefits of the options available, with a view to providing guidance on the use of materials which have the least potential effects on air, water, soil, ecosystems and public health. The Commission shall publish the results of the exchange of information for each sector.
2. Member States shall ensure that:
  - (a) for installations undergoing authorization, the guidance referred to in paragraph 1 is taken into account during authorization so that materials which have the least potential effects on air, water, soil and public health are used;
  - (b) those installations subject to registration are issued with the guidance referred to in paragraph 1.

## Article 7

### Monitoring

Member States shall specify appropriate release-monitoring requirements, including measurement methodology and frequency, evaluation procedure and an obligation to supply the competent authority with data required for checking compliance with this Directive. However, emissions from stacks to which abatement equipment has been connected and which at the final point of discharge emit more than 10kg/h of total organic carbon (determined as an eight-hour moving average) shall be measured continuously.

## Article 8

### Verification of compliance with emission limitations

1. Compliance with the provisions of Article 5(7) and (8) shall be verified on the basis of the sum of the mass concentrations of the individual organic compounds concerned. For all other cases, compliance shall be verified on the basis of the total mass of organic carbon emitted.
2. In the case of continuous measurements, the emission limit values laid down in Article 5 and in Annex III(A) shall be considered to be complied with if:
  - (a) none of the moving averages over 8 hours of normal operation exceeds the emission limit values;
  - (b) none of the one-hourly averages exceeds the established emission limit value by more than a factor of 1.5.

For the purpose of calculating the values referred to in the first subparagraph, only the periods in which the installations or the processes are actually in normal operation shall be taken into account.

3. For periodic measurements, three readings shall be obtained during each measurement exercise, and the measurement exercises shall not be more than 24 months apart.

Compliance with the emission limit values laid down in Article 5 and in Annex III(A) shall be considered to be achieved if none of the valid, randomly measured values exceeds the emission limit value. Compliance shall be reverified following a substantial change.

4. Compliance with the following shall be demonstrated to the satisfaction of the competent authority:
  - fugitive emission limit and guide values;
  - the requirements of the reduction scheme under Annex III(B);
  - the provisions of Article 5(3); and
  - emission requirements expressed in terms of solvent emissions per unit product.

Guidance is provided in Annex IV on solvent management plans serving to demonstrate compliance with these parameters.

5. The Commission shall organize an exchange of information on the use of solvent management plans in Member States based on the data for the implementation of this Directive in the three years following the date prescribed for its transposition. On the basis of the results of the exchange of information, the Commission, in accordance with the procedure referred to in Article 13, shall if appropriate amend this Article and Annex IV.

#### **Article 9**

##### **Non-compliance**

1. Member States shall take appropriate measures to ensure that, if it is found that the requirements of this Directive have been breached:
  - (a) the operator informs the competent authority and takes measures to ensure that compliance is restored within the shortest possible time;
  - (b) if necessary, the operation of the installation is prohibited.
2. Where the targets of an agreed national plan are not achieved, the Member State shall ensure that those industry sectors which fail to achieve their commitments and obligations under the plan are required to comply with emission controls in the form specified in Article 5(2), (3) and (4) and Annex III which ensure that those commitments and obligations are achieved and which at least meet the provisions of Article 5(2), (3) and (4) and Annex III. This compliance must be achieved on the same timescale as for any other installation of the same type, or within two years of the establishment of non-compliance, whichever is the later.

#### **Article 10**

##### **Information systems and reporting**

1. At intervals of three years Member States shall send information to the Commission on the implementation of this Directive, in the form of a sectoral report which shall also cover other pertinent Community Directives. The report shall be drawn up on the basis of a questionnaire or outline drafted by the Commission in accordance with the procedure laid down in Article 6 of Council Directive 91/692/EEC<sup>18</sup>. The questionnaire

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<sup>18</sup> OJ No L 377, 31.12.1991, p. 48.

or outline shall be sent to the Member States six months before the start of the period covered by the report. The report shall be made to the Commission within nine months of the end of the three-year period covered by it. Member States shall publish the reports produced at the same time as they are transmitted to the Commission, subject to the restrictions laid down in Article 3(2) and (3) of Council Directive 90/313/EEC<sup>19</sup>. The first report shall cover the period 2000 to 2003.

