



**ENVIRONMENTAL PROTECTION AGENCY**

**AER / PRTR GUIDANCE DOCUMENT No. 4:**

## **EPA GUIDANCE NOTE:**

# **ANNUAL ENVIRONMENTAL REPORT ANNEX ON AER / PRTR REPORTING**

**For use in reporting of:**

- 1 PRTR Emissions and Waste Transfers information via the EPA Electronic AER / PRTR Reporting Workbook**
- 2 Full AER: Submission of the “hardcopy” or “paper” AER specified under your licence is no longer applicable please submit electronic copy only.**
- 3 The Full PDF Annual Environmental Report – Electronic Copy**

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## EXECUTIVE SUMMARY

This report is intended to be read as an Annex to the EPA's Guidance Note on the Annual Environmental Report (AER).

The objectives of this Guidance Note Annex are

- 1 to assist the operators of EPA-licensed facilities in satisfactorily complying with their AER / PRTR Emission Data reporting requirements; and
- 2 to provide guidance to non-licensed facilities that are covered by the European and Irish PRTR (Pollutant Release and Transfer Register) Regulations, and thus are required to submit annual emission and waste transfers information to the EPA under these statutes.

This Guidance sets out in detail how facility operators should compile and submit their annual emission data via the EPA's *AER/ PRTR Electronic Reporting Workbook* and the AER / PRTR Reporting Website.

The document should be read in conjunction with the general body of guidance, of which the present document is part, which is available at:

<http://www.epa.ie/enforcement/prtr/operator/>

In particular, users of the AER / PRTR Reporting Website should have to hand the *AER / PRTR Electronic Reporting Workbook and Website User Manual* when entering their emission and waste transfers information into the *AER/ PRTR Electronic Reporting Workbook*.

If operators have any specific questions, they are invited to submit these to our contact email address: [aerreturns@epa.ie](mailto:aerreturns@epa.ie)

The present document provides detailed guidance on appropriate measurement, calculation and estimation methodologies as well as procedures that should be met to ensure a high level of data quality and reliability. It also provides a wealth of additional material, including

- examples of the use of specific calculation and estimation methods,
- conversion tools,
- a list of international measurement and analysis standards,
- worked examples.

## 1. INTRODUCTION

### 1.1 Overview

The [E-PRTR Regulation \(EC\) No 166/2006](#) concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC was adopted on the 18th of January 2006, and came into force on the 7th February 2006. The E-PRTR Regulation was signed into Irish Law on 22 March by the European Communities (European Pollutant Release and Transfer Register) Regulation 2007, [S.I. No. 123 of 2007](#) and [S.I. 649 of 2011](#)), which was signed into Irish Law on 13 December 2011. These regulations are collectively referred to herein as the **PRTR Regulations**.

The present document is an Annex to the EPA's [Guidance Note for the Annual Environmental Report \(Draft\)](#), and details the information that must be provided by EPA licensees in relation to both the PRTR Regulations and individual EPA licences issued under the EPA Acts 1992 – 2008, the Waste Management Acts 1996 – 2008, the Waste Water Discharge (authorisation) Regulations S.I. 684 of 2007 and other legislation.

It is also intended to be of assistance to non EPA-licensed facilities that fall under the terms of the PRTR Regulations.

### 1.2. Background to the PRTR Regulations

Pollutant Release and Transfer Registers are becoming more common globally, and countries around the world have already developed national PRTRs or are in the process of developing one; Ireland is among the latter group of countries.

The increased requirements for reporting and record-keeping are part of Ireland's obligations under the PRTR Regulations, the UNECE PRTR Protocol and the Aarhus Convention. In addition, there is an increased demand for good service from the EPA's stakeholders. The use of a web-based AER / PRTR reporting system is part of the recognition that information management and technology must play a significant role in the provision of an enhanced enforcement service to meet multiple needs.

In response, the EPA has developed the *AER / PRTR Electronic Reporting Website and Workbook* reporting system to meet the challenges of providing an enhanced enforcement service and a greater need for public access to information while at the same time minimising the administrative burden impacting on facility operators. The AER / PRTR reporting system provides a means of facilitating both AER Reporting from EPA licensees and reporting under the PRTR Regulations. This combining of national and European reporting systems is provided for in Recital 21 of the PRTR Regulations.

### 1.3 Annual Environmental Information Reporting Tasks for EPA-Licensed Facilities

The electronic reporting by EPA licensees of their annual emissions (releases) to air and water as well as off-site transfers of effluent and solid waste is the first of the three tasks that together comprise the annual environmental information reporting obligation on EPA-licensed facility operators. These are:

- Task 1** AER / PRTR Emissions Data: Reporting of emissions and waste transfers information via the EPA's *AER / PRTR Electronic Reporting Website and Workbook*;
- Task 2** Full AER: Submission of the "hardcopy" or "paper" AER specified under your licence is no longer applicable please submit electronic copy only.
- Task 3** Full PDF AER: Submission of an electronic PDF copy of your Full AER.

Note that only Task 1 applies to non EPA-licensed facilities.

The AER / PRTR Guidance (see 1.6 below) includes a *Step by Step Guide for AER / PRTR Reporting* which will ensure that all steps are completed in the correct sequence to achieve full completion of the two Reporting Tasks.

A version of the *Step by Step Guide for AER / PRTR Reporting for non EPA-licensed facilities*, intended for use by the operators of non EPA-licensed facilities, is also available.

## **1.4 AER / PRTR Reporting Requirements**

All EPA-licensed facilities are obliged to report their emissions and waste transfers information, as required under both the Regulations and their licensees. In addition, non-licensed facilities operating in certain specific activity sectors within the terms set out in Annex I of the PRTR Regulations are also required to report their annual emissions and waste transfers.

Under PRTR, 91 specified pollutants must be reported upon if they are released to air, water or land, either as permitted emissions or as accidental releases, or transferred to off-site Waste Water Treatment Plants. The transfer of polluting material in the form of hazardous or non-hazardous wastes must also be reported under the Regulations.

The list of 91 PRTR Pollutant substances, listed in Annex II of the Regulations, was established by international expert working groups. The Pollutants that are mainly focussed on in the PRTR list include greenhouse gases, acid rain pollutants, ozone-depleting substances, heavy metals and certain carcinogens such as dioxins. The activities covered are specified in Annex I of the PRTR Regulations, and include in particular activities covered by Directive 96/61/EC (the "IPPC" Directive), as well as thermal power stations, mining, quarrying and metalworking industries, chemical plants, paper and timber industries and also waste and waste-water treatment plants.

## **1.5 The AER / PRTR Electronic Reporting Workbook and Website reporting system**

The EPA has developed a web facilitated reporting and data management system, available at <http://aer.epa.ie/reporting>, to carry out Tasks 1 and 3 as listed above (Task 1 only in the case of non EPA-Licensed facilities).

The EPA Electronic Reporting System has been developed to allow EPA licensees, and operators of relevant non EPA-licensed activities, to report their emissions and offsite waste transfers more easily and in a readily understandable and easy-to-use format.

The required information cannot be accepted in any other manner or format other than that specified here and in the other guidance documentation described at Section 1.6 below.

When using the AER / PRTR Reporting Website, you should have to hand the *AER / PRTR Electronic Reporting Workbook and Website User Manual* which describes in detail the process of information entry and upload.

## **1.6 AER / PRTR Guidance**

The EPA has developed a body of AER / PRTR Guidance, of which the present document is part, to assist the operators of both EPA-licensed and non EPA-licensed facilities in fulfilling their reporting obligations. This is available at:

<http://www.epa.ie/enforcement/prtr/operator/>

The present document provides detailed guidance on appropriate measurement, calculation and estimation methodologies which should be used for AER / PRTR reporting, as well as procedures that should be met to ensure a high level of data quality and reliability. It also provides a wealth of additional material, including

- examples of the use of specific calculation and estimation methods,
- conversion tools,
- a list of international measurement and analysis standards,
- worked examples.

### **1.6.1 The European PRTR Guidance Document**

European PRTR Guidance Document (EC Final Guidance Document for the implementation of the European PRTR, issued on the 31st May 2006) is also available at the above link. The E-PRTR Guidance Document should be read in conjunction with this chapter as it contains greater detail on many aspects of the reporting requirements. The E-PRTR Guidance Document also contains the full text of the PRTR Regulation for further reference.

The E-PRTR Guidance Document is of most direct relevance to non-EPA licensed industry sectors but will be of interest to licensed sites as well. Please note, however, that in the event of any inconsistency or conflict between the EU Guidance Document and the requirements of your licence, the requirements of your licence shall apply and shall be followed. Please therefore take account of the requirements of your licence when considering the EU Guidance Document and how it might be applied in relation to your facility.

## **1.7 Legal Declaration**

Reporting by facilities is a formal legal obligation under both the PRTR Regulations and under EPA licences. It is essential that each facility reporting their emissions via the electronic reporting system consider their submission as a **legal declaration**. In this regard, the Agency requires all facilities to use best available methodology for the monitoring, calculation or estimation of their annual emission loads. See Chapter 4 for more details on Quality

Assurance of information and Appendix 1 for a list of internationally approved Emission Quantification methods for the PRTR Pollutants (i.e. the pollutants listed in Annex I of the PRTR Regulations).

If best methodologies, as prescribed in specified International Standards such as those listed in Appendix 1, are not used as part of the facility's emission quantification methods, the operator must justify this non-use. During site audits, the Agency may interrogate the use of the verified quantification methods that were employed for the data return declaration.

It is noted that the use, which has been approved by the EPA or other permitting authority, of non-standard methods will be common, reflecting the specific circumstances at individual facilities or the state of development of measurement techniques in respect of certain industrial or waste management sectors. In these situations, EPA suggests that the introduction of the PRTR presents an opportunity for operators to review the methods and systems in place on their facilities in line with the requirements to use best available methodologies for determination of releases from their sites.

## **1.8 Reporting of emissions and waste transfers information to the European PRTR website**

The PRTR Regulations require that emissions and waste transfers from specified industrial and waste management operations must be reported to the European Commission for publication on a dedicated website.

