EXECUTIVE SUMMARY

The BAT (Best Available Techniques) Reference Document (BREF) entitled 'Surface Treatment Using Organic Solvents (STS)' reflects an information exchange carried out under Article 16(2) of Council Directive 96/61/EC (IPPC Directive). This Executive Summary describes the main findings, a summary of the principal BAT conclusions and the associated consumption and emission levels. It should be read in conjunction with the preface, which explains this document's objectives; how it is intended to be used and legal terms. It can be read and understood as a standalone document but, as a summary, it does not present all the complexities of this full document. It is therefore not intended as a substitute for this full document as a tool in BAT decision making.

Scope of this document

The scope of this document is based on Annex 1, 6.7, to the IPPC Directive 96/61/EC: *'Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating, with a consumption capacity of more than 150 kg per hour or more than 200 tonnes per year.'*

Industry asked for clarification of the definitions of 'organic solvents' and 'consumption capacity'. At the conclusion of the information exchange, it could be seen that the exchange had dealt with information on organic solvents being defined as VOCs (as defined in the Solvent Emissions Directive, Council Directive 1999/13/EC). It could equally be seen that, in determining conclusions on BAT, the exchange had focused on installations whose actual use of solvents exceeded the consumption capacity thresholds stated in the IPPC Directive (where the use in the activity included solvents recovered from waste gas emission abatement equipment). Interpretation of these capacity thresholds is discussed in the context of work carried out by DG Environment to develop some guidance on the interpretation of certain provisions of the Directive.

This document discusses:

- three printing processes using solvents on a large scale (heatset web offset, flexible packaging and publication gravure)
- coating and/or painting of winding wires, cars and commercial vehicles, buses, trains, agricultural equipment, ships and yachts, aircraft, steel and aluminium coil, metal packaging, furniture and wood, as well as other metal and plastic surfaces
- adhesive application in the manufacture of abrasives and adhesive tapes
- impregnation of wood with preservatives
- cleaning and degreasing associated with these activities. No separate degreasing industry was identified.

The use of water-soluble alternatives to solvent-based coatings (such as e-coat) are discussed in this document: other water-based surface treatments are discussed in the STM BREF.

Other activities have not been considered in this document. These include:

- other dressing, waterproofing, sizing or impregnation processes that may be in the scope of the BREF(s) on Textiles and Tanneries
- the production of laminate boards, chipboard, etc. as these use water-based resins
- industries (or those parts of) or activities using solvents widely known to operate below the thresholds
- the manufacture of paints, inks, adhesives, etc., which are not within the scope.

All the industries in this document are also regulated by the Solvent Emissions Directive (the SED, Council Directive 1999/13/EC). Where emission limit values (ELVs) are prescribed in the SED, these are assumed to be minimum ELVs pursuant to the IPPC Directive (Article 18(2)). They are not used as emission values associated with BAT.

General information
This is not a homogenous sector and covers several industries, with installation sizes ranging from SME to multinational. About 4.5 million tonnes of solvents a year are sold for use in Europe, 27 % (2003) of this is used in the paint and coatings industries, a decrease from 47 % (1998) due to increased use of water-based, powder technologies and other low-solvent technologies. Printing ink formulations use about 7 % and adhesives about 4 % (These figures include significant non-IPPC uses).

Key environmental issues
The main environmental issues relate to the emission of solvents to air, water and groundwaters, and soil. Energy usage is also important, as are particulate emissions to air, waste minimisation and management (including reducing raw material consumption by increased application efficiency) and site condition on cessation of activities.

Structure of this document
Chapters 2 through to 19 each address an industry in the sector and consist of the four following sections:

Section 1: general information on the industry or activity concerned
Section 2: a description of the industrial processes used within this industry or activity
Section 3: data and information concerning current consumption and emission levels
Section 4: techniques to be considered for determining BAT as explained below for Chapter 20; however, the emphasis is on techniques or information specific to the individual industry or activity.