2. The information submitted under paragraph 1 shall, in particular, include:
  - (a) details of authorizations and registrations issued under this Directive;
  - (b) details of the extent of compliance with the requirements of Article 5(2), (3) and (4) and Annex III, or with the requirements of Article 12;
  - (c) compliance with the requirements of Article 5(6) and (8).

## **Article 11**

### **Public access to information**

1. Without prejudice to Directive 90/313/EEC, Member States shall take the necessary measures to ensure that applications for authorization for new installations or for substantial changes are made available for an appropriate period of time to the public, to enable it to comment on them before the competent authority reaches a decision. Without prejudice to Directive 96/61/EC, no obligation to reformat the information for public consumption is implied.

That decision, including at least a copy of the authorization, and any subsequent updates, must also be made available to the public.

For installations undergoing registration, the register and the general rules applicable shall be made available to the public.

2. The results of emission monitoring as required under the authorization or registration conditions referred to in Article 7 and held by the competent authority must be made available to the public.
3. Paragraphs 1 and 2 shall apply subject to the restrictions regarding grounds for refusal by public authorities to provide information, including commercial and industrial confidentiality, laid down in Article 3(2) and (3) of Directive 90/313/EEC.

## **Article 12**

### **National plans**

1. Member States may define and implement national plans for reducing emissions from the processes and industrial installations covered by Article 1. These plans shall result in a reduction of the annual emissions of volatile organic compounds from installations covered by this Directive by at least the same amount as would have been achieved by applying the emission limits under Article 5(2), (3) and (4) and Annex III by 30 October 2007.

A Member State which does so shall be exempt from implementation of the emission limit values laid down in Article 5(2), (3) and (4) and Annex III.

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<sup>19</sup> OJ No L 158, 23.6.1990, p. 56.

2. The plan shall include a list of the legal measures taken or to be taken to ensure that the aim specified in paragraph 1 will be achieved, including details of the proposed plan monitoring mechanism. It shall also include binding interim reduction targets against which progress towards the aim can be measured.
3. The Member State shall supply to the Commission a copy of the plan by the date prescribed for the transposition of this Directive. The plan must be accompanied by supporting documentation sufficient to verify that the aim of paragraph 1 will be achieved, including any documentation specifically requested by the Commission.
4. The Member State shall designate a national authority for the collection and evaluation of the information required by paragraph 3, as well as for the implementation of the national plan.
5. If the Commission, in considering the plan, or in considering the progress reports submitted by the Member State under Article 10, is not satisfied that the objectives of the programme will be achieved within the prescribed period, it shall inform the Member State and the Committee referred to in Article 13 of its opinion and of the reasons for reaching such an opinion. It shall do so within six months of receipt of the plan or report. The Member State shall then notify the Commission, within three months, of the corrective measures it will take in order to ensure that the objectives are achieved.
6. As regards the original plan, if the Commission decides within six months of the notification of the corrective measures that those measures are insufficient to ensure that the objective of the plan is achieved within the prescribed period, the Member State shall be obliged to satisfy the requirements of Article 5(2), (3) and (4) and Annex III within the period specified in the Directive in the case of existing installations, and within 12 months of the date of the Commission's decision in the case of new installations.

### **Article 13**

#### **Advisory Committee**

1. The Commission shall be assisted by the Committee established under the first paragraph of Article 19 of Directive 96/61/EC (hereinafter "the Committee") operating according to a consultative procedure.
2. The representative of the Commission shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion on the draft of the measures to be taken within a time limit which the chairman may lay down according to the urgency of the matter, if necessary by taking a vote.