Emissions and waste transfers are reportable under the European PRTR Regulation when two distinct criteria are met:

- 1 The facility itself must be carrying out one of the specified activities and must be of a sufficient size or capacity (Annex I of the PRTR Regulation), and
- 2 Each emission or the total quantity of waste transferred must exceed prescribed threshold quantities (Annex II of the PRTR Regulation).

Facility operators will be notified where any of their emissions or waste transfers exceed the relevant PRTR thresholds and will consequently be included in the annual report for Ireland to the European Commission.

## **1.9 Reporting deadlines**

The reporting deadline set out in the PRTR Regulations is 31 March of the year following the calendar year being reported.

Some EPA Licences specify an earlier reporting date for the submission of the AERs; this earlier date shall be the formal reporting deadline for all three AER / PRTR Reporting Tasks (as outlined in Section 1.3 above) for these facilities; all three tasks must be completed by the earlier date.

Where the EPA Licence specifies a date for AER submission that is later than 31 March, then the latter is superseded by the PRTR date. Licensees for which a later reporting date is specified in the licence shall regard 31 March as their reporting deadline for all of their annual environmental information obligations.



To clarify any possible confusion, the 31 March reporting deadline for submission to the EPA of the Full AER has been in effect since 11 December 2002, and was communicated to all licensees in a letter of that date issued by the EPA. The letter confirmed the amendment to the reporting deadlines in all licences. The letter stated that:

“All licensees are required to submit their future AERs by the 31st March in each year and to report on the previous calendar year as previously directed by the Guidance Note on Annual Environmental Reporting”.

## **1.10 Retention of records**

EPA licence holders are required to keep their environmental data records for 7 years. Under the PRTR Regulations, non-licensed operators are also obliged to keep records of the data from which the reported information was derived and a description of the methodology used for data gathering for a period of five years.

In the case of a change of operators, the obligation to retain records will pass to the successor.

## **1.11 Confidentiality**

Reporting of the information required under the PRTR Regulations and, where applicable, under EPA Licences is obligatory. The specified information must be reported to the EPA.

Article 11 of the PRTR Regulations provide that an operator may request that specific information concerning releases or off-site transfers should be kept confidential; that is, that such specific information should be excluded from any national report of PRTR data to the European Commission.

In order to benefit from the confidentiality provision, the operator must make a case to the EPA explaining the reasons for the requested confidentiality. Having considered the request, the EPA may decide to keep the data confidential and will have to provide this information in a specific way to the Commission and the EEA. In particular, the EPA must indicate separately for each facility claiming confidentiality the type of information that has been withheld and the reason for which it has been withheld. For further details related to confidentiality of information under the PRTR Regulations, see Section 1.2.4 of the *EU PRTR Guidance Document*.

### **Article 11, PRTR Regulations**

#### **Confidentiality**

Whenever information is kept confidential by a Member State in accordance with Article 4 of Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information (1), the Member State shall, in its report under Article 7(2) of this Regulation for the reporting year concerned, indicate separately for each facility claiming confidentiality the type of information that has been withheld and the reason for which it has been withheld.

## **2. GENERAL AER / PRTR REPORTING REQUIREMENTS**

### **2.1 Who has to report?**

#### **2.1.1 EPA-licensed facilities**

All EPA-licensed facilities are obliged to report their emissions and waste transfers information, as required under both the Regulations and their licensees. The Electronic PRTR and separate electronic AER submission tasks together comprise the annual environmental information reporting obligation as outlined in Section 1.3.

Licensees are responsible for submitting quality-assured data which has been quantified using validated methodologies (see chapter 4). All data submitted via the AER Returns web-form should be viewed by licensees as constituting a legal declaration, and may be scrutinised by the Agency during site audits.

Recommended emission monitoring and calculation methodologies in relation to all relevant parameters are provided in the Appendices to this document and in the EU PRTR Guidance Document.

#### **2.1.2 Non- Licensed facilities**

Some non EPA-licensed companies, who operate in sectors listed in Annex I of the Under the PRTR Regulations, are obliged to report annual emission data to the EPA, as competent authority under the Regulations, via the EPA electronic reporting system.

In Ireland the non EPA-licensed activities that are covered by the terms of the PRTR Regulations include:

- ◆ Opencast mining and quarrying where the area effectively under extractive operation above 25 ha<sup>1</sup>
- ◆ Urban waste-water treatment plants with a capacity of 100,000 population equivalents;
- ◆ Independently operated industrial waste-water treatment plants with a capacity of 10,000 m<sup>3</sup>/day
- ◆ Preservation of wood and wood products with chemicals with a production capacity of 50 m<sup>3</sup>/day;
- ◆ Intensive aquaculture with a production capacity of 1,000 tonnes of fish or shellfish per year;
- ◆ Installations for the building of, and painting or removal of paint from ships with a capacity for ships 100 m long.

Reporting of data by the non-IPPC facilities must meet the same quality assurance standards as are required from IPPC companies.

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<sup>1</sup> The term “Surface area effectively under extractive operation” means the surface of the area of the site reduced by

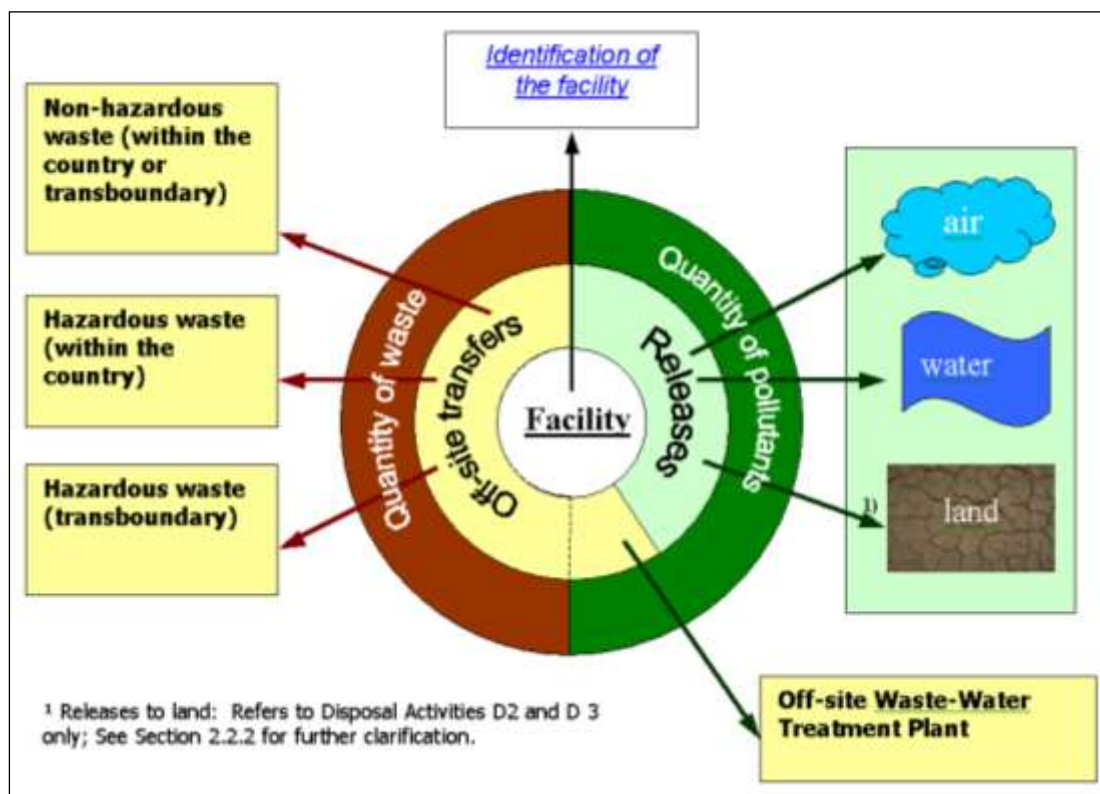
1. the surface of the rehabilitated area and
2. by the area of future excavation

Note that all in-site transport, processing, storage and associated facilities, including settlement lagoons, are to be included within this definition. (Source: EU PRTR Guidance Document May 2006).

## 2.2 What and How to report?

All relevant facilities are required to quantify their emissions by employing appropriate standard methods, and to report the emissions data to the EPA. Waste transfers must also be reported.

The range of information to be reported is summarised in Figure 2 of the *European Commission Guidance Document for the implementation of the European PRTR 31 May 2006*:



Reporting must be done via the EPA AER / PRTR Electronic Reporting Workbook and Website (See Section 1.5).

When using the AER / PRTR Reporting Website, you should have to hand the *AER / PRTR Electronic Reporting Workbook and Website User Manual* which describes in detail the process of information entry and upload.

### 2.2.1. Facility ID & Activities

The first page of the Reporting Workbook concerns the identification of the facility, and contains information on facility name, address, Licence Register Number, geographic location, economic activity, contact details and (optional) information describing the scale of the facility.

Much of the information in this sheet is pre-entered from records in the possession of the EPA in respect of the facility. Please check that this information is correct and accurate. If there are any errors in the information, please inform the Agency before proceeding to enter releases and waste data, so that a corrected Workbook can be created for your facility.

When the **Facility ID & Activities** worksheet has been completed, please proceed to entry of your Releases and Waste Transfers information.

## 2.2.2 Releases (Emissions) Reporting

The relevant emissions are:

- ◆ Emissions to air and water
  - controlled, accidental and fugitive emissions
- ◆ Off-site transfer of pollutants in effluent to off-site waste water treatment facilities
  - e.g. sewer discharges or removal of effluent by road tanker (**note landfill leachate must ONLY be reported, under PRTR, as a waste transfer whether discharged to the sewer or transferred off-site by tanker**)

***All emission data to air or water must be provided in kg per annum.***

**You are required to report emissions from your facility, as distinct from monitoring of the ambient environment in the vicinity of your facility, such as ambient air quality, or ambient water quality [e.g. stormwater, groundwater, surface water], noise, odour, dust and so on).**

You must report annual mass loads released from your facility of:

- (a) All substances for which your licence requires Emission monitoring;
- (b) All substances which appear on the PRTR list of 91 specified pollutants as laid out in Annex II of the Regulation and which are used or are present on your facility, and which may therefore be present in emissions (see Section 2.4.2).

