

Air Advice Note No. 1:

Good Practice for Solvent Mass Balance and Fugitive Emission Assessments for EPA Licensed Sites

An Gníomhaireacht um Chaomhnú Comhshaoil

Tá an Gníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaoil a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaoil a chosaint ó éifeachtaí díobhálacha na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: Déanaimid córais éifeachtacha rialaithe agus comhlíonta comhshaoil a chur i bhfeidhm chun torthaí maíthe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.

Eolas: Soláthraimid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spríocdhírithé agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.

Tacaíocht: Bimid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaoil atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaoil inbhuanaithe.

Ár bhFreagrachtaí

CEADÚNÚ

Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaoil:

- saoráidí dramhaíola (*m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistriúcháin dramhaíola*);
- gníomhaíochtaí tionsclaíoch ar scála mór (*m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta*);
- an diantalmhaíocht (*m.sh. muca, éanlaith*);
- úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe (*OGM*);
- foinse radaíochta ianúcháin (*m.sh. trealamh x-gha agus radaiteiripe, foinse tionsclaíochta*);
- áiseanna móra stórála peitiril;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

FORFHEIDHMÍÚ NÁISIÚNTA I LEITH CÚRSAÍ COMHSHAOIL

- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdarás áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, trí dhírú ar chiontóirí, agus trí mhaoirsiú a dhéanamh ar leasúcháin.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a idíonn an ciseal ózón.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaoil.

BAINISTÍOCHT UISCE

- Monatóireacht agus tuairiscíú a dhéanamh ar cháilíocht aibhneacha, lochanna, uisce idirchriosacha agus cósta na hÉireann, agus screamhuisc; leibhéal uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairiscíú a dhéanamh ar Cháilíocht an Uisce Snámha.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOIL

- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.

- Tuairiscíú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil (*m.sh. tuairiscíú tréimhsiúil ar staid Chomhshaoil na hÉireann agus Tuarascálacha ar Tháscáirí*).

RIALÚ ASTAÍOCHTAÍ NA NGÁS CEAPTHA TEASA IN ÉIRINN

- Fardail agus réamh-mheastacháin na hÉireann maidir le gáis cheaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde comhshaoil a chistiú chun brúnna a shainathint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

MEASÚNACHT STRAITÉISEACH TIMPEALLACHTA

- Measúnacht a dhéanamh ar thionchar pleannanna agus clár beartaithe ar an gcomhshaoil in Éirinn (*m.sh. mórfheallanna forbartha*).

CO-SAINN RAIDEOLAÍOCH

- Monatóireacht a dhéanamh ar leibhéal radaíochta, measúnacht a dhéanamh ar nochtadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleannanna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taisní núclicéacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núclicéacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

TREOIR, FAISNÉIS INROCHTANA AGUS OIDEACHAS

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaoil ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaoil (*m.sh. Timpeall an Ti, léarscáileanna radóin*).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

MÚSCAILT FEASACHTA AGUS ATHRÚ IOMPRAÍOCHTA

- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

BAINISTÍOCHT AGUS STRUCTÚR NA GNÍOMHAIREACHTA UM CHAOMHNÚ COMHSHAOIL

Tá an gníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig um Inmharthanacht Comhshaoil
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fianaise is Measúnú
- Oifig um Chosaint Radaíochta agus Monatóireachta Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltáí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair inní agus le comhairle a chur ar an mBord.

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This document was prepared by the EPA's
Office of Environmental Enforcement's Air Enforcement team,
July 2017.

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This is a general summary guidance document; the EPA reserves the right to apply different criteria depending on location specific requirements and may require an alternative route towards compliance than that which is contained herein.

This document was prepared by the EPA's Office of Environmental Enforcement's Air Enforcement team, July 2017. For further information please email airthematic@epa.ie.