The opinion shall be recorded in the minutes; in addition, each Member State shall have the right to ask to have its position recorded in the minutes.

The Commission shall take the utmost account of the opinion delivered by the Committee. It shall inform the Committee of the manner in which its opinion has been taken into account.

### **Article 14**

#### **Sanctions**

Member States shall determine the sanctions applicable to breaches of the national provisions adopted pursuant to this Directive and shall take all necessary measures for their implementation. The sanctions determined must be effective, proportionate and dissuasive. Member States shall notify these provisions to the Commission at the latest by the

date mentioned in Article 15, and shall notify any subsequent modification of them as soon as possible.

## **Article 15**

### **Transposition**

Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 31 December 1999 at the latest. They shall forthwith inform the Commission thereof.

These laws, regulations and administrative provisions shall contain a reference to this Directive or shall be accompanied by such a reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

Member States shall communicate to the Commission the text of the provisions of national law which they adopt in the field covered by this Directive.

## **Article 16**

### **Entry into force**

This Directive shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Communities.

## **Article 17**

### **Addressees**

This Directive is addressed to the Member States.

Done at Brussels,

For the Council  
The President

## SCOPE

Categories of industrial activity referred to in Article 1. In each case the process includes the cleaning of the process equipment but not the cleaning of work.

Adhesive coating:

- any process in which an adhesive is applied to a surface, with the exception of adhesive coating and laminating associated to printing processes.

Coating processes:

- any process in which a single or multiple application of a continuous film of a coating is laid onto:
  - vehicles as listed below:
    - new cars, defined as vehicles of category M1 in Directive 70/156/EEC, and of category N1 in so far as they are coated at the same installation as M1 vehicles;
    - truck cabins, defined as the housing for the driver, and all integrated housing for the technical equipment, of vehicles of category N2 and N3 in Directive 70/156/EEC;
    - vans and trucks, defined as vehicles of categories N1, N2 and N3 in Directive 70/156/EEC, but not including truck cabins;
    - buses, defined as vehicles of category M2 and M3 in Directive 70/156/EEC;
  - metallic and plastic surfaces;
  - wooden surfaces;
  - textile, fabric, film and paper surfaces;
  - leather.

It does not include the coating of substrates with metals by electrophoretic and chemical spraying techniques. If the coating process includes a step in which the same article is printed, that printing step is considered part of the coating process. However printing processes operated as a separate process are not included.

Coil coating:

- any process where coiled steel, stainless steel, coated steel, copper alloys or aluminium strip is coated with either a film forming or laminate coating in a continuous process.



### Conversion of natural or synthetic rubber:

- the mixing, milling, blending, calendering, extrusion and vulcanization of natural or synthetic rubber and any ancillary operations for converting natural or synthetic rubber into a finished product.

### Dry Cleaning

- any process using volatile organic compounds to remove contamination from the following manufactured consumer goods: furs, leather, down feathers, textiles or other objects made of fibres.

### Impregnation of wooden surfaces

- any process giving a loading of preservative in the timber.

### Manufacturing of coatings, varnishes, ink and adhesives

- the manufacture of the above final products, and of intermediates where carried out at the same installation, by mixing of pigments, resins and adhesives materials with organic solvent or other carrier, including dispersion and predispersion activities, viscosity and tint adjustments and operations for filling the final product into its container.

### Manufacturing of pharmaceutical products:

- the chemical synthesis, fermentation, extraction, formulation and finishing of pharmaceutical products or intermediates.