All substances released directly to air and water under licensed emission limit values must be quantified as annual mass loads (kg/annum) in the AER / PRTR Electronic Reporting Workbook. Similarly, effluents released directly to sewer or tankered off-site must be quantified in kg/annum.

In addition, facilities may release other substances that require reporting which are not currently listed in their EPA licence. These may include any of 60 air pollutants or any of 71 water pollutants listed in the PRTR Regulations, Annex II. If any of these listed substances arise at a facility and are not prescribed in the licence, they have to be assessed by the facility. A suitable approach to this assessment is described in Section 2.3.2.

The diagram below provides an example of the information required for the **Releases to Air** worksheet of the AER / PRTR Electronic Reporting Workbook. Similar information is required in the worksheets for **Releases to Water** and **Releases to Wastewater or Sewer**.

The screenshot displays the '4.1 RELEASES TO AIR' worksheet. It is divided into three main sections: Section A (Sector Specific PRTR Pollutants), Section B (Remaining PRTR Pollutants), and Section C (Remaining Pollutant Emissions). Each section contains a table with the following columns: Pollutant Name, Method Code, Method Used, Designation or Description, Emission Point 1, and T (Total) kg/Year. Section A is for releases to air, Section B is for releases to air and water, and Section C is for releases to air and water. Each section includes an 'ADD NEW ROW' and 'DELETE ROW' button. The tables are currently empty, with only the headers and some example data visible.

The Releases worksheets allow the reporting of all 91 PRTR substances and the entire range of non-PRTR substances authorised for release under EPA licences.

The pollutants list are presented in three sections, based on the “Indicative sector-specific list” of air and water pollutants respectively as prescribed in Appendix 4 and 5 of the EU Guidance Document:

- Section A contains the prescribed *Sector-Specific PRTR Pollutants* based on your main PRTR Activity, \*
- Section B contains all *Remaining PRTR pollutants* that could be released to air (or to water as applicable) but are not contained in Section A, i.e. are not prescribed for your main PRTR Activity;
- Section C lists the “*Remaining Pollutants*” (as required in your licence), that is the entire range of substances authorised for release under EPA licences which are not prescribed PRTR Pollutants

\*Please note that if your facility does not operate a PRTR activity, Section A will be blank, i.e. it will not contain any pollutants in the dropdown in your Excel file. All the Pollutants you require will be listed in Section B and Section C. Therefore, leave Section A blank, and fill in your pollutant details in Section B and, if required, Section C.

The **Releases to Wastewater or Sewer** worksheet contains only two sections as follows:

- Section A contains all 91 *PRTR Pollutants*;
- Section B lists the “*Remaining Pollutants*” (as required in your licence), that is the entire range of substances authorised for release to water or to sewer under EPA licences which are not prescribed PRTR Pollutants.

A total of 9 Emission Points may be reported on for each Section of the Releases Worksheets (these do not “carry over” between sections). The Workbook provides a facility for entering the name, label or designation of each Emission Point.

When filling in the **Releases** worksheets, please follow the detailed step-by-step guidance the *AER / PRTR Electronic Reporting Workbook and Website User Manual*.

### 2.2.3. Releases to Land

The reporting on “Releases to Land” applies only to certain disposal operations such as land treatment of oily sludges (Waste Disposal Activity D2) and deep injection of saline solutions underground (Waste Disposal Activity D3).

**These activities are not currently employed in Ireland. Therefore, although a page has been made available in the Workbook for the reporting of releases to land to cater for future developments, it is currently not expected that any operation in Ireland will report under this category.**

### 2.2.4 Waste Transfers Reporting

The relevant information is:

- ♦ Off-site transfers **of hazardous waste** and **non-hazardous waste** for recovery or disposal <sup>\*2</sup>

**All waste data must be reported in tonnes per year**

The diagram below illustrates the information that must be entered in the **Treatment & Transfers of Waste** worksheet.

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE											24/02/2008 15:59	
Transfer Destination	European Waste Code	Hazardous	Quantity T/Year	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Name and Licence / Permit No. of Recoverer / Disposer / Broker	Address of Recoverer / Disposer / Broker	Name and Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)	Licence / Permit No. of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
* Select a row by double-clicking the Description of Waste then click the delete button.												

You are required to report your waste transfers broken down by the following headings:

- 1 Transfer Destination (within the country or to other countries);
- 2 EWC code; an automatic *EWC Code* Generator function is incorporated into the worksheet;
- 3 Hazardous (Yes or No) – this is determined by the EWC Code;
- 4 Waste Treatment Operation (as per the Schedules of the Waste Management Act 1996-2003); an automatic *Waste Treatment Operation* Generator function is incorporated into the worksheet;
- 5 Quantification Method Used (this will either be M - Weighing, C - Volume calculation, or E – None [*this is a default only, not expected to be used*])

<sup>\*2</sup> 'Waste' means any substance or object as defined in Article 1(a) of Council Directive 75/442/EEC on waste of 15 July 1975. 'Hazardous waste' means any substance or object as defined in Article 1(4) of Council Directive 91/689/EEC on hazardous waste of 12 December 1991. 'Non hazardous waste' means any waste which is not 'Hazardous waste'. All data have to be expressed in tonnes/year of (normal) wet waste and with three significant digits.

- 6 Location of Treatment (Onsite in Ireland, Offsite in Ireland or Abroad)
- 7 For non-hazardous waste, the next owner of the waste (permitted waste carrier / collector waste facility) must be detailed.
- 8 For hazardous wastes the next owner of the waste (permitted waste carrier or waste facility) must be detailed AND the ultimate disposal/ recovery location must also be provided.

While it is not necessary to break down your waste summary any further than this, please ensure that sufficient detail is presented to allow the information to be validated and audited without significant extra effort. In particular, significant waste streams arising on your facility should be clearly identifiable in your report

If waste is being sent to a waste transfer station (WTS) where it undergoes blending, bulking, and/ or mixing prior to transfer, the facility will name the transfer station as the next and ultimate destination in the PRTR workbook. The recovery or disposal code used will indicate the waste has undergone blending, bulking, and/or mixing at the waste transfer station. The WTS will report the final destination and the ultimate recovery/ disposal technique.

When filling in the **Treatment & Transfers of Waste** worksheet, please follow the detailed step-by-step guidance the *AER / PRTR Electronic Reporting Workbook and Website User Manual*.

### **Organic sludges**

Organic sludges from industrial and municipal waste water treatment plants which are recovered by landspreading under regulatory approval are **NOT** considered as releases to land. These are classed as off-site transfers of waste for recovery, and should be reported as Waste Recovery Operation R10 "Land treatment resulting in benefit to agriculture or ecological improvement".

**SLUDGE SPREADING IS CLASSED AS A WASTE RECOVERY OPERATION AND SHOULD BE DETAILED IN THE "ON –SITE TREATMENT AND OFF-SITE WASTE TRANSFERS" SHEET OF THE WORKBOOK**

Please note that the above does not include EWC Code 02 02 06: "Animal faeces, urine and manures (including spoiled straw), effluent, separately collected for treatment off-site" and EWC Code 02 01 01: "Sludges from washing and cleaning" arising on Intensive Agriculture facilities.

**DO NOT INCLUDE ANIMAL MANURES, SLURRIES OR SIMILAR ORGANIC MATERIALS ARISING ON INTENSIVE AGRICULTURE FACILITIES, WHERE THESE ARE RECOVERED AS FERTILISER BY LANDSPREADING ACCORDING TO LICENCE REQUIREMENTS.**

**THE EPA DOES NOT CONSIDER THESE MATERIALS TO BE WASTES WHERE THE MATERIALS ARE RECOVERED BY A LAWFUL LANDSPREADING OPERATION ON CLEARLY IDENTIFIED PARCELS OF LAND AND STORAGE IS LIMITED TO THE DEMONSTRATED NEEDS OF THE SPREADLANDS.**



## **Leachate**

Leachate removed from site, whether tankered or by sewer is considered an **Off-Site Waste Transfer**, under PRTR and must be reported in the “**On-Site Treatment and Off-Site Waste Transfers**” Sheet of the PRTR Workbook. Leachate going off-site must **NOT** be reported in the “Releases to Wastewater or Sewer” sheet of the PRTR workbook.

The non-hazardous EWC 190703 must be used unless the facility has undertaken analysis of the leachate to show that it is hazardous.

## **2.3 Types of Emissions to be included in your AER / PRTR Emissions Data Reporting**

### **2.3.1. Authorised Releases vs. Unauthorised Releases**

The following comprise the main AER / PRTR Categories of Releases:

- ◆ **Routine Releases** include all authorised releases during **normal operations** from licensed emission points (to air, water or sewer, etc) for which the license stipulates emission limit values.
- ◆ **Non-Routine Releases** are authorised releases that may be caused by **extraordinary activities that are carried out under controlled and approved operation** and that may lead to increased releases of pollutants; for example shut-down and start-up processes before and after maintenance operations, new process trials, approved maintenance works, or sanctioned increased emissions during the installation of a new abatement plant. All non-routine releases from such activities require EPA approval at licensed facilities.
- ◆ **Fugitive Emissions** or diffuse releases may arise during normal operations but are not released via controlled waste gas emission points or effluent discharge pipes. They frequently arise in facilities using solvents for printing / surface coating or where vats are left uncovered from which aerosol vapours may be released. They include uncaptured emissions released to the outside environment via windows, doors, vents or other openings. They should be estimated by mass-balance calculations, and should be controlled where possible. It is likely that quantification and control conditions are already specified in relevant facility licences.
  - More information on Fugitive Emissions can be found on p.42 of the *EU Commission PRTR Guidance Document* and in the *IED BREF for Monitoring of Emissions from IED installations*, downloadable at [http://eippcb.jrc.ec.europa.eu/reference/BREF/ROM\\_FD\\_102013\\_online.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/ROM_FD_102013_online.pdf)
- ◆ **Accidental Releases are unauthorised releases not subject to normal abatement or operational controls** and which result from uncontrolled developments on the facility. Quantification may be on the basis of checking residual quantities in tanks or the duration of an accidental release and relating these to assumed flow rates. At times, it may be impossible to estimate data for all relevant pollutants, especially where releases to air are involved. In such cases, it is appropriate to make sensible, conservative (i.e. “worst-case”) assumptions in order to facilitate the estimate. Details of the estimation process(es) used should be noted as a footnote to the Summary of Emissions section of your Full (hardcopy) AER.