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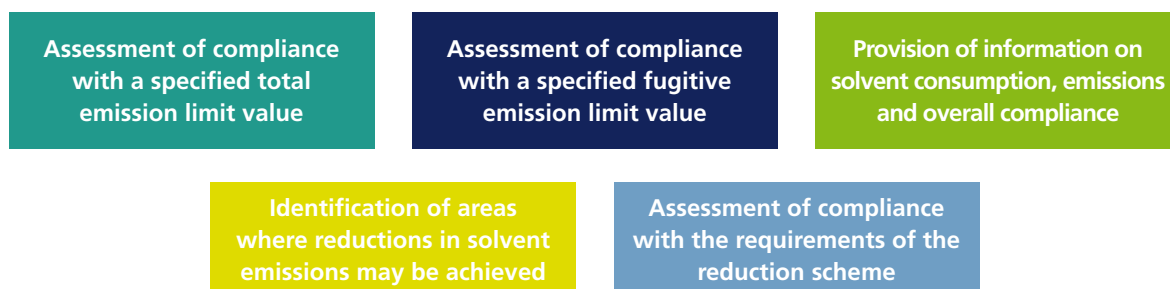
Section 1: Introduction

The aim of this Advice Note is to provide concise ‘best-practice’ guidance for the completion of a Solvent Management Plan (SMP). A SMP is in essence a solvent mass balance which aims to account for all inputs and outputs of solvents for a given activity. The main elements of an SMP are outlined in Chapter V and Annex VII of the Industrial Emissions Directive (IED)¹. The IED sets limits on solvent emission levels from certain activities including:

- Emission limit values in gases (mgC/m³);
- Fugitive emission limit values (as a % of total solvent input);
- Total emission limit values (various units applied for these limits, such as mass of solvent released per unit of goods produced or as a % of solvent input).

The IED also allows the application of a ‘reduction scheme’. The reduction scheme allows the operator to achieve, by other means, a reduction in solvent emissions equivalent to the reduction achieved by meeting the emission limit values (e.g. by applying techniques to allow use of water based products). Assessment of compliance according to the reduction scheme is not addressed in this guidance as it is infrequently used at EPA licensed sites.

Completion of an SMP is a specific requirement in some EPA licences and provides for the following, where relevant to the licence:



Solvent mass balances must be completed using an appropriate methodology to ensure that precise and reliable information is provided to the EPA. The methodology used to determine the various components of the mass balance equation must be clear and robust and must be auditable by the Agency. Rough estimates or approximations of the components of the mass balance are not acceptable to the EPA.

Generating a solvent management plan to account for solvent use and to quantify fugitive emissions is described in Annex VII, Part 7 of the IED.

The licensee should refer to the specific condition within the licence and clarification should be sought from the EPA if there is uncertainty in relation to specific requirements. The following are examples of conditions from EPA licences in relation to solvent management:

¹ This guidance is not intended to explain the requirements of Chapter V or Annex VII of the IED. This reference guide is an aid to understanding the requirements of Annex VII and should be read in conjunction with it.

- The licensee shall prepare a programme, to the satisfaction of the Agency, for the calculation of fugitive emissions to air. This programme shall be submitted to the Agency for agreement, within six months of the date of grant of this licence and shall be fully implemented within three months of the date of such approval or such other time as the Agency may allow. A full report on fugitive emissions to air shall be included annually in the AER.
- The VOC fugitive emissions limit value from the activity is 20% of the solvent input. Assessment of compliance with this fugitive emission limit shall be reported annually as part of the AER.
- The licensee shall prepare and report a Solvent Management Plan (SMP) for the installation for each calendar year. The substances to be included in the SMP shall be determined with reference to the definition of an organic solvent in Council Directive 1999/13/EC and shall be as agreed by the Agency each year. The SMP shall be prepared in accordance with any relevant guidelines in Schedule 6 of the Solvent Regulations or as issued by the Agency and shall be submitted as part of the AER. The licensee shall keep records of the data from which the reported information was derived and supporting documentation including a description of the methodology used for data collection.

The above conditions essentially require licensees to record solvent flow through their operation from purchase to usage, re-usage and emission. No more than 20% of solvent input may go unaccounted for in the example condition provided above. The 'unaccounted for' figure in the solvent tracking process is the fugitive emission.

Section 2: Review of Solvent Mass Balance Components and their Derivation

A solvent management plan will track the movement of solvent through an installation and will identify the environmental media where the solvent eventually ends up.

The terms in the Table below are from IED Annex VII Part 7. An expanded explanation has been provided for each mass balance term, in relation to how the information may be generated.