### Printing

- a reproduction process of text and/or images in which, with the use of an image carrier, ink is transferred onto whatever type of surface. It includes associated varnishing, coating and laminating techniques. Only the following sub-processes are subject to this Directive:

flexography - a printing process using an image carrier of rubber or elastic photopolymers on which the printing inks are above the non-printing areas, using liquid inks which dry through evaporation.

heatset web offset - a web-fed printing process using an image carrier in which the printing and non-printing area are in the same plane, where web-fed means that the material to be printed is fed to the machine from a reel as distinct from separate sheets. The non-printing area is treated to attract water and thus reject ink. The printing area is treated to receive and transmit ink to the surface to be printed. Evaporation takes place in an oven where hot air is used to heat the printed material.

laminating associated to a printing process - the adhering together of two or more flexible materials to produce laminates.

publication rotogravure - rotogravure used for printing paper for magazines, brochures, catalogues or similar products, using toluene-based inks.

rotogravure - a printing process using a cylindrical image carrier in which the printing area is below the non-printing area, using liquid inks which dry through evaporation. The recesses are filled with ink and the surplus is cleaned off the non-printing area before the surface to be printed contacts the cylinder and lifts the ink from the recesses.

rotary screen printing - a web-fed printing process in which the ink is passed onto the surface to be printed by forcing it through a porous image carrier, in which the printing area is open and the non-printing area is sealed off, using liquid inks which dry only through evaporation. Web-fed means that the material to be printed is fed to the machine from a reel as distinct from separate sheets.

varnishing - a process by which a varnish or an adhesive coating for the purpose of later sealing the packaging material is applied to a flexible material.

#### Surface Cleaning:

- any process except dry cleaning using organic solvents to remove contamination from the surface of material including degreasing. A cleaning process consisting of more than one step before or after any other processing step shall be considered as one surface cleaning process. This process refers to the cleaning of work and not to the cleaning of process equipment.

#### Vegetable oil extraction and fat and vegetable oil refining processes:

- the extraction of vegetable oil from seeds and other vegetable matter, the processing of dry residues to produce animal feed, the purification of fats and vegetable oils derived from seeds, vegetable matter and/or animal matter.

#### Vehicle refinishing<sup>20</sup>

- all coating processes of a road vehicle as defined in Directive 70/156/EEC, or a part of it, carried out as part of vehicle repair, conservation or decoration outside of manufacturing installations, and the original coating of vehicle with refinishing-type materials, where this is carried out away from the original manufacturing line.

#### Winding wire coating:

- coating of metallic conductors used for winding the coils in transformers and motors etc.

#### Wood and plastic lamination

- the adhering together of wood and/or plastic to produce laminates.

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<sup>20</sup> The Commission shall consider approaches to the regulation of this sector by control of the products it uses, and may consequently remove the sector from the scope of this proposal in order to control it by other means.

## DEFINITIONS

For the purpose of this Directive:

### Adhesive

- means any preparation, including all the organic solvents or preparations containing organic solvents necessary for its proper application, which is used to adhere separate parts of a manufactured article.

### Halogenated organic solvent

- means an organic solvent which contains at least one halogen atom per molecule.

### Coating

- means any preparation, including all the organic solvents or preparations containing organic solvents necessary for its proper application, which is used to provide a decorative, protective or other functional effect on a surface.

### Consumption

- means the total input of organic solvents into an installation or a process per calendar year, or any other 12 month period, less any volatile organic compounds that are recovered for re-use.

### Ink

- means a preparation, including all the organic solvents or preparations containing organic solvents necessary for its proper application, which is used in a printing process to impress text or images onto a surface.

### Moving average over 8 hours

- means the calculation, once per hour, of the arithmetic average of all valid readings taken during the preceding 8 hours period of normal operating conditions and calculated after each period of 8 hours of normal operating conditions.

### Nominal capacity

- means the maximum mass use of organic solvents by an installation averaged over one day, if the installation is operated under normal operating conditions at its design output.

### Normal operation

- means all periods of operation of an installation or a process except start-up and shut-down operations and maintenance of equipment.

### Preparation

- means mixtures or solutions composed of two or more substances.