All of the above emission types must be quantified and included in your data entry in the **Releases** worksheets for each relevant Pollutant. The combined Routine and Non-Routine (authorised) emissions should be added up and entered into the appropriate cell under each relevant Emission Point; Fugitive and Accidental Emissions, where applicable, must be entered in their separate cells. The Total Emission is then automatically added up across each Pollutant row.

### **2.3.2. Assessing the potential for release of PRTR Pollutant Substances not prescribed in licences**

The EU Guidance Document (Page 14-15) provides the following guidance in respect of substances to be reported, which is in line with the requirements of the EPA:

An activity is usually related to a typical pollutant release spectrum. Appendices 4 and 5 (indicative sector specific sub-list of pollutants) of this guidance document contain two tables (for air and water respectively) which give operators and competent authorities an example of the pollutants which may be released in the performance of a specified E-PRTR-relevant activity.

**Both tables are indicative only and should not be interpreted as a standard list of parameters for specific sub-sectors.** To decide which parameters are relevant to each specific installation, Appendices 4 and 5 should be referred to, together with information contained in Environmental Impact Assessments (EIAs), permit applications, site inspection reports, process flow sheets, material balances, read-across of similar operations elsewhere, engineering judgements, published and peer-reviewed literature and the results of previous measurement exercises. As a result, it might be that for a certain activity fewer or possibly more pollutants than indicated have to be considered.

Where a facility that performs an E-PRTR-relevant activity releases additional pollutants not specified for that activity in the tables, but contained in Annex II to the E-PRTR Regulation, the pollutants have to be reported. The tables do not exempt the operator from the responsibility to report on releases of these pollutants in accordance with Article 5 of the E-PRTR Regulation.

Reporting by the operator of a facility will in most cases contain fewer pollutants than listed in the tables of Appendix 4 or 5. In practice, the Annex II pollutants that are relevant for reporting purposes will be decided for each facility on a case-by-case basis. Extensive release monitoring campaigns should be avoided. In most cases, plausibility checks will be sufficient to determine whether a certain pollutant is released above the threshold value; in case of doubt, a representative measurement might result in more certainty on complete reporting.

Where a facility uses any of the Pollutants specified in PRTR Annex II, the quantity of the Pollutant released in emissions from the facility should be assessed, even if the Pollutant has not been controlled by the setting of an Emission Limit Value in the facility's EPA licence. In particular, this might be expected to apply in instances where the licence requires monitoring of groups of substances, such as 'Total Metals', Total Volatile Organic Carbons (Total VOC's), Total Pesticides or Total Diesel Range Organics (DRO).

In such situations, and in the interests of balancing the need for reliable reporting against avoiding unnecessary additional cost, the EPA recommends that the following procedure be adopted to provide for assessing the potential for release by the facility of PRTR Pollutants in quantities requiring reporting under the PRTR Regulations:

- 1 An estimate of the potential quantities of the Pollutant which might be present in the emission should be made based on existing information, including the following:

- a. Knowledge of the concentrations of the substance present in materials on site or generated on site;
  - b. A mass balance of imports and releases or exports of the substance based on records and knowledge of the on-site systems;
  - c. Knowledge or data from other similar facilities;
- 2 This information should then be used to estimate the annual mass load of the Pollutant released by the facility.
- 3 Where the Estimated Annual Mass Load of the Pollutant falls below 10% of the PRTR Reporting Threshold for the Pollutant (in releases to Air or Water (inclusive of wastewater & sewer) as prescribed in Annex II of the PRTR Regulations, then, with the agreement of the EPA, it will not generally be necessary to adopt more sophisticated monitoring techniques for improving the accuracy of the estimate for future years. Instead, a similar estimate may be made for each reporting year, and this estimate should be reported in the Reporting Workbook and in the Full AER.
- 4 If, however, in the present (or any subsequent) year, the Estimated Annual Mass Load exceeds 10% of the respective Reporting Threshold, the Agency will initially require a more detailed assessment of the actual release. The facility should consider carrying out a once-off or short-term speciated substance characterisation survey of their emissions to establish what are the approximate quantities of the substances emitted annually. This Characterisation Programme should be agreed with your EPA Licence Inspector before commencing, and should be sufficient to provide good confidence in terms of the true emission for the characterisation period.
- 5 Depending on the outcome of the Characterisation Programme, you should agree with your EPA Licence Inspector how the emission should be quantified in future years. This might involve formal monitoring or a suitable calculation or modelling approach. In certain cases, additional abatement or mitigation works might need to be implemented; this would be a matter for discussion with the EPA's Office of Climate, Licensing and Resource Use.
- 6 Where the substance is predicted by the initial Characterisation Programme assessment to be emitted in a quantity greater than the relevant PRTR reporting threshold, formal monitoring of the emission should be initiated without delay with the prior agreement of the EPA.

The licensee should provide a report on the exercise in their Full (hardcopy) AER, outlining the details of the exercise. This should include data on the emission/s and the pollutant/s concerned and details of the measurements and estimations carried out over the annual reporting period.

The operators of non EPA-Licensed facilities are also subject to the requirement to provide a report of any such exercise to the EPA. In such cases, the operator should send the report to the EPA at [aerreturns@epa.ie](mailto:aerreturns@epa.ie).

### Example PRTR Pollutant Assessment

#### Zinc – PRTR reporting Threshold for Air Emissions: 200 kg/year

A process uses a compound in its manufacture that contains zinc. The licence air emission monitoring requirement specifies **Total Metals**, but not zinc as an individual substance.

A mass balance calculation is carried out assessing the incoming quantity of zinc in the raw material and the quantity of zinc contained in the final product. It is assessed that approximately 80 kg/annum of zinc is unaccounted for and is assumed to be released to air in the facility's licensed emission. 80 kg/annum of zinc is equal to 40% of the PRTR reporting threshold of 200 kg/annum. In this instance, zinc should be included as a speciated compound in the **speciated substance characterisation programme**.

Depending on the outcome of the short term characterisation programme, it may be appropriate to add zinc to the standard list of parameters for ongoing measurement under the monitoring programme.

If, conversely, the mass balance calculation indicated that less than 5kg/annum of zinc is unaccounted for, which is only 2.5% of the PRTR reporting threshold, the reporting of this substance as an **Estimation** is likely to be acceptable subject to agreement with the EPA.

#### 2.3.3. Substances falling into several Pollutant Categories

Releases of pollutants falling into several categories shall be reported for each of these categories if the relevant thresholds are exceeded. This mainly applies to the two examples below:

##### ◆ Solvent Emissions to Air (NMVOC)

Solvent emissions to air may be classified in various ways, depending on the purpose of their quantification. They may be classified as Total Organic Carbon (TOC), whereby only the carbon content of the solvent is assessed, or they may be classed as TA.Luft<sup>\*3</sup> Class 1,2 or 3 solvents, which lists them by their level of potential harm (carcinogen, irritant, etc) and requires speciated identification of the different solvents such as chloroform, trichloroethylene, acetone, hexane, benzene, etc.

Alternatively, solvents can be all grouped together as Non Methane Volatile Organic (NMVOC), which is the combined sum of all solvents except methane. The AER / PRTR Reporting Workbook requires solvents to be reported as their individual species, AND to be summed under the collective **Pollutant 07: NMVOC**. For example 1,2-dichloroethane is a NMVOC, so releases must be reported under 1,2-dichloroethane and also under NMVOC. Any other NMVOC's emitted (for example, toluene, benzene, ethylene, etc) should similarly be added up under NMVOC.

##### ◆ Organotin

The releases of tributyltin and its compounds and triphenyltin and its compounds must also be included under **Pollutant 69: Organotin (as Sn)**.

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<sup>\*3</sup> German Air Pollution Standard "Technische Anleitung zur Reinhaltung der Luft" commonly referred to as the **TA Luft**.

For further information on the pollutants that fall into multiple Pollutant Categories for the purposes of AER / PRTR Releases reporting, see p. 13 of the *EU Commission PRTR Guidance Document*.

#### **2.3.4. Releases below analytical determination**

Where the volume of an emission is very large, the concentrations of certain Pollutants in the emission may fall below the Limits of Detection (LoD) and/or Quantification (LoQ) at the emission point/s. For example, in large waste water discharges or exhaust air volumes generated by facilities, the concentration of the pollutant might be “diluted” below the determination limit at the final release point, even though the annual mass emission may not be Zero and the PRTR Reporting Threshold value may be exceeded.

The fact that a Pollutant of relevance to the facility is not quantifiable at the final emission point does NOT permit a conclusion to be drawn that emitted quantities are insignificant. Equally, this fact does not mean that PRTR reporting threshold values are not exceeded or that the operator need not assess such releases.

On the contrary, the operator is obliged to assess the annual mass emission of the Pollutant(s) by other means. Possible procedures which can be used to determine releases in such cases include measurement closer to the source (e.g. measurement in part-streams before these enter a central air abatement or waste-water treatment plant) and/or estimation of releases e.g. on the basis of pollutant elimination rates or mass balance calculations.