Table 1: Mass balance terms and descriptors

Inputs of organic solvents (I):

Mass Balance Terms	Explanation	Source of Data and Additional Requirements
I1	The quantity of organic solvents or their quantity in mixtures purchased which are used as inputs into the process in the timeframe over which the mass balance is being calculated	<p>The amount of solvent purchased and used in a year.</p> <p>Purchase records or data provided directly by the supplier. Also include stock level change: stocks at start of year minus stocks at end of year. The units used should be consistent and take account of variations in the density of different solvents within a given raw material.</p> <p>In some cases analysis of input materials may be required, for example where technical data sheets or Material Data Safety Sheets (MSDS) do not provide sufficiently accurate data on the solvent content of materials as delivered. Generally analysis would only be necessary where the solvent quantity is such that the potential errors introduced by using generic data (e.g. MSDS compositional data) would materially impact on the findings of the solvent mass balance, e.g. by resulting in a calculated fugitive emission exceeding the limit as specified in the licence. All potential sources of error and uncertainty should be clearly stated in the report and quantified where possible.</p>
I2	The quantity of organic solvents or their quantity in mixtures recovered and reused as solvent input into the process. (The recycled solvent is counted every time it is used to carry out the activity)	<p>This includes solvent that is reused directly or solvent that is recovered and used again on the premises.</p> <p>For example, calculate reuse based on process solvent capacity and number of batches processed. Analysis of recovered materials may be necessary to determine the solvent composition and overall solvent content of reused materials.</p>

Outputs of organic solvents (O):

Mass Balance Terms		Explanation	Where to get information
O1	Emissions in waste gases	The amount of solvent emitted from stacks.	<p>Stack emissions monitoring data (concentration and volumetric flow). The calculation must take account of process variations and the relevant parameters should be recorded (e.g. hours of operation of equipment, emission rates at different stages of the process, changes in the nature of production (e.g. different product types)).</p> <p>Depending on the consistency of the process, additional monitoring may be required to fully characterise the emissions during different operational conditions. Errors in calculation of this parameter can lead to significant errors in other mass balance outputs.</p> <p>N.B. Total VOC measurements in emissions are typically reported as a carbon equivalent value (e.g. mgC/m³) and must normally be converted to a solvent/total VOC equivalent value based on the VOC composition of the emissions.</p>
O2	Organic solvents lost in water, if appropriate taking into account waste-water treatment when calculating O5	The amount of solvent emitted in waste-water.	<p>May not be relevant to most processes, but where necessary sufficient data must be captured to fully characterise and quantify waste water emissions in terms of solvent composition.</p> <p>Where solvent losses in water are expected on a batch/periodic basis (e.g. as a result of periodic cleaning activities), waste water from such activities should be specifically sampled and the overall emissions determined based on the volumes of water used and the frequency of the activity.</p> <p>Again, attention must be paid to ensuring consistency of units.</p>
O3	The quantity of organic solvents which remains as contamination or residue in products output from the process	The solvent which leaves your installation on/in products	Product analysis. Sufficient analytical data must be available to demonstrate that the solvent content of the product has been accurately characterised. This figure does not cover solvent content of products such as paints, where the solvent is intended to be a part of the final product (see O7).

Outputs of organic solvents (O):

Mass Balance Terms	Explanation	Where to get information
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.	<p>Solvent emissions from areas which are not covered by extraction systems, e.g. cleaning material handling & storage area, waste storage area (containers, rags), spills, waste water treatment, etc.</p> <p>Data on these emissions is generally derived via the mass balance calculation rather than being specifically calculated/measured.</p> <p>However, in some cases it is possible to carry out measurements and calculations to determine fugitive losses from specific equipment, processes or production areas, and this may be an appropriate step to validate or cross-check the results of the mass balance calculations.*</p> <p>Measurement/assessment of fugitive emissions should be carried out using a robust and comprehensive methodology to provide accurate data. Generally the assessment need not be done annually unless alterations have been made which may impact on the calculated emissions (e.g. change of equipment or raw materials).</p>
O5	Organic solvents and/or organic compounds lost due to chemical or physical reactions (including for example those which are destroyed, e.g. by incineration or other waste gas or waste-water treatments, or captured, e.g. by adsorption, as long as they are not counted under O6, O7 or O8)	<p>Solvent destruction by abatement techniques.</p> <p>There is significant potential for errors in this term if robust methods are not employed. Simply using factors such as the manufacturers quoted destruction efficiency for a thermal oxidiser is not sufficient, and generally in-situ measurement should be considered. As with other parameters in the solvent mass balance, the need to carry out detailed monitoring/assessment of individual sources will depend on the significance of the source and how it influences the overall mass balance. Worst-case assumptions maybe considered where they will not lead to non-compliant mass balance results. Where this approach is taken the basis for the assumptions taken must be clearly outlined in the report.</p> <p>Solvent adsorbed onto activated carbon should only be included under O5 if the solvents are subsequently destroyed.</p>

