PLASTICS EUROPE
Enabling a sustainable future

Guidelines to estimate pellet loss for reporting under the REACH restriction on intentionally added microplastics

December 2025

Introduction

On 17 October 2023, the REACH Restriction on Intentionally Added Microplastics (Commission Regulation (EU) 2023/2055) entered into force. This legislation requires manufacturers and industrial downstream users of synthetic polymer microparticles (SPMs) to communicate within the supply chain and report their estimated quantity of SPMs released into the environment each year. This includes plastic pellets, flakes, and powders used as feedstock in plastics manufacturing processes at industrial sites.

Synthetic Polymer Microparticles definition from Commission Regulation (EU) 2023/2055 of 25 September 2023[1]	
Synthetic polymer microparticles are polymers that are solid, and which fulfil both of the following conditions: **(a)** are contained in particles and constitute at least 1 % by weight of those particles; or build a continuous surface coating on particles; **(b)** at least 1 % by weight of the particles referred to in point (a) fulfil either of the following conditions: *(i) all dimensions of the particles are equal to or less than 5 mm;* *(ii) the length of the particles is equal to or less than 15 mm and their length to diameter ratio is greater than 3.*	The following polymers are excluded from this designation: **(a)** polymers that are the result of a polymerisation process that has taken place in nature, independently of the process through which they have been extracted, which are not chemically modified substances; **(b)** polymers that are degradable as proved in accordance with Appendix 15; **(c)** polymers that have a solubility greater than 2 g/L as proved in accordance with Appendix 16; **(d)** polymers that do not contain carbon atoms in their chemical structure.

The restriction requires the annual reporting of the following information:
(a) a description of the uses of synthetic polymer microparticles in the previous calendar year;
(b) generic information on the identity of the polymers used;
(c) an estimate of the quantity of SPMs released into the environment in the previous calendar year, which shall include transportation.

[1] https://eur-lex.europa.eu/eli/reg/2023/2055/oj

Regarding point (a) and (b) this information shall be disclosed using a set of picklists either predefined by ECHA in ECHA Guidance on Information Requirements and Chemical Safety Assessment, Chapter R.12 [2] or adopted by industry sectors, so that stakeholders can comply with their reporting obligations without disclosing confidential business information.

When reporting, companies have the option to do it under option A: Quantity of particles containing SPMs or option B: Quantity of SPMs.

- **Option A: Quantity of particles containing SPMs**

When selecting this option companies must report the total volume of the particles including SPMs and any other non-polymeric component of the particles (i.e. additives or fillers). To not greatly exaggerate the loss estimate it is required to provide the concentration range of SPMs in the formulation. For this a pick list is provided – 0.1 to 10%; 10-30%; 30-50%; 50-70%; 70-90% and 90-100%. *In case no concentration is provided a 100% concentration of SPMs in the total volume is considered.*

- **Option B: Quantity of SPMs**

This option requires companies to report only the volume concerning SPMs. This is that only the materials that fulfil the previously mentioned SPMs definition should be considered for this estimate, excluding any other components such as additives and fillers.

The reporting should be done in kilograms (when below 1 tonne) or tonnes when exceeding 1 tonne. As there is no lower limit for reporting, for every use subject to the reporting requirement there must be a reported estimate even if very low or zero.

This information shall be reported to the European Chemicals Agency (ECHA) by 31 May each year, starting from:

- 2026 for manufacturers and industrial downstream users handling pellets, flakes, and powders as feedstock in plastics manufacturing at industrial sites;
- 2027 for all other manufacturers and industrial downstream users using SPMs at industrial sites

This reporting shall be done through a dedicated, IUCLID-based online system which is hosted by ECHA, which is available in the following link: https://reach-it.echa.europa.eu/reach/
Further information on how to submit the report provided by ECHA is available here: Submitting a microplastics report - ECHA

[2] https://www.echa.europa.eu/documents/10162/17224/information_requirements_r12_en.pdf/ea8fa5a6-6ba1-47f4-9e47-c7216e180197

On the Explanatory Guide for the Regulation (EU) 2023/2055 released by the European Commission, it is stated that:

European Commission's Explanatory Guide on REACH restriction of synthetic polymer microparticles (Entry 78 of Annex XVII REACH, as introduced by Commission Regulation (EU) 2023/2055) - page 54[3]
"ECHA will not provide a methodology for estimating the releases. Given the very different products and uses concerned, it is considered more appropriate to leave the choice of the method to estimate emissions to the concerned industrial sectors, which are encouraged to develop sector-specific Environmental Release Factors (spERCs)."

