

Pollution Inventory reporting



Environmental Permitting (England and Wales) Regulations 2010
Regulation 60(1)

December 2010. V3

Landfill guidance note

Introduction

You will have received a Regulation 60 Notice and Schedule under the Environmental Permitting Regulations (EPR) requiring you to report your annual releases of certain substances to air, controlled waters and land, and off-site transfers in wastewater and of waste. It should be used in conjunction with the Pollution Inventory (PI) General Guidance to ensure that you meet the reporting requirements of the European Pollutant Release and Transfer Register (E-PRTR) Regulation. The reporting form includes questions on resource efficiency – this is voluntary for the landfill sector and so operators can submit their return without filling this section in.

See the web links below for further information on the background to the PI and E-PRTR, and other guidance notes.

This guidance and associated reporting tools should only be used where site-specific data is not available. In general, the assumptions made in this guidance mean that it is of most relevance to sites with leachate and gas management systems in place. The research underpinning this guidance is available in reports from the Environment Agency dissemination centre at <http://publications.environment-agency.gov.uk/epages/eapublications.storefront> (references 2,3,4,5,6).

You need to complete this form to tell us what your emissions to the environment are for January to December 2010 by 28 February 2011.

Pollution Inventory Guidance: www.environment-agency.gov.uk/pi
E-PRTR: http://ec.europa.eu/environment/air/pollutants/stationary/eper/pdf/en_prtr.pdf

General reporting requirements

You are required to report the total quantity released annually of each substance on the PI Schedule where it exceeds a substance-specific reporting threshold. The current reporting thresholds can be found in the latest PI Schedule and form. For each substance you must report the releases in one of the following ways:

- **n/a (not applicable)**
Where no release of the substance occurs.
- **brt (below reporting threshold)**
Where the release has been determined and is below the specified annual reporting threshold.
- **Release**
The mass of substance released annually, where this exceeds the reporting threshold.

You should use the most accurate methods available to you without requiring additional monitoring, whether this is based on measurement (M), calculation (C) or estimation (E). If the reporting tools described in this guidance are used, the numbers generated should be described as deriving from calculation (C) and the detailed method is OTH (other calculation method). Numbers should be reported to three significant figures regardless of how they are derived.

Reporting releases to controlled waters and transfers in leachate

For the purposes of PI reporting the term leachate refers to all contaminated water releases from a landfill reaching controlled waters (surface and groundwater), and/or being transferred off-site for treatment at a wastewater plant. For each PI substance you should sum all leachate releases to controlled waters and compare this figure with the relevant reporting threshold. If the threshold is exceeded then releases to controlled waters should be reported in the relevant section of the PI electronic or paper reporting form. Quantities of leachate transferred off-site should be compared to the reporting threshold, then reported in the same way as for controlled waters. If the reporting threshold is not exceeded for releases or transfers, they are reported as “brt” or “n/a” as appropriate.

Where site-specific data is unavailable for PI substances, you may use the Excel spreadsheet tool associated with this guidance or the look-up Tables below to provide an estimate of releases and transfers. **In addition to the substances listed in this guidance we anticipate that site-specific data should be available for ‘TOC’ and ‘nitrogen’ and would expect such data to be used to generate figures for the PI return. Also, releases of the following substances need to be reported where relevant but have not yet been assessed for inclusion in this document and the associated Excel spreadsheet tool:**

Asbestos	Hexabromobiphenyl
Alachlor	Isodrin
Anthracene	Lindane
Azamethiphos	Mirex
Benzo(g,h,i)perylene	Pentachlorobenzene
4-t-Butyltoluene	Perfluoro octanyl sulphate (PFOS)
Chlordane	Polychlorinated dibenzodioxins and dibenzofurans (PCDDs/PCDFs) - as WHO- and I-TEQ
Chlordecone	Polycyclic aromatic hydrocarbons (PAHs)
Chlorfenvinphos	Teflubenzuron
Clotrimazole	Tetrachloroethylene (PER)
Dibutylphthalate	Toxaphene
Dodecylphenol	Trichloroethylene
Emamectin benzoate	Triclosan
Ethylene oxide [1,2-Epoxyethane]	Triphenyltin and compounds – as TPT
Fluoranthene	Vinyl chloride
Heptachlor	

The Excel spreadsheet tool is downloadable from the PI website at <http://www.environment-agency.gov.uk/pi> (follow the links to ‘Pollution Inventory reporting’ then ‘Sector-specific guidance’ and then ‘Landfill’). In the spreadsheet enter the four site variables in the blue boxes and report the figures calculated in the green boxes.

If you prefer not to use the Excel tool the same results can be derived using the look-up Tables 1-3 below. This technique consists of two steps: Step 1 should be carried out separately for releases to controlled waters and transfers in leachate.

This guidance allows calculation of releases for 25 substances from the full PI water list that are most likely to be present in significant quantities in leachate (excluding TOC and nitrogen – see above). This assumption is based on sampling carried out by Robinson and Knox (references 2, 5, 6).