### Re-use of organic solvents

- means the use of organic solvents recovered from an installation for any technical or commercial purpose including use as a fuel where this is demonstrated to the satisfaction of the competent authority, but excluding the treatment of such recovered organic solvent as waste.

### Standard conditions

- means a temperature of 273.15 Kelvin and a pressure of 101.3 KPa.

### Start-up and shut-down operations

- means operations whilst bringing a process, an equipment item or a tank into or out of service or into or out of an idling state. Regularly oscillating process phases are not to be considered as start-ups and shut-downs.

### Small installation

- means an installation which falls within items 6, 11 or 12 of Annex III(A), or within the lower threshold band of items 1, 3, 4, 5, 8, 10, 13, 16, or 18 of Annex III(A).

### Varnish

- means a transparent coating.

### Waste gases

- means the final gaseous discharge containing organic compounds or other pollutants, from a chimney, a stack or an abatement equipment into air. The volumetric flow rates shall be expressed in [m<sup>3</sup>/h] at standard conditions.

**ANNEX III**

**A: THRESHOLDS AND EMISSION CONTROLS**

	Process (Solvent consumption threshold in tonnes/year)	Threshold (Solvent consumption threshold in tonnes/yr)	Emission Limit (mgC/m <sup>3</sup> )	Fugitive/Total <sup>#</sup> Emission Limit (percentage of solvent input)		Special provisions
				New	Existing	
1	Heatset web offset printing (>15)	15-25 >25	100 20	30 <sup>1</sup>		<sup>1</sup> Solvent residue in finished product is not to be considered as part of fugitive emissions. Guide value.
2	Publication rotogravure (>25)	>25	75	10	15	
3	Other rotogravure, flexography, rotary screen printing, laminating or varnishing units (>15)	15-25 >25	100 100	20 <sup>1</sup> 20 <sup>1</sup>		<sup>1</sup> Guide value
4	Surface cleaning <sup>1</sup> (>1)	1-5 >5	20 <sup>2</sup> 20 <sup>2</sup>	15 10		<sup>1</sup> Using compounds specified in Article 5 paras 5 and 7 <sup>2</sup> Limit refers to mass of compounds in mg/m <sup>3</sup> , and not to total carbon. If average content of dichloromethane in all cleaning agents used over 12 month period is > 50% by weight, an emission limit of 50 shall apply.
5	Other surface cleaning (>2)	2-10 >10	75 <sup>1</sup> 75 <sup>1</sup>	20 <sup>1</sup> 15 <sup>1</sup>		<sup>1</sup> Installations which demonstrate to the competent authority that the average solvent content of all products used does not exceed 30% by weight are exempt from application of these values.
6	Vehicle coating (<15) and vehicle refinishing		50	25		

7	Coil coating (>25)		50 <sup>1</sup>	5	10	<sup>1</sup> For installations using nitrogenated solvents which use techniques which allow reuse of recovered solvents, the emission limit shall be 150.
8	Other coating, including metal, plastic, textile, film and paper coating (>5)	5-15 >15	100 <sup>1</sup> 50/75 <sup>2,3</sup>	25 20		<sup>1</sup> Emission limit applies to coating application and drying processes operated under contained conditions. <sup>2</sup> The first value applies to drying processes, the second to coating application processes. Contained conditions are assumed. <sup>3</sup> For installations using nitrogenated solvents which use techniques which allow reuse of recovered solvents, the emission limit applied to coating application and drying processes taken together shall be 150.
9	Coating of winding wire (>5)			10g/kg <sup>1</sup> 5g/kg <sup>2</sup>		<sup>1</sup> Applies for installations where average diameter of wire ≤ 0.1mm. <sup>2</sup> Applies for all other installations. Emission limits are expressed in grammes of solvent emitted per kilogramme of product produced.
10	Wood coating (>15)	15-25 >25	100 <sup>1</sup> 50/75 <sup>2</sup>	25 20		<sup>1</sup> Emission limit applies to coating application and drying processes operated under contained conditions. <sup>2</sup> The first value applies to drying processes, the second to coating application processes. Contained conditions are assumed.
11	Dry cleaning			20 g/kg <sup># 1,2</sup>		<sup>1</sup> Expressed in mass of solvent emitted per kilogramme of product cleaned. <sup>2</sup> The emission limit in Article 5 paragraph 7 does not apply for this sector.
12	Wood impregnation (> 25)		100 <sup>1</sup>	45 or 11 kg/m <sup>3</sup> <sup>2,#</sup>		<sup>1</sup> Does not apply for impregnation with creosote. <sup>2</sup> Expressed in mass of solvent per m <sup>3</sup> of timber treated. Stack emission limit does not apply if this option is chosen.

