

## **1. Introduction**

This report provides an overview of the results of a series of pilot audits of solvent-using activities covered by the Solvents Directive (1999/13/EC) and Statutory Instrument No 543 of 2002. The objective of the pilot audits was to test the two sector guidance documents and inspection report template in an audit situation on commercial volunteer operations (documents available at [www.epa.ie](http://www.epa.ie)). In turn, this was to highlight areas for development in the sectors in order for them to prepare for compliance with the Directive's requirements by 2005/7.

The audits were conducted in March and April 2004 at three vehicle refinishers and two dry cleaners in different parts of the country. A total of ten audits (two audits per installation) were conducted by expert auditors from six different potential Accredited Inspection Contractor (AIC) companies. EPA and INAB personnel observed the audits. Air monitoring and water/waste samples were taken for appropriate analysis also.

The Environmental Protection Agency (EPA) and the Irish National Accreditation Board (INAB) wish to sincerely thank the following people and organizations that voluntarily took part in the pilot audits:

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This report has been prepared by Eileen O'Leary, Clean Technology Centre who observed all of the audits on behalf of the EPA and Dr Gerry Byrne, Programme Manager, Office of Licensing & Guidance at the EPA.

## **2. Overall Findings**

It is acknowledged that the sectors examined have not been subject to formal environmental regulation or audit previously. Therefore, points raised in this report in relation to audit findings should not be seen as a criticism of the operations audited, but rather should be used as learning points for all operators in the sectors as they prepare themselves to comply with the Solvents Directive. This report should be read along with the draft sector guidance documents already published (see [www.epa.ie](http://www.epa.ie)).

The overall findings of the pilot process are set out as follows. A number of issues are first highlighted that were common to both sectors involved in the audit process. There were also issues that were specific to the vehicle refinishing sector and to the dry cleaning sector which are addressed separately below.

### **Sector Awareness and Understanding**

While awareness of the existence of the solvents regulations was good among the operations audited, the trial audits highlighted the need for a greater level of understanding of the specific requirements for the sectors themselves to demonstrate compliance. Sector operators need to gain detailed knowledge of the guidelines developed and of the records required to demonstrate compliance to AIC auditors. Also, in the case of vehicle refinishing, operators need to be aware that there are two methods of compliance available, and that they themselves must choose which route to take. A number of the operators had the incorrect understanding that ongoing inspections would be carried out (and funded) by local authorities or the EPA. The nature of the AIC process and exactly what an AIC is, the fact the onus will be on the operator to choose and bring in an AIC, and the fact the operator has to pay the AIC for the audit report needs to be explained to the sectors.

There was also a perception that getting ready for the Regulations early might somehow penalize the company involved by requiring them to meet more strict levels later on. The reverse is in fact the case and this needs to be highlighted in any awareness raising exercises. Early preparation will ease the burden on operations by spreading the necessary changes over time, ensuring that sufficient reliable records are available for audit purposes and avoiding poor investment choices.

### **Record Keeping and Documentation**

Record keeping is a significant issue for both sectors. While a number of the installations involved in the pilot had some good records in place, it was found that a significant increase in formal record keeping would have to be put in place by both sectors in order to demonstrate compliance with the requirements of the Directive. Where records are in place, the information is usually not collated or summarized in line with the guidelines issued. For example, in the vehicle refinishing sector, while data was available for the amount of solvent contained in

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each purchased unit of product, this information was not totaled for the calendar year.

Apart from solvent consumption records, other records such as volume and solvent concentration of waste materials, machine maintenance, training of operators etc are needed. For example, training of operators should include the operational requirements of the Directive and a signed, dated record of this training activity retained. Records that have been found to be present or absent are detailed for each sector (see below).

Therefore, the sector operators need to have the documentation in place and have it summarized for the purposes of the AIC audit (with back up original documentation which an inspector can cross-check). This will be in the best interests of the operator since it will keep audit costs to a minimum. The audits conducted demonstrated to operators the need for credible documentary evidence/records of critical control/management parameters in each sector.

The fact that such record keeping needs to start immediately cannot be stressed too strongly. For Vehicle Refinishing installations that want to use the reduction scheme for compliance, record keeping should ideally have commenced at the beginning of 2004, but in any case should start as soon as possible so that data for at least 12 months of operation will be available for audit during 2005. For installations that will be using the Emission Limit Value compliance route (Vehicle Refinishing and all Dry Cleaners), record keeping should commence at the latest from January 2006, but obviously the sooner this is done, the sooner individual facility compliance issues can be recognized and addressed cost-effectively.