Releases to groundwater are assumed to be negligible compared to the reporting thresholds based on research carried out by Hall, Plimmer and Kemp (reference 3). In some circumstances, such as an unlined landfill with no leachate management system, this assumption may be unrealistic. In such cases you should estimate any groundwater releases as part of controlled waters reporting.

Using the look-up tables:

STEP 1. Selecting substances that exceed the reporting threshold

For this step it is necessary to know:

- the volume of leachate released to controlled water and/or transferred, in m³, during the year in question
- the type of release or transfer (raw leachate or leachate subjected to one of four pre-treatment categories defined below)
- the biochemical status of the leachate (acetogenic or methanogenic as defined below)

Select the appropriate column in Table 1, for the type of release or transfer.

For each substance, determine separately whether the annual volumetric release and/or transfer equals or exceeds the stated annual threshold. For these substances the annual release and/or transfer must be estimated and reported (see Step 2). For substances where it is less than the threshold value in Table 1, the release and/or transfer should be reported as below reporting threshold (brt), or n/a where there is no release or transfer. **If the annual volume of leachate released to controlled waters from your site is greater than zero but less than 90,900 m³, all 25 substances listed in Table 1 should all be reported as 'brt' for releases to controlled waters. The same applies for the reporting of off-site transfers in wastewater (leachate).**

Table 1. Annual leachate volumes (in cubic metres) below which reporting of named substances should not be necessary (i.e. reported as 'brt').

	R	T1	T2	T3	T4
Acetogenic leachates					
Nickel-acetogenic	117,000	117,000	117,000	146,200	146,200
Zinc-acetogenic	150,000	150,000	1,500,000	500,000	500,000
Methanogenic leachates					
Nickel-methanogenic	360,000	360,000	360,000	450,000	450,000
Zinc-methanogenic	1,000,000	1,000,000	10,000,000	3,333,300	3,333,300
All leachates					
Aniline	1,000,000	1,000,000	1,000,000	5,000,000	10,000,000
MTBE	1,000,000	1,000,000	1,000,000	10,000,000	10,000,000
Cyanides	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
DEHP	100,000	100,000	100,000	1,000,000	2,000,000
Fluorides	3,100,000	3,100,000	3,100,000	3,100,000	3,100,000
Halogenated organics (AOX)	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000
MCPA	10,000,000	10,000,000	10,000,000	200,000,000	200,000,000
Organotin compounds	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000
Phenols	670,000	670,000	670,000	6,700,000	6,700,000
PAHs	190,000	190,000	190,000	380,000	380,000
Nonylphenols	1,000,000	1,000,000	1,000,000	20,000,000	20,000,000
Arsenic	625,000	781,300	1,250,000	2,083,300	2,083,300
Chlorides	1,746,700	1,746,700	1,746,700	1,746,700	1,746,700
Chromium	400,000	400,000	400,000	571,400	571,400
Copper	1,800,000	2,000,000	2,250,000	3,600,000	3,600,000
Ethyl benzene	1,000,000	1,666,666	1,000,000	5,000,000	5,000,000
Lead	400,000	400,000	400,000	400,000	400,000
Mecoprop	90,900	90,900	181,800	9,090,900	18,181,800
Naphthalene	2,170,000	4,340,000	2,170,000	43,400,000	43,400,000

Pentachlorophenol	500,000	500,000	500,000	1,000,000	1,250,000
Phosphorus	1,666,666	1,666,666	1,666,666	Use site data	Use site data
Toluene	470,000	626,700	470,000	2,350,000	2,350,000
Xylenes	280,000	466,700	280,000	700,000	1,120,000

Notes on the use of Table 1 (also applicable to Tables 2 and 3):

Type of release

- R** = raw leachate, i.e. not treated by any of the categories T1 to T4;
- T1** = methane stripping by aeration for at least 30 minutes;
- T2** = treatment in a reed bed system;
- T3** = single stage aerobic biological treatment;
- T4** = T3 plus polishing (e.g. wetland, ozone, activated carbon, reverse osmosis, irrigation)

Biochemical status: **acetogenic (a):** if any of the following leachate conditions apply:

BOD/COD > 0.4
COD > 5 000 mg/l
pH < 6.5

methanogenic (m): if none of the above applies

For information only, Table 2 shows the threshold volumes in the form of daily average flow rates (m³/d).

Table 2. Mean daily leachate volumes (in cubic metres) equivalent to the threshold volumes given in Table 1.