13	Leather coating (>10)	10-25 >25		85 g/m <sup>2</sup> # 75 g/m <sup>2</sup> #	Emission limits are expressed in grammes of solvent emitted per square metre of product produced.
14	Footwear manufacture (>5)			20g per pair <sup>#</sup>	Emission limits are expressed in grammes of solvent emitted per pair of footwear produced.
15	Wood and plastic lamination (>5)			30 g/m <sup>2</sup> #	Emission limits are expressed in grammes of solvent emitted per square metre of product produced.
16	Adhesive coating (>5)	5-15 >15	50 <sup>1</sup> 50 <sup>1</sup>	25 20	<sup>1</sup> If techniques are used which allow reuse of recovered solvent, the emission limit shall be 150.
17	Manufacture of coatings, varnishes, inks and adhesives (>100)	100-1000 >1000	150 150	5 <sup>1</sup> 3 <sup>1</sup>	<sup>1</sup> Installations which achieve total emission limit values of 5 and 3 respectively are exempt from application of the relevant emission limit. The fugitive emission limit does not include solvent sold as part of a coatings preparation in a sealed container.
18	Rubber conversion (>10)	10 -15 >15	20 <sup>1</sup> 20 <sup>1</sup>	30 25	<sup>1</sup> If techniques are used which allow reuse of recovered solvent, the emission limit shall be 150.
19	Vegetable oil extraction (>10)			olives - 2.5 kg/tonne <sup>(1)</sup> # castor - 3.0 kg/tonne rape seed - 1.0 kg/tonne sunflower seed - 1.0 kg/tonne soya beans (normal crush) - 0.8 kg/tonne soya beans (white flakes) - 1.2 kg/tonne other seeds - 3 kg/tonne 1.5 kg/tonne <sup>(2)</sup> # 4 kg/tonne <sup>(3)</sup> #	<sup>1</sup> Applies to extraction of oil from the material specified. <sup>2</sup> Applies to all fractionation processes excluding degumming (the removal of gums from the oil). <sup>3</sup> Applies to degumming.
20	Manufacture of pharmaceuticals (>50)		20 <sup>1</sup>	5 15	<sup>1</sup> If techniques are used which allow reuse of recovered solvent, the emission limit shall be 150.

# Emission requirements in this column marked with this sign are product-based emission requirements referring to total emissions, including solvents used for the cleaning of process equipment, averaged over one year. Otherwise the requirements refer simply to fugitive emissions.

## Article 5(2) derogation

Those installations which are identified in the above table as having to meet emission limits of 75 mgC/m<sup>3</sup> or 100 mgC/m<sup>3</sup>, and which operate existing abatement equipment which meets an emission limit value of 150 mgC/m<sup>3</sup> and which was put into operation no earlier than 1994, are derogated from the emission limit values in the above table, provided the total emissions of the installation do not exceed those that would have resulted if all the requirements of the above table were met.

### The vehicle coating industry

The emission limits are expressed in terms of grammes of solvent emitted in relation to the surface area of product in square metres.