As such, in the absence of a harmonised methodology prior to the reporting obligation deadline, Plastics Europe proposes the adoption of minimum reporting criteria and supporting guidelines for plastic pellet producers, converters, masterbatchers, and compounders. This approach aims to ensure consistency and comparability of data across the value chain by promoting aligned reporting practices and minimising potential data gaps or inconsistencies. **The following guidelines for estimating plastic pellet losses to aid reporting for companies is considered to be a bridge methodology/guidelines until a standardized harmonised methodology has been established as per the mandate under Article 13 of the Regulation 2025/2365 of the European Parliament and of the Council of 12 November 2025 on preventing plastic pellet losses to reduce microplastic pollution.**

This guideline offers companies a practical and harmonised approach to estimating losses of plastic pellets aiding compliance with the REACH restriction.

Estimation Guidelines

Under Commission Regulation (EU) 2023/2055, both manufacturers and industrial downstream users handling synthetic polymer microparticles (SPMs) are required to report estimated emissions to the environment. This includes not only emissions occurring at their own sites but also transport.

While transport and logistics providers (including on- and off-site storage) may be involved in handling the material, they do not meet the definition of "downstream users" under Article 3(13) of REACH (EC) No 1907/2006, as such, they are not subject to direct reporting obligations under the restriction. Transporters who do not process/repackage have no reporting duty, but may need to

[3] https://webgate.ec.europa.eu/circabc-ewpp/d/d/workspace/SpacesStore/a4b3c599-db77-4210-8ca1-430e88c59bb1/file.bin

share emission data with clients who are responsible for reporting. Instead, the responsibility for reporting pellet losses during transport lies with the party that is contractually liable for the material at the time the emission occurs. This is typically defined through contractual terms, such as Incoterms®.

Transport service providers that further process or re-package products are regarded as downstream users and have their own reporting obligations.

Toll manufacturers must report their own estimated SPM emissions to ECHA. They may delegate reporting via contractual agreement to a third party. If tollers formulate SPM-based products for a third party, they are Downstream Users and must report their own emissions or all downstream emissions if placing the product on the market for the first time for professionals/consumers.

For further information on understanding the reporting obligation during transport/storage and other activities, it is recommended to consult the European Commission's explanatory guide on REACH Restriction Intentionally added Microplastics.

Following Operation Clean Sweep® (OCS) programme and its guidelines, plastic pellet manufacturers and many plastics converters have been already implementing measures on their respective pellet handling sites/installations to combat pellet loss to the environment.

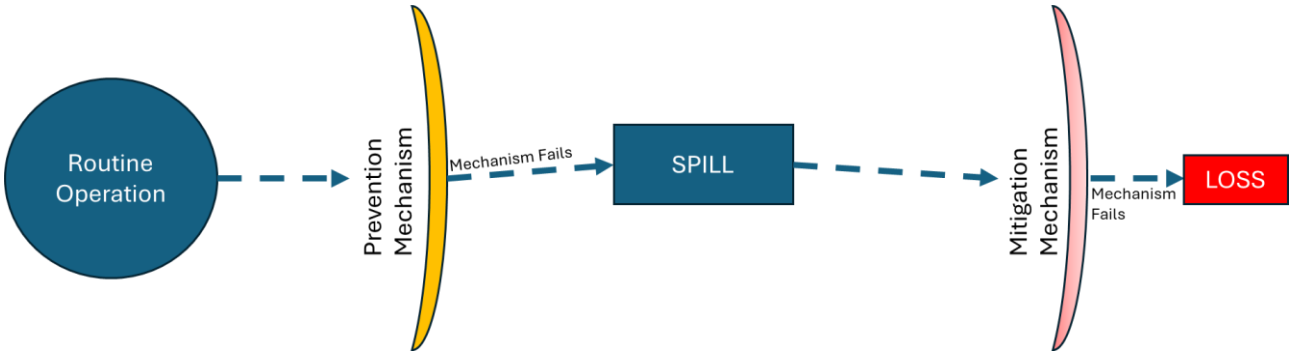

Figure 1. *Pellet prevention/mitigation mechanisms*

In pellet loss prevention, a range of barriers, procedures, and devices are typically employed to prevent or mitigate spills[4] which could lead to environmental losses[5]. A prevention mechanism[6] is typically placed to prevent any onsite spills from routine operations. If the prevention mechanism is

[4] Spill - One-off or prolonged release of pellets that when effectively contained do not result in a loss to the environment.

[5] Loss - One-off or prolonged release of pellets OUTSIDE the operating boundary into the environment (e.g. water, soil...) and which are not recovered

[6] Prevention Mechanism/Barrier - Either a physical barrier or a procedure that prevents a spill to occur.

compromised, then a mitigation mechanism [7]is used to contain the spill within the site to prevent the loss to the environment. If the Mitigation mechanism fails to contain spills or an unforeseen event resulting in an incident of release of pellets, then it's considered that the spill or volume is lost to the environment.