Chapter 20 describes generic techniques for the reduction of consumptions and emissions and other techniques that are considered to be most relevant for determining BAT and BAT-based permit conditions in more detail, and are relevant for more than one of the industries or activities concerned.

Consumptions and emissions
The best data relates to production throughput based on production parameters, e.g. surface (m^2) treated or solids input to the process. Most data are for specific plants or ranges for industries. In most cases, emission values associated with a selection of BAT in each industry are given based on suitable production parameters.

Best available techniques
The BAT chapter (Chapter 21) identifies those techniques that are considered to be BAT at a European level, based mainly on the information in Chapter 20 and the specific industry chapters. This takes into account the Article 2(11) definition of best available techniques and the considerations listed in Annex IV to the IPPC Directive. The BAT chapter does not set or propose emission limit values but suggests consumption and emission values that are usually associated with the use of a combination of BAT.

Where water-based surface treatments (as defined in IPPCD, Annex 2.6) are operated with solvent-based processes, the relevant BAT for the water-based treatments can be found in the STM BREF. Additional techniques and supporting information may be found in particular in the CWW BREF, the Storage BREF and the Monitoring REF, as well as other BREFs. These techniques have not, however, been validated for the industries covered in this document.

The following paragraphs summarise the key BAT conclusions relating to the most relevant environmental issues. Although the industry is complex in size and range of activities, the same generic BAT may be considered for all. Other BAT are given that apply to specific processes. The BAT elements for a specific installation will be a selection of the BAT described related to the activity, taking into account the considerations in Annex IV to the IPPC Dirctive.

Generic BAT

Installation design, construction and operation. BAT is to minimise consumptions and emissions (particularly to soil, water and groundwater, as well as to air) by:

- implementing and adhering to environmental and other management systems, whether or not these are externally validated. These include planning the ongoing reduction of the environmental footprint of the installation (including actions and investments), benchmarking consumptions and emissions (over time against internal and external data), considering eventual decommissioning in designing new plants or upgrades, etc.
- using simple risk management to design, construct and operate an installation, together with techniques described in this document and in the Storage BREF when storing and using process chemicals and raw materials. These BAT aid site decommissioning by reducing unplanned emissions, recording the history of usage of priority and hazardous chemicals and dealing promptly with potential contamination
- using operational techniques including automation, training, and written procedures for operation and maintenance.

Monitoring. BAT is to monitor solvent emissions in order to able to minimise them by:

- using a solvent management plan, which is essential to calculate fugitive or total emissions: these should be made regularly, although key parameters can be established for benchmarking and regular control. Direct measurements should be made according to the techniques referred to
- ensuring equipment critical to emissions calculations is maintained regularly, and recalibrated when necessary.

Reducing water consumption and/or conserving raw materials in water-based treatment processes. BAT is to use:

- techniques such as cascade (multiple) rinsing, ion exchange or membrane separation
- control measures to minimise the use of cooling waters
- closed cooling systems and/or heat exchangers.

Minimising energy usage. BAT is to apply the techniques described, in particular: by minimising the air volumes to be moved, minimising reactive energy losses, controlling high energy demands on equipment start up, using energy efficient equipment, etc.

Raw material management. BAT is to:

- minimise the environmental impact of emissions when selecting suitable raw materials
- minimise raw material usage by using one or a combination of techniques described.

Systems for surface treatment, application and drying/curing. BAT is to minimise VOC emissions and energy consumption, and maximise raw material efficiency (i.e. minimise waste) by selecting a system that combines these objectives. This applies to a new plant or when upgrading.

Cleaning. BAT is to use the techniques described to:

- conserve raw materials and reduce solvent emissions by minimising colour changes and cleaning
- reduce solvent emissions by collecting and re-using purge solvent when cleaning spray guns
- minimise VOC emissions by selecting one or more techniques according to the process and equipment, persistence of the contamination and whether cleaning the equipment or the substrate.