The surface area of any product dealt with in the table below is defined as follows:

- the surface area calculated from the total electrophoretic coating area, and the surface area of any parts that might be added in successive phases of the coating process which are coated with the same coatings as those used for the product in question, or the total surface area of the product coated in the installation.

The surface of the electrophoretic coating area is calculated using the formula:

$$\frac{2 \times \text{total weight of product shell}}{\text{average thickness of metal sheet} \times \text{density of metal sheet}}$$

average thickness of metal sheet x density of metal sheet

This method shall also be applied for other coated parts made out of sheets.

Computer Aided Design or other equivalent methods shall be used to calculate the surface area of the other parts added, or the total surface area coated in the installation.

The total emission limit in the table below refers to all process stages carried out at the same installation from electrophoretic coating, or any other kind of coating process, through to the final wax and polish of topcoating inclusive, as well as solvent used in cleaning of process equipment. The limit is expressed as the mass sum of organic compounds per m<sup>2</sup> of the total surface area of coated product.

Process (Solvent consumption threshold in tonnes/year)	Production threshold (Refers to annual production of coated item)	Total emission limit (g/m <sup>2</sup> )	
		New	Existing
New car coating (>15)	>5000	45	60
	<5000 monocoque or >3500 chassis-built	90	90
New truck cabins (>15)	<5000	65	85
	>5000	55	75
New vans and trucks (>15)	<2500	90	120
	>2500	70	90
New buses (>15)	<500	210	290
	>500	150	225

Vehicle coating installations below the solvent consumption thresholds in the table above shall meet the requirements for the vehicle refinishing sector in Annex III(A).



## B: REDUCTION SCHEME

### 1 Principles

The purpose of the reduction scheme is to allow the possibility to achieve emission reductions, equivalent to those achieved if the limit values were to be applied, by other means. The design of the scheme takes into account the following facts:

- (i) where substitutes containing little or no solvent are still under development, a time extension must be given to the operator to implement his emission reduction plans;
- (ii) the reference point for emission reductions should correspond as closely as possible to the emissions which would have resulted had no reduction action been taken.

The following scheme shall operate for installations for which a constant solid content of product can be assumed and used to define the reference point for emission reductions. Where the following method is inappropriate the competent authority may operate any alternative exemption scheme which it is satisfied fulfils the principles outlined here.

### 2 Practice

- (i) The operator shall forward an emission reduction plan which includes in particular decreases in the average solvent content of the total input and/or increased efficiency in the use of solids to achieve a reduction of the total emissions from the installation to a given percentage of the annual reference emissions, termed the **target emission**. This must be done on the following time frame:

Time period		Maximum allowed total annual emissions
New installations	Existing installations	
by 30.10.2001 by 30.10.2004	by 30.10.2005 by 30.10.2007	target emission * 1.5 target emission

- (ii) The annual reference emission is calculated as follows:
  - (a) The total mass of solids in the quantity of coating and/or ink, varnish or adhesive consumed in a year is determined.
  - (b) The annual reference emissions are calculated by multiplying the mass determined in (a) by the appropriate factor listed in the table below. Competent authorities may adjust these factors for individual installations to reflect documented increased efficiency in the use of solids.

Process	Multiplication factor for use in item (ii)(b)
Rotogravure printing; flexography printing; laminating as part of a printing process; varnishing as part of a printing process; wood coating; coating of textiles, fabric film or paper; adhesive coating	4
coil coating, vehicle refinishing	3
food contact coating, aerospace coatings	2.33
other coatings and rotary screen printing	1.5

- (iii) The target emission is equal to the annual reference emission multiplied by a percentage equal to
- (the fugitive emission limit value + 15), for installations falling within item 6 and the lower threshold band of items 8 and 10 of Annex III(A);
  - (the fugitive emission limit value + 5) for all other installations.
- (iv) Compliance is achieved if the actual solvent consumption determined from the Solvent Management Plan is less than or equal to the target emission.