### **Solvent Content of Waste Streams**

The volume and concentration of solvent in waste is an important issue for both sectors. The unknown solvent content of the waste stream may have a critical bearing on whether a facility is in compliance or otherwise. Waste containers should be purpose designed to avoid vapour losses and stored away from drains or fan equipment that might encourage fugitive emissions.

### **Issues in Relation to Waste Disposal**

There were a number of instances in both sectors where solvent containing wastes are currently being disposed of to municipal landfill or to drain. However, in other operations audited such wastes were being properly handled as hazardous waste by a licensed disposal facility. Anecdotal evidence suggests that the practice of disposal of solvent containing waste with non-hazardous waste may be common across the sectors. This issue needs to be addressed by each operator both to comply with hazardous waste legislation and to ensure that the solvent content of waste is calculated correctly to enable them to comply with the Solvents Directive.

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### **AIC Audit Observations**

The AIC report may record comments regarding the compliance or otherwise of an audited facility with the Solvents Directive. These may be Major Non-compliances (failed audit), Minor Non-compliances (issues to be addressed to avoid major non-compliances arising) or Observations (issues for improvement to avoid minor non-compliances arising). Other environmental issues not directly related to the Directive, may be brought to the attention of the operator or local authority by separate letter. It would be a matter for the local authority as competent authority to add conditions to a Certificate of Compliance if deemed necessary.

### **Format of AIC audits**

It is suggested that the audits may be conducted as a two stage process. This may particularly be the case for the first AIC audit at an installation. This two stage process could involve a pre-audit type visit, where the AIC obtains whatever data is available and sets out the remaining data that must be obtained by the operator. The second audit is then a follow up to critically assess this information. Alternatively, the AIC report template (available at [www.epa.ie](http://www.epa.ie)) could be filled out by the operator and submitted in advance to the AIC who would then assess and conduct an audit only when sufficient details had been provided. The INAB is considering this issue and will communicate directly with candidate AIC companies.

### **AIC expertise**

AICs will need expertise in auditing, detailed working knowledge of the Solvents Directive/Regulations, knowledge of the sector being audited, the chemistry of solvents and their detection, the ability to assess mass balances of materials for the calculation of fugitive emissions or the reduction scheme among other matters. The INAB is considering the qualifications/experience criteria necessary for AIC inspectors for accreditation purposes.

### **Audit Duration and Cost**

Audits could be considered to take about 3-4 hours depending on how well the operator is prepared. Absence of records or summary calculations would prolong an audit adding to the cost to the operator and risking an adverse finding being made.

AICs will have to bear the cost of accreditation to International Standard ISO/IEC 17020 as well as deploying qualified and trained auditors. In turn, they will need to charge a commercial rate to the operator for their audits.

### **Need for Consultancy Assistance**

Given the detail and complexity of the Solvents Directive, many operators may require some assistance from environmental consultancy advisors in order for them to prepare for compliance with the requirements by 2005/7. The need for early consideration of the requirements at each individual facility has been stressed above. While guidance, pilot audits and seminars have been provided

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by the EPA (see [www.epa.ie](http://www.epa.ie)), operators who identify the need to have the requirements further explained for their own operation will need to do this at their own expense.

### **3. Issues for the Vehicle Refinishing Sector**

Depending on the area of a repair being sprayed, it is considered that a throughput of 5-6 cars per week would bring an operation within the requirements of the Directive (500 Kg solvent/year). Spray-booths are essential in order to comply with the limit on waste gases of 50 mgC/Nm<sup>3</sup> and fugitive emissions of 25% (if utilising the emission limit value compliance route).

This sector showed good awareness of the need to recycle materials not related to the Solvents Directive including oil, plastic and other waste. No solvent waste was sent to drain (all drains were sealed in the operating areas). No odour complaints had been noted by the facilities audited.

#### **Records in the Vehicle Refinishing Sector**

While some records were maintained in the sector, in general these tended not to be collated or summarized according to the guidelines for AIC scrutiny. Records that were available included the solvent content of each coating pack purchased (the units used, i.e. grammes, litres, etc., were not always readily apparent), Material Safety Data Sheets (but for all of the supplier's materials not just the ones in use at the facility), and waste records (volumes only, no information on solvent content).

Some operators were not aware from the MSDSs if Risk Phrase solvents were in use or not - this is a critical point to confirm as the Directive has additional requirements for those using such materials. Perhaps suppliers might be willing to help their customers by providing individual summaries of their purchases to them.

Records that were not generally available were solids content of coatings purchased, stock levels, records of amounts of solvent recovered on-site (where carried out), or training records for individual operators.