	R	T1	T2	T3	T4
Acetogenic leachates					
Nickel-acetogenic	321	321	321	401	401
Zinc-acetogenic	410	410	4110	1370	1370
Methanogenic leachates					
Nickel-methanogenic	986	986	986	1,233	1,233
Zinc-methanogenic	2740	2740	27395	9130	9130
All leachates					
Aniline	2740	2740	2740	13700	13700
MTBE	2740	2740	2740	27400	27400
Cyanides	2740	2740	2740	2740	2740
DEHP	274	274	274	2740	5480
Fluorides	8490	8490	8490	8490	8490
Halogenated organics (AOX)	15340	15340	15340	15340	15340
MCPA	27400	27400	27400	547,900	547,900
Organotin compounds	68,500	68,500	68,500	68,500	68,500
Phenols	1835	1835	1835	18350	18350
PAHs	520	520	520	1040	1040
Nonylphenols	2740	2740	2740	54,800	54,800
Arsenic	1713	2,140	3,425	5,708	5,708
Chlorides	4785	4785	4785	4785	4785
Chromium	1,096	1,096	1,096	1,566	1,566
Copper	4,932	5,479	6,164	9,863	9,863
Ethyl benzene	2740	4566	2740	13700	13700
Lead	1,096	1,096	1,096	1,096	1,096

Mecoprop	249	249	498	24,907	49,813
Naphthalene	5,945	11,890	5,945	118,904	118,904
Pentachlorophenol	1,370	1,370	1,370	2,740	3,425
Phosphorus	4566	4566	4566	Use site data	Use site data
Toluene	1290	1720	1290	6440	6440
Xylenes	770	1280	770	1920	3070

STEP 2. Calculate annual releases of reportable substances from default database

For each substance identified in Step 1 as greater than threshold level, read across Table 3 for the default concentration for the type of release or transfer.

Multiply the default concentration (in mg/m³) by the annual release or transfer in cubic metres, and divide by one thousand.

Enter the resulting value, which is in grammes per year, in the appropriate box of the reporting form.

If there are releases or transfers following different levels of treatment, the Tables should be used to calculate the mass release in each case and then the total release or transfer should be reported.

Table 3. Default concentrations of reportable substances (in mg/m³)

	R	T1	T2	T3	T4
For acetogenic leachates:					
Nickel-acetogenic	170	170	170	136	136
Zinc-acetogenic	660	660	66	198	198
For methanogenic leachates:					
Nickel-methanogenic	55	55	55	44	44
Zinc-methanogenic	99	99	9.9	29.7	29.7
For all leachates:					
Aniline	1	1	1	0.2	0.1
MTBE	1	1	1	0.1	0.1
Cyanides	50	50	50	50	50
DEHP	1	1	1	0.1	0.05
Fluorides	650	650	650	650	650
Halogenated organics (AOX)	177	177	177	177	177
MCPA	0.1	0.1	0.1	0.005	0.005
Organotin compounds	0.2	0.2	0.2	0.2	0.2
Phenols	30	30	30	0.3	0.3
PAHs	5.25	5.25	5.25	2.625	2.625
Nonylphenols	1	1	1	0.05	0.05
Arsenic	8	6.4	4	2.4	2.4
Chlorides	1,145,000	1,145,000	1,145,000	1,145,000	1,145,000
Chromium	50	50	50	35	35
Copper	11	9.9	8.8	5.5	5.5
Ethyl benzene	10	6	10	2	2
Lead	50	50	50	50	50
Mecoprop	11	11	5.5	0.11	0.055

Naphthalene	0.46	0.23	0.46	0.023	0.023
Pentachlorophenol	0.1	0.1	0.1	0.05	0.04
Phosphorus	3000	3000	3000	Use site data	Use site data
Toluene	21	15.75	21	4.2	4.2
Xylenes	35	21	35	14	8.75

Reporting landfill gas releases

We need to ensure that methane emissions from landfills are properly managed to minimise impact on climate change. We therefore need a more accurate measure or prediction of methane generated at your site. Previously we have recommended a computer model called GasSimLite be used to predict annual mass releases of PI substances to air from landfills. For PI data for 2010 onwards you must use GasSim II where site-specific gas release data are unavailable. The resulting annual mass releases can be used to complete the air releases section of the PI reporting form. Copies of the model are available from the GasSim website <http://www.gassim.co.uk>.

References

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- (2) Environment Agency Technical Report P1-496/TR
Pollution Inventory discharges to sewer or surface waters from landfill leachates. Knox K. and Robinson H.D, 2001
- (3) Environment Agency Technical Report P1-497/TR
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- (4) Environment Agency Technical Report P1-295/TR
Development of the health and environmental risks from landfill gas framework
Golder Associates, 2002
- (5) Robinson, H.D
A review of the composition of leachates from domestic wastes in landfill sites. Report No. CWM 072/95, published by the Waste Technical Division of the Environment Agency, in the series 'The technical aspects of controlled waste management', 500pp, August 1996, available priced £75 from Environment Agency Dissemination Centre, c/o WRc plc, tel 01793 511711, or by email from publications@wrcplc.co.uk.
- (6) Environment Agency Technical Report P1-496/TR(2)
Updating the landfill leachate Pollution Inventory reporting tool. Knox K. and Robinson H.D., 2003