

OSPAR Guidelines for Harmonised Quantification and Reporting Procedures for Nutrients (HARP-NUT)

# Guideline 3: Quantification and reporting of nitrogen and phosphorus discharges from industrial plants

(OSPAR Agreement: 2004-2c)[[1]](#footnote-1)

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# 1. Objectives

1.1 To describe procedures for the quantification and reporting of nitrogen (N) and phosphorus (P) discharges from industrial plants not connected to urban wastewater treatment plants. This guideline should enable the comparison of nitrogen and phosphorus data across industrial sectors and facilitate national assessments of measures implemented, i.e. those not covered in Guideline 4.

1.2 To list the type of data to be reported in addition to annual figures on discharges of N and P and hazardous substances from industrial plants;

1.3 To simplify reporting and reduce unnecessary administrative burden, OSPAR should identify methods to streamline the way in which data are made available pursuant to this guideline-3 with other reporting obligations in particular those concerning EU Member States.

# 2. Introduction

**2.1. General**

2.1.1 This guideline concerns industrial plants with direct discharges of N and P from production water into surface waters. The procedures for the quantification of discharges from industrial plants connected to municipal sewerage systems are described in Guideline 4 (Sewer systems). However, the recommended procedures are also relevant for quantifying the industrial portion of the N and P loads in municipal wastewater.

2.1.2 Integrated prevention and control of pollution arising from industrial activities includes rules to reduce emissions into air, water and land and to prevent the generation of waste fall under the scope of the EU Directive on industrial emissions IED[[2]](#footnote-2). Industrial plants (industrial point sources) are identified by activities and allocated to industrial sectors. Experts are recommended to extract data from their national Registers or from the EU at [http://prtr.ec.europa.eu](http://prtr.ec.europa.eu/) and insert them into the RID templates where appropriate. Note, that some of the industrial effluents are not covered by E-PRTR[[3]](#footnote-3) reporting.

2.1.3 In cases where an industrial plant belongs to more than one identified industrial sector and that it is impossible to apportion the N and P discharge/emission of that plant to the various sectors, the total nitrogen and phosphorus discharge/emission of the plant should be related to the main industrial sector to which the plant belongs.

2.1.4 Non-EU Member States may apply other rules for identifying industrial plants. The ultimate aim is to provide complete, comparable and transparent figures for inclusion into RID reports and the OSPAR database.

**2.2. Sampling strategy**

2.2.1 It is expected that all industrial facilities have an adequate monitoring programme. The ultimate aim is that the catchment/national figures should provide comparable and transparent figures, and that the reported figures are as complete as possible.

2.2.2 The sampling strategy should be for each plant and sector sufficient to ensure a reliable quantification of total nitrogen and phosphorus discharges. Where the production and/or wastewater discharges vary significantly over the year, the sampling frequency and methods of assessment should be adjusted accordingly. Where the nutrient concentrations/discharges are relatively stable over the year, less frequent monitoring may be adopted.

2.2.3 All industrial plants discharging more than 10 tonnes of nitrogen and/or more than 2 tonnes of phosphorus per year should, ideally, take 12 samples a year for measurements of nitrogen and phosphorus concentration (cf. section 2.3.1).

2.2.4 For industrial plants, discharging less than the limits mentioned in section 2.2.3, relevant standard discharge coefficients should be used in cases where no monitoring data is available. The determination of such coefficients should be based on experience with discharges from comparable larger plants ideally in the same industrial sector, that have monitoring programmes, taking account of differences in the degree of internal treatment at the plants.

**2.3 Quantification methods**

2.3.1 Wherever possible, the annual discharges from industrial facilities should be calculated as the product of the total quantity of wastewater in a period multiplied with the corresponding flow-weighted concentrations in the period and summed up annually; the three ISO standard methods below are examples of such quantification procedures. The wastewater flow should be measured continuously to calculate the total quantity over a specified period (day, weekly, month and year).