Inventories of paint materials are considered less critical for this sector due to the low quantities involved and the relatively constant stock levels reported. The one exception to this may be in relation to gunwash and solvent waste levels at the start and end of year, which are currently not monitored.

#### **Waste Solvent Management**

Some facilities operated on-site solvent distillation recovery plants for gun wash, whereas others utilised an off-site company for solvent recovery. Losses of solvent from on-site recovery appear to be high leading to localized high vapour

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concentrations. Operators using off-site recovery were provided with equipment to contain solvent vapours during gun cleaning.

Some vehicle refinishing facilities collected waste solids from their distillation apparatus and sent these for disposal by a licensed hazardous waste management company, while another sent such solids to municipal landfill. It is considered that all solvent containing waste is hazardous and should be disposed of correctly with documentation retained to prove the ultimate fate of the waste (see European Waste Catalogue and Hazardous Waste List: 08 01 11\*).

### **Monitoring of Volatile Organic Carbon (VOC) Emissions**

Information on air emissions from two of the facilities was obtained by monitoring at two VR facilities. While instantaneous VOC readings were high during spraying operations (particularly for solvent based colour coat), 15 minute average readings did not approach the emission limit value of 50 mg/Nm<sup>3</sup>. Emissions were significantly reduced when a water based colour coat was employed.

It will be necessary to consider what the maximum spraying operation would be to avoid breaching the emission limit and to adjust/manage operations accordingly. Each facility will need to conduct monitoring to ensure that their operations and extraction equipment set-up do not breach the emission limits (if utilising the emission limit value compliance route). Additionally, such monitoring must support the preparation of an annual compliant Solvent Management Plan. Based on the findings of the pilot and some additional testing, a standard protocol is in development.

Following the heating of the sprayed vehicle, the solvent vapours should be vented to atmosphere by switching on the waste gas fans rather than add to fugitive emissions by opening the spray booth doors into the general work area.

### **Potential Area of Difficulty- Solids Content of Coatings**

Under the legislation, vehicle refinishers have the option of meeting emission limit values or using the reduction scheme in order to demonstrate compliance with the Directive. In order to utilise the reduction scheme, the total solids content of the coatings used in a calendar year needs to be obtained by operators from suppliers. There may be some difficulty in obtaining this information as it is deemed commercially sensitive by suppliers. However, for the purposes of this pilot process, summary information on solids utilized by two of the installations was obtained. There will be ongoing reliance by operators on the individual paint/solvent product supplier for this information if they are to use the reduction scheme. Over 12 months data will be needed prior to an AIC audit in October 2005. The VR operator must achieve 1.8 Kg of solvent emissions per Kg of solids consumed by 2005 and 1.2 Kg per Kg by 2007.

If the operator cannot gather this information, then they will be obliged to demonstrate compliance with the emission limit values by October 2007. In either case, full records need to be maintained and a Solvent Management Plan

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developed for inspection to demonstrate what the actual emissions were in a given calendar year.

### **4. Issues for the Dry Cleaning Sector**

All operators in the Dry Cleaning sector are covered by the regulations as there is no threshold given in the Directive. Existing operations must demonstrate compliance by October 2007 and new operations must comply from start-up. The emission limits are 20g solvent emitted per Kg product cleaned (or 80 Kg product cleaned per litre of perc emitted).

#### **Compliance with the Emission Limit Value**

The audits have shown that a new, well-operated machine will perform well within the dry cleaning emission limit value under the Solvents Regulations. However, a facility with a seven-year-old machine needed data on waste volumes and concentration to demonstrate compliance. Therefore, an operator will not necessarily have to purchase a new machine to comply unless serious mechanical problems are identified.

Critical to meeting the limits will be a well-maintained, well-operated machine along with suitable means to keep accurate records both of the weight of product cleaned and solvent consumed over each calendar year. The more manual operations are performed on a machine, the more critical will be the management of operating procedures, record keeping and operator training. Optimum loads should be used such that the machine is neither under- nor over-loaded. Some retrofitting of solvent capture equipment may be needed but operators will only find this out by starting to keep and critically analyze records now.

It was noted that even a brand new machine did not have automated options available to facilitate the recording of either the weight of product cleaned or the amount of solvent consumed. Solvent volumes are measured using sight glasses at ground level which has only approximate graduations. The absence of such user-friendly options was confirmed by the machine suppliers. This omission by the designer/manufacturers was surprising given that the Solvents Directive is currently being rolled out throughout the EU after many years in open negotiation and in published form.