Using less hazardous substances (substitution). BAT is to*:*

- use non-solvent or low solvent techniques for cleaning as described generally, and for production as described for the specific industries
- minimise adverse physiological effects by replacing those with the risk phrases R45, R46, R49, R60 and R61 in accordance with Article 5(6) of Council Directive 1999/13/EC
- minimise adverse ecotoxic effects by replacing those with the risk phrases R58 and R50/53 where there is a risk of emission to the environment and alternatives exist
- reduce stratospheric (high level) ozone depletion by replacing those with the risk phases R59. In particular, all halogenated or partially halogenated solvents with the risk phrase R59 used in cleaning should be replaced or controlled as described
- minimise the formation of tropospheric (low level) ozone by using VOCs or mixtures with a lower ozone formation potential (OFP) where other measures cannot achieve the associated emission values or are not technically applicable (such as having unfavourable cross-media effects), and when substituting as described above. However, this cannot be applied to complex formulations such as automotive paints and specific single solvent systems where no replacement exists yet, such as publication gravure. Where the OFP is not increased, substitution can be made using solvents with a flashpoint of >55 ºC.

Emissions to air and waste gas treatment. BAT is to (in the design, operation and maintenance of the installation):

- minimise emissions at source, recover solvent from emissions or destroy solvents in waste gases. Emission values are given for individual industries. (Using low solvent materials can lead to excessive energy demands to operate thermal oxidisers. Oxidisers may be decommissioned where the negative cross-media effects outweigh the benefits of destroying the VOC)
- seek opportunities to recover and use excess heat generated in VOC destruction and minimise the energy used in extraction and destruction of VOCs
- reduce solvent emissions and energy consumption by using the techniques described, including reducing the volume extracted and optimising and/or concentrating the solvent content.

Particulates discharged to air from paint spraying. BAT is to use a combination of the techniques described. Associated emission values are:

- 5 mg/m^3 or less for existing installations
- 3 mg/m^3 or less for new installations.
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The industry for the coating of wood and furniture recorded a split view: the associated emission value is 10 mg/m^3 or less for both new and existing installations. The rationale is: this value is economically and technically feasible in the industry.

Waste water. BAT is:

- to minimise emissions to water by using water minimisation techniques, carry out waste water pretreatment and treatment as described
- to monitor raw materials and effluent to minimise the discharge of materials with aquatic toxicity, and reducing their effects where there is a risk of contact with water by one or more of the following: use of less harmful materials, reduced material use and losses in process treatment and by spillages, and treatment of waste waters
- where solvents may be in contact with water, to prevent hazardous levels in the atmosphere of receiving sewers by maintaining a safe discharge level
- for paint shops using water, to use the techniques described. Associated emission values for discharge to surface waters are COD 100 - 500 mg/l and suspended solids 5 - 30 mg/l
- for wet scrubber systems, reduce water consumption and effluent discharges and treatment by optimising paint transfer minimising paint sludge build up.

Techniques for biological waste water treatment can be found in the CWW BREF. Other techniques and associated emission values are discussed in the STM BREF.

Materials recovery and waste management. BAT is to reduce material usage, material losses, and recover, re-use and recycle materials as described.

Odour nuisance. BAT is, where a sensitive receptor is affected, to use a VOC emission control technique, such as using less odorous materials and/or processes, and/or waste gas treatment including high stacks.

Noise. BAT is to identify significant noise sources and any potential sensitive receptors in the vicinity. Where noise may have an impact, BAT is to use good practice techniques such as closure of bay doors, minimising deliveries and/or using engineered controls, such as silencers on large fans.

Groundwater protection and site decommissioning. BAT to address these issues are given in the BAT for installation design, construction and operation, above.

Specific industry BAT

Printing with heatset web offset. BAT is to use a combination of techniques for printing, cleaning, waste gas management, as well as generic BAT to reduce the sum of fugitive emissions and the VOCs remaining after waste gas treatment. Associated emission values for the combined isopropyl alcohol (IPA) and cleaning solvent are:

- for new or upgraded presses, 2.5 to 10 % VOC expressed as wt-% of the ink consumption
- for existing presses, 5 to 15 % VOC expressed as wt-% of the ink consumption.