2.3.2 For industrial plants discharging less than the given E-PRTR pollutant thresholds into waters, relevant standard discharge coefficients should be used in cases where no monitoring data is available. The determination of such coefficients should be based on experience with discharges from larger plants that have monitoring programmes, taking into account differences in the degree of internal treatment methods at the plants.

2.3.3 The three methods ISO standard method described below are examples of:

a. Continuous flow measurement and sampling (e.g. 24 hours flow-weighted composite samples seven times/week). The annual nutrient load is then the cumulative load of continuously monitored periods and can be calculated as follows:

  
Where:

L = annual load (kg a-1)

Qi = wastewater volume of period i (m3)

Ci = flow weighted concentration of period i (mg l-1)

n = number of sampling periods.

b. Continuous flow measurement and non-continuous sampling every second day, once a week or twice a month (preferably as 24 hours composites). The annual nitrogen and phosphorus load can then be calculated as follows:

  
Where:  
L = annual load (kg a-1)

Qi = wastewater volume of the period i (m3)

Ci = concentration of sample i (mg l-1)

Qt = total wastewater volume of the year (m3)

n = number of sampling periods.

c. Flow measurements only on sampling days and sampling rather seldom i.e. 1 – 12 times/year. In this case, the annual nitrogen and phosphorus load can be calculated by multiplying the average load of sampling days by 365.

  
Where:  
L = annual load (kg a-1)

Qi = wastewater volume on sampling day i (m3)

Ci = concentration of the period i (mg l-1)

n = number of sampling days.

# 3. Reporting

3.1 The minimum reporting requirements of E-PRTR should include plants/facilities, which have a significant impact on the environment. The significance is demonstrated by covering facilities that,

(1) undertake one of the activities listed in Annex I (Categories of activities referred to in Article 10 of the IED),

(2) and exceed the production capacity/output,

(3) and exceed the pollutant threshold values.

Plants/facilities that fulfil all these three criteria have to report data to the European Pollutant Release and Transfer Register (E-PRTR) available at <http://prtr.ec.europa.eu/>. The data reported to this Register could directly be used in RID reports without modification. For completeness and the assessments, any other plant with industrial effluents entering North Sea and North-East Atlantic and national catchment areas should be included in RID reporting.

3.2 All industrial sources of pollution registered in the E-PRTR and discharging to North-East-Atlantic assessment areas are to be considered in RID reports. For completeness and for the RID assessments, any other plant with industrial effluents entering the North-East Atlantic and national catchment areas should be included in RID reporting.

3.3 The E-PRTR also holds data from wastewater treatment plants (WWTP) by location without differentiating between monitored and unmonitored areas. Recently, the register separates industrial wastewater dischargers from municipal WWTPs reported in the frame of the EU Directive[[4]](#footnote-4). While the latter plants have a clear reference to river basin districts (according to the European Water Framework Directive[[5]](#footnote-5)), industrial wastewater dischargers still require an allocation to national discharge areas and related OSPAR assessment areas.

3.4 Sources of industrial pollution fall in one of the nine activity sectors (c.f. categories of activities to be referred to in Article 10 of IED) specified for in the E-PRTR as follows:

|  |  |  |
| --- | --- | --- |
| 1. Energy 2. Production and processing of metals 3. Mineral industry 4. Chemical industry 5. Waste and waste water management 6. Paper and wood production and processing 7. Intensive livestock production and aquaculture 8. Animal and vegetable products from the food and beverage sector 9. Other activities |  | 6,7 and 8 make up IED category 6 |

3.4 Activities, especially within sectors 5, 6, 7 and 8, generate a vast amount of releases to water bodies. Experts may extract data registered in their national PRTR and insert them into the RID template. Due to specific definitions, some of the industrial plants and related effluents are not regularly included in PRTRs.

3.5 The RID assessment requires reporting of all industrial effluents, which enter the North-East Atlantic directly and via discharge areas relating to the assessment areas.