#### **Records in the Dry Cleaning Sector**

Records that were available included purchase records and waste records (volumes only, no information on solvent content). Records that were available in one facility only (and perhaps may not be widely available in the industry at present) related to the weight (Kg) of product cleaned. The ongoing measurement of this parameter is critical for this sector and is as important as calculating the amount of solvent used in order to demonstrate compliance with the Directive to auditors (see above).

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For weighing product (Kg), it is recommended that a digital scales or balance be used with a basket to hold product. Every six months, the scales should be calibrated using commercially weighed materials eg flour or sugar bags. Records should be logged per the guidelines.

Inventory records of solvent materials are considered more critical for this sector. Such inventories should include wastes. Inventory records may not be generally maintained on a regular basis at present in the sector. Also of importance for the sector are good estimates of the amount of separator water generated and analytical results of perc content. This will vary for each machine, so site-specific data will need to be generated (see the Best Practice Guidelines).

### **Lint and Separator Water Disposal**

Lint waste containing solvent was generally correctly disposed as hazardous waste by an approved contractor and records retained (see European Waste Catalogue and Hazardous Waste List: 14 06 04\*). Some samples of this waste were analysed and shown to have perc content between 38 and 84 g/litre (well in excess of the hazardous waste limit of 1% w/v for this material).

In general in the dry cleaning sector, separator water is disposed of to drain. However, the Best Practice Guidelines require its disposal as solvent containing hazardous waste (see European Waste Catalogue and Hazardous Waste List: 14 06 02\*). Analysis of some separator water was performed as part of this pilot. Perc levels were shown to be between 230 and 440 mg/litre. Operators are advised to have a representative sample of their own separator water analysed for perc and consult with their local authority to see if disposal to drain is locally permissible (perc is very toxic to the aquatic environment).

Critical to the minimisation of solvent in the separator water are the correct operation of the water separator, further manual separation of the water phase, and the presence of a second water separator. Additionally, any disposal of trade effluent to drain must be done only in accordance with an appropriate licence from the local or sanitary authority who should be consulted in this regard.

## **5. Changes to the Best Practice Guidelines and AIC Protocol**

A number of comments were raised regarding the two sectoral Best Practice Guidelines and the AIC Protocol. These include:

- The references within the Protocol to conditions and recommendations made by the AIC need to be removed. Change to audit non-compliances (major or minor) and observations.
- Some minor additions to be made to the lists of best practices.
- Put auditor's and operator's checklists in the Best Practice Guidelines.

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- Some minor change in terminology in the Best Practice Guidelines to reflect the industry jargon.
- A small number of clerical corrections.

The documents have been revised to reflect these changes.

### **6. Summary of Recommendations for Operators**

Both Sectors:

1. Spread the word on the detailed preparations needed to comply with the Solvents Directive and the AIC scheme in your sector.
2. Start now to maintain records and documentation related to the critical control issues identified for your facility
3. Develop summary data in line with the guidance documents to determine if you are compliant and, if not, what you need to do to become compliant.
4. Record the volume and determine the solvent content of all waste streams.
5. Use only purpose designed containers to store all solvent materials to avoid fugitive emissions.
6. Ensure all solvent containing wastes are recovered/disposed of by authorized outlets only as hazardous waste and retain documentation.
7. Given the complexity of the Solvents Directive, you may need to consider getting professional advice on the specific requirements for your facility.
8. Develop a Solvents Management Plan when 12 months data is available in preparation for your first AIC audit (before October 2007).

Vehicle Refinishing:

1. Determine if solvents with specified Risk Phrases are in use from the MSDS documents.
2. If you are intending to comply using the Reduction Scheme, obtain solids information on the solvents in use and collate in accordance with the guidance to determine compliance or otherwise.
3. If you are intending to comply using the Emission Limit Values, conduct emissions monitoring to determine compliance or otherwise.
4. If you determine that you are not compliant, you must develop a detailed management plan of specific actions required to achieve compliance by October 2007.

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### Dry Cleaning:

1. Only install new equipment that will ensure compliance with the Solvents Directive.
2. Minimise solvent losses where manual operations are in use with appropriate management procedures (some retrofitting of automation may be necessary).
3. Record the weight of product being cleaned on an ongoing basis.
4. Load machines to the optimum levels recommended by the manufacturer.
5. Maintain records of solvent volumes consumed and volumes/solvent concentration of waste arising.
6. Test separator water for perc and consult with local authority regarding disposal.
7. Trade effluent must only be disposed of in accordance with an appropriate discharge licence.
8. If you determine that you are not compliant, you must develop a detailed management plan of specific actions required to achieve compliance by October 2007.