- *This may necessitate setting up new monitoring points at WWTP's or in exhaust systems to capture and quantify pollutant loads prior to dilution.*

Where determination of the annual mass emission is not possible as a result of current arrangements on the facility, it is necessary for the operator to make an estimate of the potential pollutant load in the emission. For this purpose, and in the interests of balancing the need for reliable reporting against avoiding unnecessary additional cost, the EPA recommends that the following procedure be adopted:

- 1 Where measurement data indicates that a pollutant known to be relevant to the facility is consistently present in the emission at concentrations below the limit of analytical quantification available, the operator should use the reported value or, if this is unsuitable, a value equal to 50% of the LoD value, i.e. the concentration value representing the analytical detection limit, as a first order approximation of the “actual” concentration in their determination of the annual mass load. These values, and the calculated loads derived from them, should always be handled and reported as being based on analyses below the LoD / LoQ.
- 2 This information should then be used to estimate the annual mass load of the Pollutant released by the facility.
- 3 Where the Estimated Annual Mass Load of the Pollutant falls below 10% of the PRTR Reporting Threshold for the Pollutant (in releases to Air or Water (inclusive of wastewater & sewer) as prescribed in Annex II of the PRTR Regulations, then, with the agreement of the EPA, it will not generally be necessary to adopt more sophisticated monitoring techniques for improving the accuracy of the estimate for future years. Instead, a similar estimate may be made for each reporting year, and this estimate should be reported in the Reporting Workbook.

- 4 If, however, in the present (or any subsequent) year, the Estimated Annual Mass Load exceeds 10% of the respective Reporting Threshold, the Agency will initially require a more detailed assessment of the actual release. The facility should consider carrying out a once-off or short-term speciated substance characterisation survey of their emissions to establish what the approximate quantities of the substances emitted annually is likely to be. This Characterisation Programme should be agreed with your EPA Licence Inspector before commencing, and should be sufficient to provide good confidence in terms of the true emission for the characterisation period.
- 5 Depending on the outcome of the Characterisation Programme, you should agree with your EPA Licence Inspector how the emission should be quantified in future years. This might involve formal monitoring or a suitable calculation or modelling approach. In certain cases, additional abatement or mitigation works might need to be implemented; this would be a matter for discussion with the EPA's Office of Climate, Licensing and Resource Use.
- 6 Where the substance is predicted by the initial Characterisation Programme assessment to be emitted in a quantity greater than the relevant PRTR reporting threshold, formal monitoring of the emission should be initiated without delay with the prior agreement of the EPA.

If the need to apply this procedure arises on a facility, the operator should provide a report on the exercise in their Full (hardcopy) AER, outlining the results obtained and decisions taken at each step of the above procedure. This should include the emission and the pollutant/s concerned, the relevant limits of detection, and details of the measurements and estimations carried out over the annual reporting period.

The operators of non EPA-Licensed facilities are also subject to the requirement to provide a report of any such exercise to the EPA. In such cases, the operator should send the report to the EPA at [aerreturns@epa.ie](mailto:aerreturns@epa.ie)

#### **2.3.5. Background Load**

Where water is abstracted for use on site and discharged back into the same waterbody, the background load of a pollutant in water may be taken into account when calculating the Pollutant Load released from a facility in, for example, cooling water releases. For instance, if cooling water is collected from a river, lake or sea and is subsequently released from the site into the same river, lake or sea, the portion of the pollutant present in the Release due to the background load of that pollutant in the incoming water can be subtracted from the total release of that pollutant from the facility. In other words, only the additional contribution directly resulting from the facility's activities must be reported.

If, however, the additional load results from the use of extracted groundwater or drinking water, it should not be subtracted since it increases the load of the pollutant in the river, lake or sea.

### 3. REPORTING OF QUANTIFICATION METHODS

All licensees are required to report the details of the quantification methods they employed in determining their releases and waste transfers.

This chapter provides guidance on the correct terms to be used when completing the AER / PRTR Reporting Workbook.

#### 3.1 Method Class: Measurement / Calculation / Estimation of Releases and off-site Transfers

All methods used by facilities to determine the quantities of materials in their releases and waste transfers will fall within one or other of the following three designated Classes of Quantification Methods (see PRTR Regulation Article 5):

<b>CLASS M -</b>	<b>DATA BASED ON MEASUREMENTS</b>
<b>CLASS C -</b>	<b>DATA BASED ON CALCULATIONS</b>
<b>CLASS E -</b>	<b>DATA BASED ON NON-STANDARDISED ESTIMATION</b>

##### 3.1.1 Class M - Emission data based on measurements

It is expected that all EPA licence-specified emissions monitoring should be designated as Class M. Class M is to be used where emissions are derived from direct monitoring results for specific processes at a facility. The measurements should be carried out using standardised or EPA-approved and accepted facility-specific methods. This is a requirement for all existing EPA licence holders, as typically specified under the relevant Licence Conditions, such as:

*The licensee shall ensure that:*

- (i) sampling and analysis for all parameters listed in the Schedules to this licence, and*
- (ii) any reference measurements for the calibration of automated measurement systems, shall be carried out in accordance with CEN-standards. If CEN standards are not available, ISO, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.*

The requirement to use the best available information and internationally approved methodologies applies equally to EPA-Licensed and to non EPA-Licensed facilities; it is specified in the PRTR Regulations Article 5(4) and in the PRTR Guidance, page 35.

**Both Continuous and Discontinuous measurements, such as weekly / quarterly spot samples are included in Class M. Often, additional calculations will be required to convert the results of spot sample measurements into annual emission data, but Class M remains appropriate in such instances.**

Two common formulae for calculating mass flow from discrete or spot sample results are provided below. Further common conversion equations and relevant calculation examples are provided in Appendix 2.

### Calculate Mass flow mg/m<sup>3</sup> to kg/annum

To convert a normalised gas or liquid spot sample results in mg/m<sup>3</sup> to the required

Annual Mass Flow in kg per year

the concentration in mg/m<sup>3</sup> has to be multiplied by a flow rate in m<sup>3</sup>/hr

#### Calculate Mass flow

$$\frac{\text{Conc} \times \text{hourly rate}}{1,000,000} = \text{mass flow kg/hr} \times 8760 \text{ (hrs per year)} = \text{mass flow kg/yr}$$

$$\text{e.g. } \frac{150 \text{ mg/m}^3 \times 4000 \text{ m}^3/\text{hr}}{1,000,000} = 0.6 \text{ kg/hr} \times 8760 = 5,256 \text{ kg/yr}$$

### Calculate Mass flow

#### mg/litre to kg/annum

In order to convert a liquid spot sample result (mg/litre) to the required

Annual Mass Flow in kg/year

the concentration in mg/litre has to be multiplied by a volume in  
litres/day

#### Calculate Mass flow

$$\frac{\text{Conc} \times \text{litres/day}}{1,000,000} = \text{mass flow kg/day} \times 365 \text{ (days per year)} = \text{mass flow kg/yr}$$

$$\text{e.g. } \frac{20 \text{ mg/litre} \times 5000 \text{ litres/day}}{1,000,000} = 0.1 \text{ kg/day} \times 365 = 36.5 \text{ kg/yr}$$

### 3.1.2 Class C - Emission data based on Calculations

Class C is applicable to facilities such as landfills, where the best available approach for quantifying the relevant emissions is the use of standard, scientifically-based methane emission models based on the type, history and amount of waste deposited, or intensive agriculture facilities, where ammonia and other emissions are best calculated based on standard emission factors and site-specific information on animal numbers, storage arrangements and so on.

More generally, Class C should be used for determining annual emissions based on calculation methodologies that use activity data such as fuel use, production rate, etc., or on internationally agreed emission factors or mass balances. The nationally or internationally agreed calculation methods used should be representative for the industrial sectors, and must be specified in the method description columns of the Worksheets.

The following Calculation Methodologies are examples of Class C methodologies that are considered to be internationally approved:

- ◆ “Guidelines for the monitoring and reporting of greenhouse gas emissions under the Emission Trading Scheme”,
- ◆ the “IPCC Guidelines”;
- ◆ “UN-ECE / EMEP Atmospheric Emission Inventory Guidebook”;

Additional calculation methodologies that have been approved by the EPA for data reporting under Class C - include the following:

GasSim Lite	- For landfill gas emission calculations at active landfills
LandGem	- For landfill gas emission calculations at long-term inactive landfills
Intensive Agriculture Emission Calculation Tool for AER / PRTR Reporting	- For calculation of methane and ammonia and nitrous oxide emissions arising from Intensive Agriculture facilities (Pig, Broiler and Duck farms).
Emission Calculation Tool for AER / PRTR Reporting for the Quarrying Sector	- For calculation of dust / PM <sub>10</sub> and exhaust emissions from fixed and mobile plant and calculation of emissions to waters
CONCAWE report no. 9/05R, 2006: “air pollutant emission estimation methods for EPER and PRTR reporting by refineries” (CONCAWE, Brussels).	- For refineries, Large Combustion Plants

The EPA-approved Calculation Tools are provided on the AER / PRTR Reporting pages of the EPA website at <http://www.epa.ie>. Links to international calculation methods are also available at this location.

### 3.1.3 Class E - emission data based on non-standardised Estimation

Class E must be used where the data quantification refers to emission data that is based on non-standardised estimation derived from best assumptions or expert guesses that are not referencing publicly recognised emission estimation methodologies or good practices guidelines.

This will typically arise in relation to PRTR Pollutants that have not been controlled by the setting of an Emission Limit Value in the facility's EPA licence. In such cases, the use of an estimation method may be appropriate, but the licensee should follow the procedure set out in Section 2.4.2 to establish the acceptability of the estimation approach for future reporting years.



## 3.2 Method Identification Codes

The PRTR Regulations require the entry of a Method Code in conjunction with the M / C / E Classification discussed above, where (and only where) the operator does not use an internationally approved methodology, such as a CEN standard or ISO standard for the determination of the parameter. These codes are intended to provide a simple “at-a-glance” indication of the type of method used for the quantification of the particular parameter.

In such instances, the operator must define the type of methodology used by employing one of the codes in the Method Code table of the Reporting Workbook. The Method Codes Table is accessed by a “double-click” action from the **Releases** worksheets. Please select the appropriate Method Code and input this into the appropriate cell. Except in the case of an internationally approved measurement method, you must also give a brief description of method you used in addition to the Method Code.