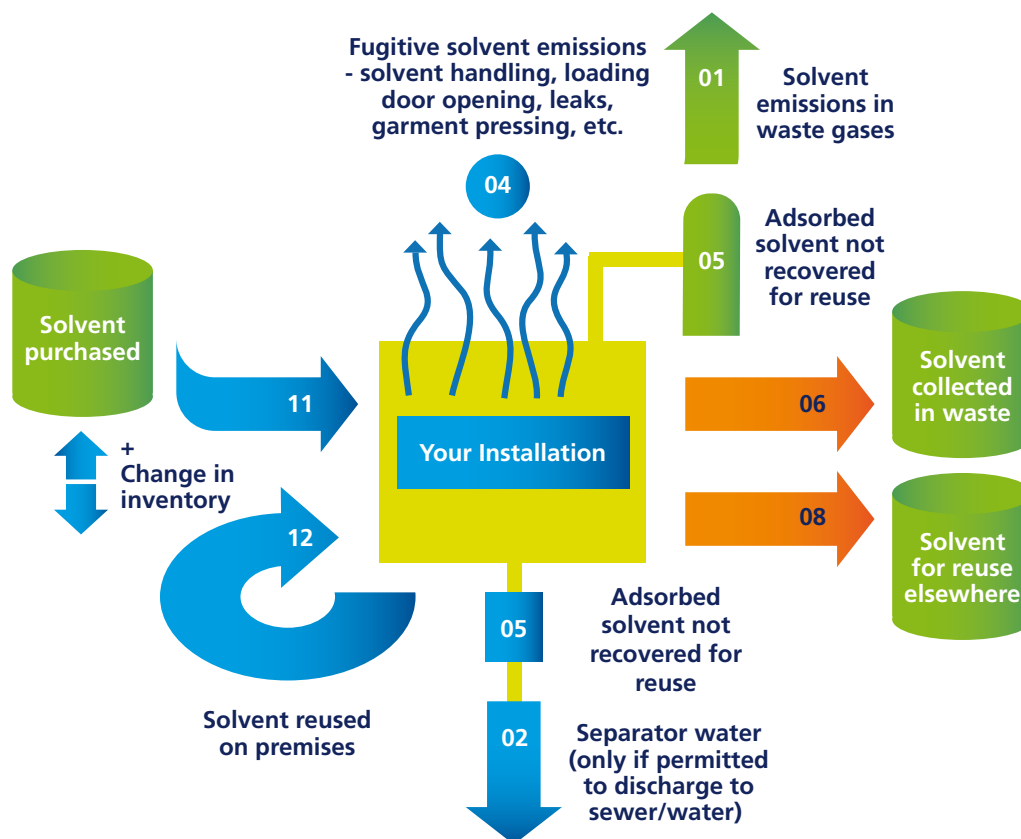
Outputs of organic solvents (O):