Note that the top half of the ranges are associated with IPA emissions for 'difficult' jobs (as defined). Concentration techniques cannot be used because of odour problems.

Printing flexible packaging by flexography and packaging gravure. BAT is to*:*

- use a combination of techniques described to reduce the sum of fugitive and non-fugitive VOC emissions. Associated emission values for the three scenarios occurring in the industry are (using the reference emission defined in Annex IIb to the SED):

(Scenario 1) Installations where all production machines are solvent-based and connected to abatement equipment:

- with incineration: total emissions 7.5 - 12.5 % of the reference emission
- with solvent recovery: total emissions 10.0 - 15.0 % of the reference emission

(Scenario 2) Existing installations, where there is waste gas abatement equipment but not all solvent-based production machines are connected:

(2.1) for the machines that are connected to the abatement equipment:

- with incineration: total emissions 7.5 - 12.5 % of reference emission relating to those machines
- with solvent recovery: total emissions 10.0 - 15.0 % of the reference emission relating to those machines

(2.2) for the machines not connected to waste gas treatment, BAT is one of:

- use low solvent or solvent free products on these machines
- connect to the waste gas abatement equipment when there is capacity
- preferentially run high solvent content work on machines connected to waste gas abatement

(Scenario 3) Where installations have no waste gas abatement equipment and are using substitution, it is BAT to follow the developments of low solvent and solvent free inks, varnishes and adhesives, and continuously decrease the amount of solvents consumed.

In Scenarios 1 and 2.1, where an installation has a solid:solvent ratio of higher than 1:5.5 for the total of the solvent-based inks, varnishes and adhesives, the emission values may not be obtainable. In this case, it is BAT to cover the ink fountains or apply chamber doctor blades and to apply a suitable combination of other techniques, as described.

BAT is also to:
- minimise energy consumption when optimising waste gas treatment in all sites
- seek opportunities to recover and use any surplus energy in all sites.

Printing with publication gravure. BAT is to:
- reduce the sum of fugitive emissions and the VOCs remaining after gas treatment, expressed as total solvent input:
  - for new plants to 4 to 5 %, using techniques applicable to new plants
  - for existing plants to 5 to 7 %, using techniques applicable to existing plants
- prevent the excessive use of energy by using the optimum number of regenerations required to maintain emissions within the emission values expressed
- reduce the emissions of toluene to a municipal sewer to below 10 mg/l by air stripping.

Manufacturing of winding wire. BAT is to:
- minimise energy consumption after drying the wire by cooling using room and/or exterior air
- reduce the total VOC emissions by a combination of the described techniques as well as the generic BAT. Total emission values associated with these techniques are:
  - 5 g/kg or less for non-fine wires (>0.1 mm diameter)
  - 10 g/kg or less for fine wires (0.01 – 0.1 mm diameter)
- reduce VOC emissions further by seeking and implementing low or no solvent techniques in place of solvent-based lubricants.

Manufacturing of abrasives. BAT is to:
- reduce total VOC emissions by one or more of the following in conjunction with the generic BAT:
  - using no or low solvent-based bonding materials. This can be done when water cooling is not required during the process, e.g. for the manufacture of dry grinding abrasives
  - increasing the internal solvent concentration in the driers
  - using a suitable combination of the waste gas treatment techniques.

Total emission values for VOCs associated with these techniques are 9 – 14 wt-% of the solvent input.

Manufacturing of adhesive tapes. BAT is to:
- for the production of tapes using solvent-based adhesives, reduce VOC emissions by using a combination of techniques in conjunction with the generic BAT, including:
  - using non-solvent based adhesives when applicable. Water-based and hot melt adhesives only use small amounts of solvents (e.g. in cleaning). However, they can only be used in certain applications
  - using one of the following waste gas treatments or combinations: a+b, a+c, b, or c, where:
    a) condensation after a pre-drying step using an inert gas drier
    b) adsorption with a recovery efficiency of more than 90 % of the solvent input and direct emissions after this abatement technique of less than 1 %
    c) oxidisers with energy recovery.