## SOLVENT MANAGEMENT PLAN

### 1. Introduction

This Annex provides guidance on carrying out a solvent management plan. It identifies the principles to be applied (item 2), provides a framework for the mass balance (item 3) and provides an indication of the requirements for verification of compliance (item 4).

### 2. Principles

The solvent management plan serves the following purposes:

- (i) verification of compliance as specified in Article 8(4);
- (ii) identification of future reduction options
- (iii) enabling of the provision of information on solvent consumption, solvent emissions and compliance with this Directive to the public.

### 3. Definitions

The following definitions provide a framework for the mass balance exercise.

Inputs of organic solvents:

- I1. The quantity of organic solvents or their quantity in preparations purchased which are used as input into the process in the timeframe over which the mass balance is being calculated.
- I2. The quantity of organic solvents or their quantity in preparations recovered and re-used as solvent input into the process. (The recycled solvent is counted every time it enters the process.)

Outputs of organic solvents:

- O1. Captured emissions of organic solvents and/or organic compounds, due to solvent consumption, emitted at the outlet of stacks or after abatement equipment.
- O2. Organic solvents lost in water, if appropriate taking into account waste water treatment when calculating O5.
- O3. The quantity of organic solvents which remains as contamination or residue in products output from the process.
- O4. Uncaptured emissions of organic solvents to air. This includes the general ventilation of rooms, where air is released to the outside environment via windows, doors, vents and similar openings.
- O5. Organic solvents and/or organic compounds lost due to chemical or physical reactions (including for example those which are destroyed, eg by incineration or other waste gas or waste water treatments, or captured, eg by adsorption, as long as they are not counted under O6, O7 or O8).
- O6. Organic solvents contained in collected waste.

- 07. Organic solvents, or organic solvents contained in preparations, which are sold or are intended to be sold as a commercially valuable article.
- 08. Organic solvents contained in preparations recovered for re-use but not as input into the process, as long as not counted under 07.
- 09. Organic solvents disposed of to soil.

**4. Guidance on use of solvent management plan for verification of compliance**

The use made of the solvent management plan will be determined by the particular requirement which is to be verified, as follows:

- (i) Verification of compliance with the reduction option in Annex III(B), with an emission limit expressed in solvent emissions per unit product, and with the requirements of Article 5(2)(ii).

- (a) For all processes using Annex III(B) the solvent management plan should be done annually to determine consumption. Consumption can be calculated according to the following equation:

$$C = I1 - O8$$

A parallel exercise should also be undertaken to determine solids used in coating in order to derive the annual reference emission and the target emission each year.

- (b) For assessing compliance with an emission limit expressed in solvent emissions per unit product the solvent management plan should be done annually to determine emissions. Emissions can be calculated according to the following equation:

$$E = F + O1$$

where F is the fugitive emission as defined in section (ii)(a) below. The emission figure should then be divided by the relevant product parameter.

- (c) For assessing compliance with the requirements of Article 5(2)(ii), the solvent management plan should be done annually to determine total emissions from all processes concerned, and that figure should then be compared with the total emissions that would have resulted had the requirements of Annex III been met for each process separately.

- (ii) Determination of fugitive emissions for comparison with the guide and limit values in Annex III(A):

- (a) Methodology

The fugitive emissions can be calculated according to the following equation:

$$F = I1 - O1 - O5 - O6 - O7 - O8$$

This quantity can be determined by direct measurement of the quantities. Alternatively, an equivalent calculation can be made by other means, for instance by using the capture efficiency of the process.

The fugitive emission limit is expressed as a proportion of the input, which can be calculated according to the following equation:

$$I = I_1 + I_2$$

(b) Frequency

Determination of fugitive emissions for a piece of plant can be done by a short but comprehensive set of measurements. It need not then be done again until the equipment is modified. However unless each piece of plant meets the fugitive emission limit values individually, an annual solvent management plan should be done for the installation as a whole, to ensure that it complies with the fugitive emission limit value.

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