Mass Balance Terms		Explanation	Where to get information
O6	Organic solvents contained in collected waste	Includes waste solvent itself (e.g. spent cleaning solution) plus materials contaminated with solvent (rags, wipes, empty containers, etc.).	Accurate records of solvent containing waste must be kept, e.g. records (not estimates or assumptions) on number and contained liquid volume of drums sent off-site for disposal; and proven solvent content of the waste. Account should be taken of the potential for solvent/water mixes to separate out when sampling liquids for solvent content. Fugitive losses from solvent waste storage should be included under O4. Waste must be stored in such a way as to minimise fugitive losses.
O7	Organic solvents, or organic solvents contained in preparations, which are sold or are intended to be sold as a commercially valuable product	Only relevant if you sell solvent products.	Sales figures. In activities such as paint manufacture the majority of solvent used in the process remains in the final product and small errors in determination of the solvent content of the product can lead to significant errors in the solvent mass balance. Where final viscosity adjustments are made to a product before packaging (i.e. through addition of solvents), details of the quantities used should be recorded in order to generate accurate figures on solvent content of the products, as small errors in solvent content can be significant where batch sizes are large.
O8	Organic solvents contained in preparations recovered for reuse but not as input into the process, as long as not counted under O7	Any waste solvent collected and sent away for recovery/recycling rather than disposal.	Records on number and volume of drums sent off-site for recovery & reuse elsewhere; and the known (not assumed) solvent content of these materials. Also refer to comments in relation to O.6 above.
O9	Organic solvents released in other ways	The 'other' option. Should only be used when supported by full details, not for general use.	Situation dependent.

Note: In all cases records which are used in determining these parameters must be maintained by the licensee for EPA inspection

- * For example, see Van Duen et al., 2007. Measuring fugitive emission in the printing sector as a verification of the solvent management plan according to the EU Solvent Directive. WIT Transactions on Ecology and the Environment, Vol 101, 2007. Available at: <https://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/101/17367>

A pictorial representation of some of the terms from Table 1:



Section 3: Determining Consumption

Step 1: What materials are in use?

Compile a list of all organic solvent containing products used at your installation. Consider that solvent use may be carried out in more than one location, or at more than one stage in the process.

For clarity, the following definitions of organic solvent and volatile organic compound are taken from the Industrial Emissions Directive (2010/75/EU):

Organic Solvent	Volatile Organic Compound
<p>'Organic solvent' means any volatile organic compound which is used for any of the following:</p> <ul style="list-style-type: none"> ■ alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials; ■ as a cleaning agent to dissolve contaminants; ■ as a dissolver; ■ as a dispersion medium; ■ as a viscosity adjuster; ■ as a surface tension adjuster; ■ as a plasticiser; ■ as a preservative. 	<p>'volatile organic compound' means any organic compound as well as the fraction of creosote, having at 293.15 K a vapour pressure of 0,01 kPa or more, or having a corresponding volatility under the particular conditions of use.</p>

Step 2: Which of these materials contain solvents?

Check the Technical Data Sheets or Material Safety Data Sheets (MSDS) of the products to establish their solvent content.

Note that the term 'water-based' is commonly misunderstood. A preferred, more accurate term is 'water-borne'. Water-borne coating materials or cleaners may still contain organic solvent, albeit it at a lower level and these must also be considered.

Where organic solvent is present, note the solvent percentage in the product. This should generally be the solvent percentage by weight (e.g. if a raw material is 60% solvent by weight, then 1 kg of this material will contain 600 g of solvent).

If the percentage is not provided, or if a range of concentration is given, or if you are unsure if organic solvent is present or not, ask your supplier. Assumptions and estimates will generally not be acceptable. If necessary, representative analyses of the material should be completed in order to determine the solvent content. Where a range of solvent composition is indicated in the MSDS it may be reasonable to assume a worst case scenario (i.e. use the maximum solvent content) where the assumption is clearly justified and where the assumption does not result in a non-compliance (e.g. a breach of a fugitive emission limit value). Where such assumptions have a material impact on compliance it will be necessary to carry out further work to characterise the solvent content more accurately.

For pure solvents it is important to note that the relationship between the volume of material and its weight must be known. For example, 1 litre of acetone (C₃H₆O) has a weight of approximately 0.785kg, while 1 litre of dichloromethane (CH₂Cl₂) has a weight of 1.326kg.

Step 3: How much of these materials are used (parameter I1)?

For the materials you have identified containing solvent, you need to determine how much of the product you use in a given year. This consists of purchases and the change in stock level over the period.

Purchase information should be available from your own purchase records, but if you have difficulty, your supplier may be able to provide you with this data.