Emission values associated with these techniques are 5 wt- % or less of the total solvent input.

Coating of cars. BAT is to:

- minimise the energy consumption in the selection and operation of painting, drying/curing and associated waste gas abatement systems
- minimise solvent emissions, as well as energy and raw material consumptions, by selecting a paint and drier system as described. A whole coating system needs to be considered, as individual steps may be incompatible. The associated emission values are 10 - 35 g/m^2 (e-coat area) (or 0.3 kg/body + 8 g/m^2 to 1.0 kg/body + 26 g/m^2 equivalent). Lower values have been achieved in two exceptional circumstances that are reported
- establish and implement plans for existing plants to reduce consumptions and emissions to achieve the emission values above bearing in mind the cross-media effects, cost benefits, high capital costs and long payback periods to achieve these values. It is important to note that major step improvements will require techniques with significant capital costs. It may be more cost effective and environmentally beneficial to wait for step changes than to make smaller short-term improvements that will not achieve the same improvement, depending on the time-scale
- where spray booth waste gas treatment is applied, concentrate the VOC by using one of the described pretreatment techniques
- optimise transfer efficiencies using one or more of the techniques described
- minimise raw material consumption and waste by maximising material transfer efficiencies
- minimise waste production by either dewatering paint sludge, recycling paint sludge or using the water emulsion technique.

Coating of trucks and commercial vehicles. BAT is to:

- minimise solvent emissions, as well as energy and raw material consumptions, using a combination of paint and drier systems in conjunction with waste gas treatment systems. In particular, use solvent-free polyurethane materials applied with airless spraying for noise dampening and floor covering, as well as pre-coated materials. Overall associated emission values are 10 – 55 g/m^2 for new truck cabins and 15 – 50 g/m^2 for new vans and trucks (e-coat area). Use a combination of techniques to reduce solvent emissions from cleaning. The associated emission values are less than 20 g/m^2 (e-coat area)
- minimise raw material consumption and waste by maximising material transfer efficiencies
- minimise waste production by either dewatering paint sludge, recycling paint sludge or using the water emulsion technique.

Coating of buses. BAT is to:

- minimise solvent emissions, as well as energy and raw material consumptions, using a combination of paint and drier systems in conjunction with waste gas treatment systems. In particular, use solvent-free polyurethane materials applied with airless spraying for noise dampening and floor covering, as well as pre-coated materials. Overall associated emission values are 92 – 150 g/m^2 (e-coat area)
- use a combination of techniques to reduce solvent emissions from cleaning. The associated emission values are less than 20 g/m^2 (e-coat area)
- minimise raw material consumption and waste by maximising material transfer efficiencies
- minimise waste production by either dewatering paint sludge, recycling paint sludge or using the water emulsion technique.

Coating of trains. BAT is to:

- reduce VOC emissions by using a combination of techniques including the generic BAT. Associated emission values are 70 - 110 g VOC/m² of the painted area (not e-coat area)
- use a combination of techniques to reduce particulate emissions to air. The associated emission values are 3 mg/m^3 or less.

Coating of agricultural and construction equipment. BAT is to:

- reduce solvent consumptions and emissions, maximise efficiency of the coating application and minimise energy usage by a combination of paint, drier and waste gas treatment techniques. The associated emission values are either:
  - emissions of 20 – 50 mg C/m³ in waste gas and 10 – 20 % for fugitive emissions, or
  - overall emissions of 0.2 to 0.33 kg VOC/kg solids input
- reduce material consumptions, solvent emissions and the amount of airflow to be treated by using dipping techniques for the coating of components prior to assembly
- use other paint systems to replace paints based on halogenated solvents.