3.6 RID and E-PRTR cover similar determinants/substances (see Table 1).

**Table 1: Correspondence between RID determinants (non-exhausting) and thresholds to water in E-PRTR reporting**

|  |  |  |
| --- | --- | --- |
| **RID Determinants** | **E-PRTR Substances** | **E-PRTR pollutant threshold\*) for releases to water [kg/a]** |
| Total N | Total nitrogen | 50.000 |
| Total P | Total phosphorus | 5.000 |
| Total Cadmium | Cadmium and compounds (as Cd) | 5 |
| Total Mercury | Mercury and compounds (as Hg) | 1 |
| Total Copper | Copper and compounds (as Cu) | 50 |
| Total Lead | Lead and compounds (as Pb) | 20 |
| Total Zinc | Zinc and compounds (as Zn) | 100 |
| PCB | Polychlorinated biphenyls (PCBs) | 0,1 |
| HCH | 1,2,3,4,5,6-  hexachlorocyclohexane(HCH) | 1 |

\*) The threshold values generally refer to production capacities or outputs.

# 4. HARP reporting format (Guideline 3)

RID template (table 5b) shall include the industrial effluents for each discharging area. Table 2 below illustrates the principle for summing up of discharges extracted from E-PRTR activity sectors.

**Table 2: Principle for summing up discharges by activity sectors**

| **Discharge area** | **E-PRTR activity sector** | **Tot N**  **tonnes/year**  **± %** | | | **Tot P**  **tonnes/year**  **± %** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID and name** |  | Mon | Unmonitored | Direct | Mon | Unmonitored | Direct |
| **ID xxx** | 1. Energy  2. Production and processing of metals  3. Mineral industry  4. Chemical industry  5. Waste and waste water management  6. Paper and wood production and processing  7. Intensive livestock production and aquaculture  8. Animal and vegetable products from the food and beverage sector  9. Other activities |  |  |  |  |  |  |
| **Sum discharge areas** | All categories |  |  |  |  |  |  |

# 5. References

EC, 1991. EEC Council Directive of 21 May 1991 concerning Urban Wastewater Treatment (91/271/EEC, Waste Water Directive).

EC, 1996. Council Directive of 24 September 1996 concerning Integrated Pollution Prevention and Control (Directive 96/61/EC; IPPC Directive).

EC, 2000, Commission Decision of 17 July 2000 (2000/479/EC) on the Implementation of an European Pollutant Emission Register (EPER) according to Article 15 of Council Directive 96/61/EC concerning Integrated Pollution Prevention Control.

Regulation (EC) No 166/2006 of the European Parliament and of the Council concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC”1 (the ‘E-PRTR Regulation’) was adopted on 18th January 2006.

IED = EU Directive 2010/75/EU on industrial emissions. The IED was a recast of seven existing Directives related to industrial emissions into a single clear and coherent legislative instrument. The recast included in particular the IPPC Directive.

OSPAR, 1996. Principles of OSPAR’s Comprehensive Study on Riverine Inputs and Direct Discharges (RID).

HELCOM (2015), HELCOM Guidelines for the annual and periodical compilation and reporting of waterborne pollution inputs to the Baltic Sea (PLC-Water) <http://helcom.fi/Lists/Publications/PLC-Water%20Guidelines.pdf>

1. Revised in 2018 [↑](#footnote-ref-1)
2. IED = EU Directive 2010/75/EU on industrial emissions. The IED was a recast of seven existing Directives related to industrial emissions into a single clear and coherent legislative instrument. The recast included in particular the IPPC Directive. [↑](#footnote-ref-2)
3. E-PRTR = The European Pollutant Release and Transfer Register (E-PRTR) is the Europe-wide register that provides easily accessible key environmental data from industrial facilities in European Union Member States and in Iceland, Liechtenstein, Norway, Serbia and Switzerland. It replaced and improved upon the previous European Pollutant Emission Register (EPER). [↑](#footnote-ref-3)
4. European Directive 91/271/EEC concerning the urban waste water treatment [↑](#footnote-ref-4)
5. Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy [↑](#footnote-ref-5)