### ***Selection of the Appropriate Method Code:***

Where an internationally approved measurement standard has been used, the method Code entry should be the short designation of the relevant standard (e.g. EN 14385:2004); in this case, no further information on the method is necessary.

For example:

M/C/E	Method Used	
	<u>Method Code</u>	Designation or Description
M	EN 14385:2004	(blank)

Where an internationally approved measurement standard has NOT been used, select the appropriate Method Code AND provide a brief “Designation or Description” of the method used.

For example:

M/C/E	Method Used	
	<u>Method Code</u>	Designation or Description
C	OTH	EPA Calculation Tool

The following example **Releases to Air** Table illustrates these requirements:

Releases to air						
Pollutant		Method			Quantity	
No. Annex II	Name	M/C/E	Method used		T (total) (kg/year)	A (accidental) kg/year
			Method Code	Designation or description		
1	CH <sub>4</sub>	C	OTH	<u>LandGem, GasSim etc</u>	125,000	0
3	CO <sub>2</sub>	C	ETS		244,000,000	0
14	HCFCs	E	ESTIMATE	<sup>1</sup>	1.28	1.28
18	Cd	M	EN 14385:2004		12.5	0

<sup>1</sup> Where an Estimate is used, as in this example, leave this cell blank, but please ensure that you enter a brief description of method you used for this estimation as a footnote in your Full (paper) AER

The following table provides a full list of the available Method Codes:

Methods used for determination of releases to air, water, waste water or sewer: Method Codes for Measurement (M) and Calculation (C) methods		
Measurement (M) Method Used	PRTR Method Code	Example
Internationally approved measurement Standard	Short description of relevant ISO/ CEN standard	EN 14385:2004
Measurement methodology already prescribed by the competent authority in a licence or an operating permit for that facility	PER	<b>Not generally applicable for Irish licensees.</b>
National or regional binding measurement methodology prescribed by legal act for the pollutant and facility concerned	NRB	<b>Not generally applicable for Irish licensees.</b>
Alternative measurement method in accordance with existing CEN/ISO measurement standards	ALT	Not generally applicable for Irish licensees, unless with prior approval of EPA
Measurement methodology the performance of which is demonstrated by means of certified reference materials and accepted by competent authority	CRM	Not generally applicable for Irish licensees.
Other measurement methodology	OTH	Specify if a non-standard monitoring methodology has been approved by EPA
Calculation (C) Method Used	PRTR Method Code	Example
Internationally approved measurement Standard	Short description of relevant ISO/ CEN standard	UN-ECE/EMEP Atmospheric Emission Inventory
Calculation methodology already prescribed by the competent authority in a license or an operating permit for that facility	PER	<b>Not generally applicable for Irish licensees.</b>
National or regional binding calculation methodology prescribed by legal act for the pollutant and facility concerned	NRB	<b>Not generally applicable for Irish licensees.</b>
Mass balance method which is accepted by the competent authority	MAB	Not generally applicable for Irish licensees.
Emission Trading Scheme	ETS	Applicable for Irish licensees that are part of the ETS.

Other calculation methodology	OTH	Specify if a non-standard calculation methodology has been approved by EPA, such as Gas Sim Lite, EPA Emission Calculation Tool, etc
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As noted in Section 3.1 above, most EPA licenses specify that international standards should be used, rather than prescribing an alternative 'permitted methodology'; therefore the method Code PER is not applicable for most facility quantification methods, unless specifically agreed with the EPA. Similarly, the other method Codes above are only applicable where the EPA has approved a non-standard method of monitoring or calculation. **The majority of methods used should be the internationally prescribed ISO or CEN standards.**

### 3.3 Combination of Methodologies- which M / C / E and Method Codes?

The Method Code section of the releases worksheets provide for only a single methodology for each Pollutant parameter. However, it may be anticipated that, for some Pollutants, a combination of different methodologies will have been used to quantify the total emission. This may be because the same Pollutant was released from several emission points in respect of which different quantification methods were used. More probably, the total may include a measured quantity released as a routine permitted emission and a calculated or estimated quantity arising from accidental or fugitive emissions.

In such cases, the methodology capturing the highest percentage of the pollutant should be ascribed to the total quantity released.

#### **Example:**

A release to air of carbon dioxide is established from different air emission points using different methodologies:

Stack 1: emission sampled using international monitoring standard	Code M	75%
Stack 2: emission calculated using IPCC guidelines	Code C	20%
Stack 3: emission estimated from standby boiler	Code E	5%

In this instance, the overall emissions should be designated under Code M, as the highest percentage of the pollutant was quantified by measurement.

In summary, the operator of the facility has to decide, before collecting the data, which determination methodology for a certain pollutant, whether this be a Measurement, Calculation or Estimation methodology, results in "best available information" for the reporting of the annual release of that pollutant.

Where data are measured or calculated, the method of measurement and/or the method for calculation must be indicated in the Reporting Workbook.

Where the data are based on an estimation method, ensure that you enter a brief description of the method you used for this estimation as a footnote to the Emissions Summary in your Full AER. This is required for each pollutant that is determined by an estimation method.

Where the results indicate that the existing approach to determination of annual mass loads is not appropriate, based, for example, on the assessment procedure at Section 2.4.2, steps should be initiated, in agreement with the EPA, to develop and implement more robust quantification methods in time for the next reporting cycle.

## 4. QUALITY CONTROL

The required emission monitoring frequency for an EPA-licensed facility is specified in the schedules and conditions of the licenses, in accordance with best practice. The same may

### 4.1 Frequency of monitoring / sampling

The required emission monitoring frequency for an EPA-licensed facility is specified in the schedules and conditions of the licenses, in accordance with best practice. The same may apply with regard to non EPA-licensed operations; if this is the case, these facilities must determine an appropriate frequency of sampling in order to ascertain reliably the quantities of Pollutants released in emissions arising from their facility. It is recommended that operators discuss their proposed sampling frequency the EPA or, if applicable, with their Local Authority, if any uncertainty exists in this regard.

As a minimum, the following guidelines should be followed:

- Annual emissions and waste quantities transferred from the facility should be determined with a frequency and duration of data collection which is sufficient over the year to give representative and comparable data.
- It is good practice to match monitoring schedules to the timeframes over which harmful effects or potentially polluting trends occur. For instance, in batch releases of emissions, monitoring should be undertaken while the batch release occurs, not in between the batch discharge, as the sampling would then not be representative of the emission. <sup>\*4</sup> The annual emitted load should reflect the actual period/s over which emissions took place.
- As specified in the conditions of their licences, operators must collect all required data based on the best available information. Where possible this should be done with the use of International Standards as listed in Appendix 1, as following these methods automatically ensures appropriate quality assurance. If International Standards are not used, the alternative method proposed by the facility must be demonstrated to be equivalent to an International Standard, or otherwise must be agreed with the EPA.

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<sup>\*4</sup> Further details on monitoring timing can be found in Chapter 2.5 of the **BREF 'Monitoring Systems'** downloadable at <http://eippcb.jrc.es/pages/FAbout.htm>

## 4.2 Quality assurance of Releases and Waste Transfers Data

Before submitting the data to the EPA, the operator should check that an appropriate quality of the data is maintained by ensuring that the information is complete, consistent and credible. (See *EU PRTR Guidance Document* page 47 and 48):

- **Completeness** means that the reported data should cover all releases and off-site transfers of all pollutants and wastes exceeding thresholds for all facilities with Annex I activities above the capacity thresholds.
- **Consistency** means that data shall be reported on the basis of unambiguous and uniform definitions, source identification and reliable methodologies for the determination of releases over several years.
- **Credibility** refers to the trustworthiness, authenticity, reliability, comparability and transparency of the data. Furthermore it is important that the information in the E-PRTR is comparable to allow an objective and reliable comparison of releases and off-site transfers from different facilities within a country or amongst different countries. The information whether a release or off-site transfer was measured, calculated or estimated, the use of internationally approved methodologies and the exact specification which methodology was used to determine the release or off-site transfer makes the data transparent and assures the credibility of data.

The EPA, as competent authority under the PRTR Regulations, has the duty to assess the quality of information provided by operators. All licensed facilities are required to have an Environmental Management System (EMS) for their facility in place, and non-licensed facilities may be accredited to ISO 9001, ISO 14000 or EMAS. The reporting of the required data should be included in that system to assure high quality of the data.

### **Quality Assurance and Assessment**

1. The operator of each facility subject to the reporting requirements to the EPA shall assure the quality of the information that they report
2. The competent authorities shall assess the quality of the data provided by the operators of the facilities referred to in paragraph 1 in particular as to their completeness, consistency and credibility

Ref: [Article 9 E-PRTR Regulation](#)

## 5. VALIDATION

Validation of the AER / PRTR Releases and Waste Transfers submissions consists of two separate steps:

- (a) Automatic Validation of the contents of the AER / PRTR Electronic Reporting Workbook xml file on Upload to the EPA database;

- (b) Validation and verification of the submitted data by the EPA, both collectively and during audits at individual sites.

## **5.1 Automatic Validation**

When you have completed entering all of your AER / PRTR Releases and Waste Transfers information into the Reporting Workbook, the file is ready to be uploaded. To do this, use the “CREATE AER XML RETURN AND UPLOAD” button on the “Facilities ID & Activities” worksheet” to create your XML return file (this is the finished format for upload to the AER / PRTR Database).

The AER / PRTR Electronic Reporting System contains a five-step Automatic Validation process to ensure that information is only uploaded by only those users who are permitted to use the system, and that all required information is inputted correctly. In particular, the data in the xml file are checked by the automatic system to confirm that there are no missing items (i.e. no blank cells where entries are mandatory) and that the data have been entered in the appropriate formats (e.g. no letters in number cells).