Coating of ships and yachts. BAT is to:

- minimise emissions to the environment by including the BAT in this section in the dry docks discipline for the installation
- reduce solvent emissions by a combination of generic BAT and some or all of:
  - using water-based, high-solids or 2-component paints where not limited by customer and/or technical requirements
  - reducing overspray and increasing application efficiency by a combination of techniques
  - for new construction, spray sections prior to assembly in enclosed areas with waste gas extraction and treatment
- reduce particulate emissions by one or a combination of techniques
- reduce waste water contamination by removing paint residues, leftovers and containers, used abrasives, mud, oil residues and any other scrap materials from the dock before flooding, storing them in containers for proper management, e.g. re-use and/or disposal.

Coating of aircraft. BAT is to:

- minimise emissions of Cr(VI) to water by using alternative passivation systems
- reduce solvent emissions to air by:
  - using high-solids paints
  - capturing and treating waste gases during paint application on components
- reduce emissions from cleaning by one or more of:
  - automation of cleaning equipment
  - measuring solvent used for cleaning
  - using pre-impregnated wipes
- reduce particulate emissions to air using techniques described. The associated emission values are 1 mg/m^3 or less.

Coating of other metal surfaces. BAT is to:

- reduce solvent consumptions and emissions, maximise efficiency of the coating application and minimise energy usage by one or a combination of paint, drier and waste gas treatment techniques. The associated emission values are 0.1 to 0.33 kg VOC/kg solids input. However, this does not apply to installations where the emissions are included in the mass emission calculations for the serial coatings of vehicles
- reduce material consumptions by using high efficiency application techniques
- use other paint systems to replace paints based on halogenated solvents.

Coil coating. BAT is to:

- reduce energy consumption using a selection of techniques. Associated consumption values are:

Energy consumption per 1000 m^2 of substrate	Minimum	Maximum
Electricity used as kWh/1000 m^2 for aluminium	270	375
Electricity used as kWh/1000 m^2 for steel	250	440
Fossil fuels used as MJ/1000 m^2 for aluminium	4000	9800
Fossil fuels used as MJ/1000 m^2 for steel	3000	10200

Coil coating: energy consumption for aluminium and steel substrates

- reduce solvent emissions using a combination of techniques described. Associated emission values are:
  - for new plants: 0.73 – 0.84 g/m^2 for waste gases, and 3 – 5 % for fugitive emissions
  - for existing plants: 0.73 – 0.84 g/m^2 for waste gases, and 3 – 10 % fugitive emissions. Existing plants will only achieve the lower values of the range when they are significantly upgraded
- recycle the aluminium and steel from residual substrates.

Coating and printing of metal packaging. BAT is to:
- reduce energy consumption by using various techniques and/or energy recovery from thermal waste gas treatment. Associated consumption values, e.g. for DWI cans are:
  - natural gas 5 - 6.7 kWh/m^2
  - electricity 3.6 - 5.5 kWh/m^2
  - recovered energy (where energy can be recovered, but not possible where emissions levels are met by substitution) 0.3 - 0.4 kWh/m^2
- reduce solvent emissions using a selection of techniques. Associated emission values are:

	VOC emission level at application (g/m^2) (2)	
	Solvent-based	**Water-based**
Food contact • DWI drink cans • sheet for ends, cans and components • drums	 6.7 – 10.5 4 – 93 90 – 100	 3.2 – 4.5 1 – 30
Non-food contact • sheet for ends, cans and components • drums	 4 – 93 60 – 70	 1 – 30 11 – 20
Print paint • sheet for ends, cans and components (1)	 2.5 – 13	 1 – 6
Notes: [1] UV ink and paint applications are limited to non-food and special applications but can achieve lower values than reported in this table [2] Values also include fugitive emissions		

Metal packaging: emission values for solvents associated with BAT

- minimise emissions to water using a selection of techniques. The associated emission values are:

Compound	**Concentration (mg/l)**
COD	<350
AOX	0.5 – 1
HC	20 or less
Sn	4 or less

Metal packaging: emission values for waste water

Coating of plastic workpieces. BAT is to:
- reduce solvent consumptions and emissions, maximise efficiency of coating application and minimise energy usage by one or a combination of paint, drier and waste gas treatment techniques. The associated emission values are 0.25 to 0.35 kg VOC/kg solids input. However, this does not apply to installations where the emissions are included in the mass emission calculations for the serial coatings of vehicles
- reduce material consumption by using high efficiency application techniques
- give priority to water-based techniques for new and upgraded systems
- degrease simple polypropylene areas by hand with solvent impregnated wipes.

Coating of furniture and wood. BAT is to:
- reduce solvent consumptions and emissions, maximise efficiency of coating application and minimise energy usage by a combination of paint, drier and waste gas treatment techniques. The associated emission values are either 0.25 kg VOC or less per kg solids input, or as in the table below:

Paint system organic solvent content	Solvent content (wt-%)	Emission reduction measures	VOC emission (g/m^2)
High	65	High efficiency application techniques and good housekeeping	40 - 60
Medium	20		10 - 20
Low	5		2 - 5

Wood coating: VOC emissions for various paint systems and with primary emission reduction measures

- reduce particulate emissions to air (see generic BAT, above). This industry recorded a split view: the associated emission value is 10 mg/m^3 or less for both new and existing installations. The rationale is: this value is economically and technically feasible in the industry.

Wood preservation. BAT is to:
- reduce solvent emissions by using vacuum impregnation with water-based or high concentration pesticide systems, with waste gas treatment for solvent systems
- use the final vacuum stage of the process cycle to remove excess solvent or carrier
- use a solvent with lower ozone-forming potential for solvent systems
- drain surplus pesticide in contained areas with both water- and solvent-based systems.

It is not BAT to spray as this has a low overall application efficiency.

Coating of mirrors. BAT is to:
- reduce solvent consumptions and emissions (mainly xylene) by a combination of the techniques described and generic BAT. The associated emission values are 1 to 3 g/m^2 for waste gas emissions (2 to 3% of the solvent input) and 5 to 10 g/m^2 for fugitive emissions (8 to 15 % of the solvent input)
- reduce the use of hazardous materials by using low lead paints.

This industry also uses water-based surface treatments described (with BAT) in the STM BREF.

Emerging techniques

Several techniques are discussed that are being developed further for, or transferred to, various industries. In particular, for inks, coatings or adhesives: using less or no solvents, improved water-based systems, 1- and 2-component systems, very high solids paints and powder coating. These often involve developing non-thermal drying or curing by UV or other radiation. For applying a final coat of lubricant on winding wires, the key development is in using low or non-solvent techniques, which is currently limited in its application. In the automotive coating industries, developments are taking place in water-dilutable, 1- and 2-component clear coats, very high solids, powder coatings, polyurethane (PU) paint which can be applied to both metals and plastics, increased use of pre-coated materials, and as a consequence of many of these developments, a reduction in the number of paint layers.

Concluding remarks

The information exchange on best available techniques for surface treatment using organic solvents was carried out from 2003 to 2006. The information exchange was successful and a high degree of consensus was achieved during the work and following the final meeting of the Technical Working Group. Only one split view was recorded on the particulate emissions from the coating of furniture and wood.

At the conclusion of the information exchange, it could be seen that the exchange had dealt with information as recorded in the Scope of this document.

Gaps in knowledge and recommendations for future research are given in the Concluding Remarks chapter. Key issues for further work are POCP and the cost-benefit of burning natural gas to abate VOCs.

The EC is launching and supporting, through its RTD programmes, a series of projects dealing with clean technologies, emerging effluent treatment and recycling technologies and management strategies. Potentially these projects could provide a useful contribution to future BREF reviews. Readers are therefore invited to inform the EIPPCB of any research results which are relevant to the scope of this document (see also the preface of this document).