It is important to be consistent in the units that you use. For example, this note refers to 'solvent mass percentage' (% weight/weight) and 'kilogrammes' of material consumed. Other common terms will be: solvent volume percentage (%) and 'litres' of material consumed and solvent specific gravity (kg/litre); or the use of 'grams/litre' for solvent content and 'litres' of material consumed; be consistent, only add like to like.

Step 4: Take Off-Site Reuse (parameter O8) of Solvent into account

As defined under the legislation, solvent consumption is the total input of organic solvents into an installation minus any solvent that is recovered for reuse elsewhere. Reuse covers any technical or commercial purpose, including use as a fuel, but not waste disposal.

Step 5: Calculate the amount of solvent consumed

The final step is to complete the following equation for consumption, using the values calculated to give the total solvent consumed per year:

$$\text{Consumption: } C = I1 - O8$$

Consumption = Solvent purchased that was used, minus solvent sent for external recovery.

Section 4: Assessing Compliance with the Fugitive Emission Value

In order to demonstrate compliance with the fugitive emission value, one of the following calculations should be made for fugitive emissions:

Calculation 1:

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

Fugitive emissions = Solvent purchased, minus solvent emissions in waste gases via stacks, minus solvent destroyed by abatement, minus solvent leaving in waste consignments, minus solvent sold in products (which are intended to be in the product), minus solvent sent for recovery.

Or

Calculation 2:

$$F = O2 + O3 + O4 + O9$$

Fugitive emissions = Solvent emitted in waste water, plus solvent leaving on/in products, plus uncaptured solvent emissions, plus 'other' solvent emissions.

The operator should generally choose which calculation to use based on which will provide the most accurate value of F. The uncertainty associated with each term in the equation should therefore be considered and stated in the report. Note that the measurement uncertainty should not be subtracted from the result.

In some cases it may be useful to apply both fugitive methods to assess the range of fugitive emissions estimated by each method.

In any event the solvent management plan must document the methodology used to calculate each of the terms in the above equations and maintain any records used in determining these values.

Once calculated, the fugitive emissions value (F) must be expressed as a proportion of Input. Input is simply the sum of I1 + I2.

$$\text{Fugitive Emissions (as \% of solvent input)} = F/(I1 + I2) \times 100\%$$

In some cases the presented results may suggest that, based on the associated uncertainty, the fugitive emissions could possibly be compliant (e.g. fugitive limit of 15% and calculated fugitive emission of $19 \pm 5\%$). Where this occurs, or generally where uncertainty is high, further assessments/monitoring should be completed to increase the accuracy of the calculated result. This should normally commence with the component of the calculation (Calculation 1 or Calculation 2 components as presented above) which have the biggest influence on compliance with the fugitive limit.

Where necessary the operator should consult with the EPA on these matters in order to ensure a robust methodology for determination of fugitive emissions is in place.

Section 5: Assessing Compliance with Total Emission Limit Value

In order to assess compliance with the total emission limit value (where applied), the SMP must be used to determine the total emissions from the activity over a 12-month period. Total emissions can be determined based on the following equation:

$$\text{Total Emissions} = O1 + F$$

Total emissions = captured emissions (parameter O1) + fugitive emissions (F). This total emission value must then be divided by the relevant criteria as specified in the IED. For example for manufacture of pharmaceutical products the total emission limit value for new activities is specified as 5% of solvent input (I1 + I2), while for footwear manufacture the total emission limit is specified as 25 g of solvent per pair.

Environmental Protection Agency

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

Knowledge: *We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.*

Advocacy: *We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.*

Our Responsibilities

LICENSING

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (e.g. landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g. pharmaceutical, cement manufacturing, power plants);
- intensive agriculture (e.g. pigs, poultry);
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- sources of ionising radiation (e.g. x-ray and radiotherapy equipment, industrial sources);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by co-ordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

WATER MANAGEMENT

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (e.g. *periodic reporting on the State of Ireland's Environment and Indicator Reports*).

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of proposed plans and programmes on the Irish environment (e.g. *major development plans*).

RADIOLOGICAL PROTECTION

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

GUIDANCE, ACCESSIBLE INFORMATION AND EDUCATION

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (e.g. *My Local Environment, Radon Maps*).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

AWARENESS RAISING AND BEHAVIOURAL CHANGE

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

MANAGEMENT AND STRUCTURE OF THE EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

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