The Automatic Validation steps are:

- ◆ Username validation
- ◆ Cell input validation
- ◆ Xml validation
- ◆ Uploading to website validation
- ◆ Uploading to EPA server validation

When the xml file has been successfully uploaded AND you have received the Verification of Acceptance email from the EPA database, Task 1 of your AER / PRTR submission is complete (subject to any requirement for resubmission arising under the Manual Validation described in the next Section). You may now proceed to the Second task, the submission of your Full Annual Environmental Report (your “Hardcopy” or “paper” AER). For non EPA-Licensed facilities, this concludes the annual reporting obligation, again subject to any requirement for subsequent modification of the information.

## **5.2. Manual Validation of the submitted data**

As described in Section 4.2, the EPA is obliged under the PRTR Regulations to assess the quality of the data submitted by operators, in particular as to their completeness, consistency and reliability (Article 9 of the E-PRTR Regulation). Equally, the EPA Act (Article 13 (5) (c) of the EPA Act 1992 – 2008) requires that information submitted by licensed facilities shall not be false or misleading. Moreover, the EPA is responsible for the development of inventories of emissions to the environment and requires that the data collected for these purposes be of a sufficient quality and reliability.

All information submitted is therefore subject to a process of Manual Validation and verification by the EPA. For example, errors in or omissions from your submissions might subsequently be detected during the EPA’s review of the information, during on-site audits of your facility or by yourself; this may necessitate correcting and resubmitting the information.

Any errors or omissions will require to be rectified by the submission of corrected information.

It is therefore strongly recommend that you retain all electronic and paper copies of your submissions and all related documentation in a secure location (the electronic documents may be retained in the AER PRTR Reporting folder you created at Step C), as these may be required for amendment and resubmission.

## **6 AER / PRTR GUIDANCE**

The following documents should be studied before completing your annual environmental reporting tasks. These should be downloaded from the Reporting Website:

<http://aer.epa.ie/reporting>

or from the AER / PRTR Pages of the main EPA website:

<http://www.epa.ie/enforcement/prtr/operator/>

### **1. PRINCIPLES OF PRTR AND AER REPORTING OF ANNUAL ENVIRONMENTAL INFORMATION**

- This introductory paper sets out the technical requirements and the legal framework for annual environmental reporting by both EPA-Licensed facilities and operators of relevant Non EPA-Licensed activities.

### **2. *The Step by Step Guide for AER / PRTR Reporting for EPA-licensed facilities***

- This Guide will assist you in making the required annual submissions of environmental information in accordance with your EPA Licence and with the PRTR Regulations.
- A version of the *Step by Step Guide for AER / PRTR Reporting for non EPA-licensed facilities*, intended for use by the operators of non EPA-licensed facilities, is also available here.

### **3. *EPA Guidance Note on the Annual Environmental Report***

- This document provides guidance for compiling all of the necessary information on emissions, waste transfers and environmental performance of the facility.

### **4. *The EPA Guidance Note Annex on AER / PRTR Reporting (the present document)***

- This document provides detailed guidance on the requirements of both AER and PRTR emissions and waste transfers reporting for all EPA-licensed industry sectors and non-licensed industry subject to the PRTR Regulations. It also provides a wealth of additional material, including examples of calculation and estimation methods, conversion tools, worked examples and a Frequently Asked Questions section based on the experience of the first reporting cycle.

### **5. *The AER / PRTR Electronic Reporting Workbook and Website User Manual***

- This document provides a detailed step-by-step procedure for using the Electronic AER / PRTR Reporting Workbook and for downloading from and uploading to the AER / PRTR Website.

### **6. *Procedure for creating and submitting your Full PDF AER***

### **7. *Where applicable, the EPA's Sector-Specific AER / PRTR Guidance Document***

- This document complements Documents 3 and 4, and provides sector-specific assistance in deciding what needs to be reported and for compiling the required information. For some sectors, the EPA have developed Excel-based Calculation Tools which provide for the calculation of the required emissions based on best available scientific knowledge.

8. *European Commission Guidance Document for the Implementation of the European PRTR, May 2006*

- This document is more relevant to non-EPA licensed industry sectors but will be of interest to licensed sites as well. Please note, however, that in the event of any inconsistency or conflict between the EU Guidance Document and the requirements of your licence, the requirements of your licence shall be followed. Also, please be careful to take the widest interpretation of the guidance in relation to your facility.

In addition, BAT (Best Available Techniques) Documents and BAT Reference Documents will be of interest to facilities in certain industrial sectors. These are available for download from the following links:

<http://www.epa.ie/downloads/advice/bat/>

<http://www.epa.ie/downloads/advice/brefs/>



## APPENDICES

### APPENDIX 1: INTERNATIONALLY APPROVED MEASUREMENT STANDARDS

The following list should be assessed in conjunction with Appendix 3 of the *European Commission Guidance Document for the Implementation of the European PRTR, May 2006*.

AIR		
Standard	Title	Pollutants covered
ISO Standard in preparation by ISO/TC 146/SC 1/WG 22		methane (CH <sub>4</sub> )
EN 15058:2004	Stationary source emissions -- Determination of the mass concentration of carbon monoxide (CO) -- Non-dispersive infrared spectrometry	carbon monoxide (CO)
ISO 12039:2001	Stationary source emissions -- Determination of carbon monoxide, carbon dioxide and oxygen -- Performance characteristics and calibration of automated measuring systems	carbon monoxide (CO), carbon dioxide (CO <sub>2</sub> )
ISO Standard in preparation by ISO/TC 146/SC 1/WG 19		nitrous oxide (N <sub>2</sub> O)
EN 13649:2001	Stationary source emissions - Determination of the mass concentration of individual gaseous organic - Activated carbon and solvent desorption method	non-methane volatile organic (NMVOC), benzene
EN 14792:2005	Stationary source emissions. Determination of mass concentration of nitrogen oxides (NO <sub>x</sub> ). Reference method: Chemiluminescence	nitrogen oxides (Nox/NO <sub>2</sub> )
ISO 11564:1998	Stationary source emissions -- Determination of the mass concentration of nitrogen oxides -- Naphthylethylenediamine photometric method	nitrogen oxides (Nox/NO <sub>2</sub> )
ISO 10849:1996	Stationary source emissions -- Determination of the mass concentration of nitrogen oxides -- Performance characteristics of automated measuring systems	nitrogen oxides (Nox/NO <sub>2</sub> )
EN 14791:2005	Stationary source emissions. Determination of mass concentration of sulphur dioxide. Reference method	sulphur oxides (Sox/SO <sub>2</sub> )
ISO 7934:1989	Stationary source emissions -- Determination of the mass concentration of sulfur dioxide -- Hydrogen peroxide/barium perchlorate/Thorin method	sulphur oxides (Sox/SO <sub>2</sub> )
ISO 7935: 1992	Stationary source emissions -- Determination of the mass concentration of sulfur dioxide -- Performance characteristics of automated measuring methods	sulphur oxides (Sox/SO <sub>2</sub> )
ISO 11632:1998	Stationary source emissions -- Determination of mass concentration of sulfur dioxide -- Ion chromatography method	sulphur oxides (Sox/SO <sub>2</sub> )

AIR		
Standard	Title	Pollutants covered
EN 14385:2004	Stationary source emissions. Determination of the total emission of As, Cd, Cr, Co, Cu, Mn, Ni, Pb, Sb, Tl and V	arsenic & (as As), cadmium & compounds (as Cd), chromium & (as Cr), copper & (as Cu), nickel & (as Ni), lead & (as Pb)
EN 13211:2001	Air quality. Stationary source emissions. Manual method of determination of the concentration of total mercury	mercury & (as Hg)
EN 14884:2005	Air quality. Stationary source emissions. Determination of total mercury: automated measuring systems	mercury & (as Hg)
EN 1948-1 to -3:2003	Stationary source emissions. Determination of the mass concentration of PCDDs / PCDFs and dioxin-like PCBs. Sampling of PCDDs / PCDFs	PCDD + PCDF (dioxins + furans) (as Teq),
(prCEN/TS 1948-4) for information only		polychlorinated biphenols (PCBs)
ISO 11338-1 to -2:2003	Stationary source emissions -- Determination of gas and particle-phase polycyclic aromatic hydrocarbons -- Part 1: Sampling, Stationary source emissions -- Part 2: Sample preparation, clean-up and determination	anthracene, polycyclic aromatic hydrocarbons (PAHs), flouranthene
EN 1911-1 to -3:2003	Stationary source emissions -- Determination of hydrochloric	chlorine & inorganic (as HCl)
ISO 10397:1993	Stationary source emissions -- Determination of asbestos plant emissions -- Method by fibre count measurement	asbestos
ISO/DIS 15713:2004		fluorine & inorganic (as HF)
ISO Standard in preparation by ISO/TC 146/SC 1/WG 20 (available as Committee Draft DC 23210) (for information only)		particulate matter (PM10)
WATER		
Standard	Title	Pollutants covered
EN 12260:2003	Water quality. Determination of nitrogen. Determination of bound nitrogen (TN <sub>db</sub> ), following oxidation to nitrogen oxides	total nitrogen
EN ISO 11905-1:1998	Water quality. Determination of nitrogen. Method using oxidative digestion with peroxodisulfate	total nitrogen
EN ISO 15681-1:2004	Water quality. Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA). Method by flow injection analysis (FIA)	total phosphorous
WATER		

Standard	Title	Pollutants covered
EN ISO 15681-2:2004	Water quality. Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA). Method by continuous flow analysis (CFA)	total phosphorous
EN ISO 11885:1997	Water quality. Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy	total phosphorous
EN ISO 6878:2004	Water quality -- Determination of phosphorus -- Ammonium molybdate spectrometric method	total phosphorous
EN ISO 11969:1996	Water quality -- Determination of arsenic -- Atomic absorption spectrometric method (hydride technique)	arsenic & compounds (as As)
EN 26595:1992	Water quality - Determination of total arsenic - Silver diethyldithiocarbamate spectrophotometric method	arsenic & compounds (as As)
EN ISO 5961:1995	Water quality. Determination of cadmium by atomic absorption spectrometry	cadmium & (as Cd)
EN 1233:1996	Water quality. Determination of chromium by atomic absorption spectrometry	chromium & (as Cr)
EN 1483:1997	Water quality. Determination of mercury	mercury & (as Hg)
EN 12338:1998	Water quality. Determination of mercury. Enrichment methods by amalgamation	mercury & (as Hg)
EN 13506:2001	Water quality - Determination of mercury by atomic fluorescence spectrometry	mercury & (as Hg)
EN ISO 6468:1996	Water quality -- Determination of certain organochlorine insecticides, polychlorinated biphenyls and chlorobenzenes -- Gas chromatographic method after liquid-liquid extraction	aldrin, DDT, dieldrin, endosulfan, endrin, heptachlor, hexachlorobenzene (HCB), 1,2,3,4,5,6-hexachlorocyclohexane (HCH), lindane, pentachlorobenzene, polychlorinated biphenols (PCBs)
EN ISO 10695:2000	Water quality -- Determination of selected organic nitrogen and phosphorus -- Gas chromatographic methods	atrazine, simazine
EN ISO 10301:1997	Water quality -- Determination of highly volatile halogenated hydrocarbons -- Gas-chromatographic methods	1,2-dichloroethane (EDC), dichloromethane (DCM)
EN ISO 15680:2003	Water quality -- Gas-chromatographic determination of a number of monocyclic aromatic hydrocarbons, naphthalene and several chlorinated using purge-and-trap and thermal desorption	1,2-dichloroethane (EDC), dichloromethane (DCM), tetrachloroethylene (PER), trichlorobenzenes (TCBs) (all isomers), trichloroethylene, trichloromethane, vinyl chloride, benzene, ethyl benzene, naphthalene, toluene, xylenes

WATER		
Standard	Title	Pollutants covered
EN ISO 11369:1997	Water quality -- Determination of selected plant treatment agents -- Method using high performance liquid chromatography with UV detection after solid-liquid extraction	diuron, simazine
EN ISO 9562:2004	Water quality - Determination of adsorbable organically bound halogens (AOX)	halogenated organic (as AOX)
ISO 18073:2004	Water quality - Determination of tetra- to octa-chlorinated dioxins and furans - Method using isotope dilution HRGC/HRMS	PCDD + PCDF (dioxins + furans) (as Teq)
EN ISO 17993:2003	Water quality. Determination of 15 polycyclic aromatic hydrocarbons (PAH) in water by HPLC with fluorescence detection after liquid-liquid extraction	anthracene, naphthalene, polycyclic aromatic hydrocarbons (PAHs), flouranthene, benzo(g,h,i)perylene
EN ISO 11423-1:1997, EN ISO 11423-2:1997	Water quality -- Determination of benzene and some derivatives -- Part 1: Head-space gas chromatographic method, Water quality -- Determination of benzene and some derivatives -- Part 2: Method using extraction and gas chromatography	benzene
ISO 22032	Water quality -- Determination of selected polybrominated diphenyl ethers in sediment and sewage sludge -- Method using extraction and gas chromatography/mass spectrometry	brominated diphenylethers (PBDE)
EN ISO 17353:2005	Quality. Determination of selected organotin. Gas chromatographic method	organotin (as total Sn), tributyltin & triphenyltin &
EN ISO 18856:2005	Water quality. Determination of selected phthalates using gas chromatography/mass spectrometry	di-(2-ethyl hexyl) phthalate (DEHP)
ISO 18857-1:2005	Water quality -- Determination of selected alkylphenols -- Part 1: Method for non-filtered samples using liquid-liquid extraction and gas chromatography with mass selective detection	phenols (as total C)
ISO 7981-1:2005, ISO 7981-2:2005	Water quality -- Determination of polycyclic aromatic hydrocarbons (PAH) -- Part 1: Determination of six PAH by high-performance thin-layer chromatography with fluorescence detection after liquid-liquid extraction, Water quality -- Determination of polycyclic aromatic hydrocarbons (PAH) -- Part 2: Determination of six PAH by high-performance liquid chromatography with fluorescence detection after liquid-liquid extraction	polycyclic aromatic hydrocarbons (PAHs)
EN 1484:1997	Water analysis. Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)	total organic carbon (TOC) (as total C or COD/3)
EN ISO 10304-1:1995, EN ISO 10304-2:1996, EN ISO 10304-4:1999	Water quality. Determination of dissolved anions by liquid chromatography of ions. Determination of fluoride, chloride, nitrite, orthophosphate, bromide, nitrate and sulphate ions. Method for water with low contamination, EN ISO 10304-2:1996 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 2: Determination of bromide, chloride, nitrate, nitrite, phosphate (ortho), and sulphate in waste water (ISO 10304-2:1995), Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 4: Determination of chlorate, chloride and chlorite in water with low contamination (ISO 10304-4:1997)	chlorides (as total Cl), fluorides (as total F)
WATER		

Standard	Title	Pollutants covered
EN ISO 15682:2001	Water quality. Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection	chlorides (as total Cl)
EN ISO 14403:2002	Water quality -- Determination of total cyanide and free cyanide by continuous flow analysis	cyanides (as total CN)
<b>AIR &amp; WATER</b>		
standard	title	pollutants covered
EN ISO 5667-1:1996, EN ISO 5667-10:1992, EN ISO 5667-3:1994	water sampling Part 1 (guidance on the design of sampling programmes) part 10 (guidance on sampling waste water), part 3 (guidance on the preservation & handling of samples)	
CEN/ISO TR 13530:1998	guide to analytical quality control for water analysis	
CEN/TS 14793	stationary source emission - intralaboratory validation procedure for an alternative method compared to a reference method	
EN ISO 17025:2005	general requirements for competence of testing & calibration laboratories	
CEN TS 13005:2000	GUM = guide to the expression of uncertainty (1995) published by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML	

## APPENDIX 2: Common conversion calculations and examples

### 1. Convert Gas Quantities

To convert normalised gas quantities from m<sup>3</sup>/year to kg/year, the **gas density** has to be multiplied by the **volume**. Each gas has a different density, which is specified on the MSDS sheets or other manufacturers information.

#### Convert Gas Quantities

$$\begin{array}{lcl} \text{m}^3/\text{year to kg/ year} & = & \text{m}^3/\text{year} \times \text{gas density} = \text{kg/ year} \\ \text{e.g. methane density} = 0.68 & & 3,000\text{m}^3/\text{year} \times 0.68 = 2,040 \text{ kg/ year methane} \end{array}$$

### 2. Calculate Mass flow

To convert a normalised gas or liquid spot sample results in **mg/m<sup>3</sup>** to the required Annual Mass Flow in **kg / year**, the concentration in **mg/m<sup>3</sup>** has to be multiplied by a flow rate in **m<sup>3</sup>/hr**

#### Calculate Mass flow

$$\begin{array}{l} \frac{\text{Conc} \times \text{hourly rate}}{1,000,000} = \text{mass flow kg/hr} \times 8760 \text{ (hrs per year)} = \text{mass flow kg/yr} \\ \\ \text{e.g. } \frac{150 \text{ mg/m}^3 \times 4000 \text{ m}^3/\text{hr}}{1,000,000} = 0.6 \text{ kg/hr} \times 8760 = 5,256 \text{ kg/yr} \end{array}$$

### 3. Calculate Mass flow

In order to convert a liquid spot sample result (mg/litre) to the required Annual Mass Flow in **kg per year** the concentration in **mg/litre** has to be multiplied by a volume in litres/day

#### Calculate Mass flow

$$\begin{array}{l} \frac{\text{Conc} \times \text{litres/day}}{1,000,000} = \text{mass flow kg/day} \times 365 \text{ (days per year)} = \text{mass flow kg/yr} \\ \\ \text{e.g. } \frac{20 \text{ mg/litres} \times 5000 \text{ litres/day}}{1,000,000} = 0.1 \text{ kg/day} \times 365 = 36.5\text{kg/yr.} \end{array}$$

## CONVERSION AND DATA INPUT EXERCISES

### Releases to air:

Carbon dioxide – total:  $17,000 \text{ m}^3/\text{year}$  ( $17,000 \times 1.97\text{-gas density}$ ) = **33490.00 kg/year**

Emission point 1:  $8,360 \text{ m}^3/\text{year}$  (16,469.20 kg/year)

Emission point 2:  $5,641 \text{ m}^3/\text{year}$  ( 11,112.77kg/year)

Emission point 3:  $2,999 \text{ m}^3/\text{year}$  ( 5908.03 kg/year)

Methane – total:  $17,000 \text{ m}^3/\text{year}$  ( $17,000 \times 0.68\text{-gas density}$ )= **11560.00 kg/year**

.

### Releases to water:

Cadmium – 8.5 litres/year (= 8.5kg/year)

Lead – 0.57 kg/year

BOD – 7,000 kg/year (find under Section C Licensed Emissions, not PRTR relevance)

### Offsite transfer of pollutants (in wastewater):

Zinc– 2.0 litres/year (=2.0 kg/year)

Total organic carbon – 536,000 litres/year (536,000kg/year)

### Releases to water:

**COD** - emission point 2 - **78,980 kg/year** find these under Section C  
Licensed Emissions, not PRTR relevance

But also calculate **TOC** ( $\text{COD}/3 = \text{TOC}$ ) = **26,326kg/year** under Section A, PRTR

### Background load of cooling water:

total nitrogen – in:  $37,560 \text{ mg}/\text{m}^3$   
Out:  $96,430 \text{ mg}/\text{m}^3$   
Difference:  **$58,870 \text{ mg}/\text{m}^3$**

Flow rate =  $200 \text{ m}^3/\text{hour}$

**Conc x hourly rate** = mass flow kg/hr x 8760 (hrs per year) = mass flow kg/yr  
**1,000,000**

Multiply  **$58,870 \text{ mg}/\text{m}^3$**  by  $200 \text{ m}^3/\text{hour}$  divide by 1,000,000 =

$11.7 \text{ kg}/\text{hour} \times 8760 \text{ hours of discharge} = \mathbf{102,492 \text{ kg/year}}$