These mechanisms can include physical barriers such as filter baskets, as well as systems like water treatment plants, which often serve as mitigating barriers. An immediate cleanup procedure following a spill or an incident is also considered a mitigation mechanism

In order to comply with the reporting requirements, the **total annual estimated loss** from a pellet handling site can be computed based on two types of emissions: on-site losses and off-site losses as shown in the figure below. The losses can be to all environmental compartments i.e. Air, Water and Soil. The mitigation mechanism in place maybe used to stop losses to any of the respective compartments.

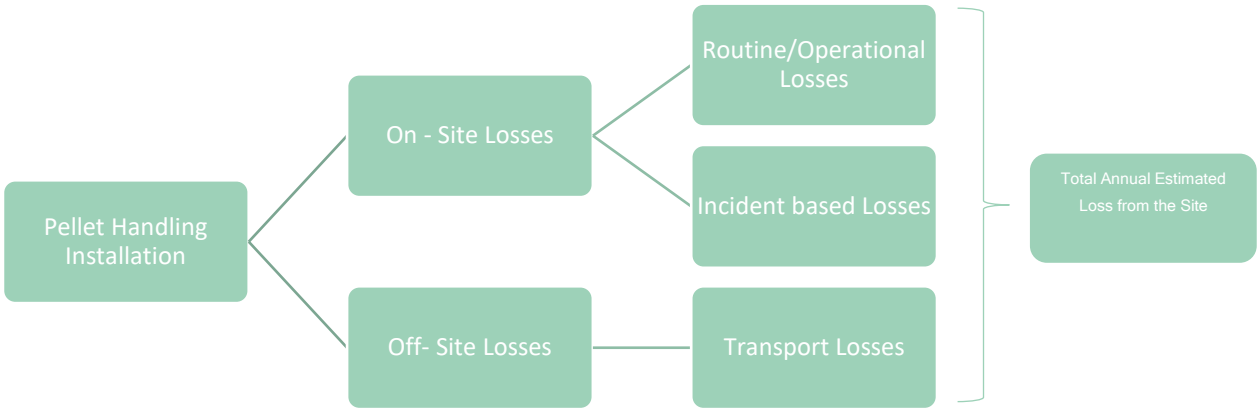

***Figure 2**. Pellet Loss Emission Types: On-site and Off-site.*

On - Site Losses

On site losses can be calculated based on two broad types:

1. **Losses from routine/normal operations**

These losses may result from spills occurring during the routine handling of pellets. Once a prevention barrier or mechanism is compromised, a spill can occur and may subsequently be contained by mitigating barriers. The extent of loss to the environment depends on the effectiveness of these mitigating barriers. Therefore, the volume of pellets collected at these

[7] Mitigation Mechanism/Barrier - Either a physical barrier or a procedure that prevents a spill to result in a loss to the environment.

mitigating barriers, when monitored on a regular basis, can be used to estimate potential losses, considering the efficiency of these mitigating barriers. The frequency of such monitoring should be determined by each installation, based on the type of barriers in place and the outcomes of their site-specific risk assessment. The resulting loss data generated can be extrapolated to annual estimates resulting from routine losses. To achieve these estimates, it is recommended in utilizing the Pellet Loss Evaluation Tool (Bow-tie model – Approach B on pellets collected at mitigating barriers), available at: https://ocscertification.eu/the-solution/toolbox

2. **Losses based on incidents reported on site**

In addition to monitoring mitigating barriers, reported incidents on site provide valuable data for estimating pellet losses. These incidents, arising from an unforeseen event such as an equipment malfunction, a major operational error, or an unpredictable external factor like heavy weather can result in an unexpected release of pellets or maybe a cause of a major spill on site. Potential losses associated with such events can be calculated based on the volume of pellets recovered and the effectiveness of the mitigating barriers or mechanisms in place at the time. If effective mitigating barriers captured a portion of the pellets, the volume recovered, adjusted for the efficiency of the barriers, can be used to estimate the environmental loss. However, in cases where no mitigating barrier was present or the system failed and no clean up has been performed, it may be assumed that the entire volume spilled or released was lost to the environment.
In this guidance the following equation is used to calculate the incident-based losses:

$$L = \frac{\left(R \times (1 - E)\right)}{E}$$

Where, L is the loss estimate in kilograms, R is the recovered amount of pellets in kilograms and E is the efficiency of the mitigating barrier in decimals (i.e 30% = 0.3).

Total estimated annual losses from the site (See Figure 3):

Total annual pellet losses from a site are the result of both routine handling activities and an unexpected incident. Losses during normal operations may occur due to minor spills, leaks, or handling inefficiencies, and can often be quantified through regular monitoring of containment points and analysis of recovered material. In parallel, losses from specific incidents such as an equipment failure, operational errors, or weather-related events, can be assessed based on reported data and estimated mitigating barrier efficiency at the time of the event. By combining both the sources of information, and accounting for the presence and effectiveness of mitigating barriers in each case, sites can develop a more comprehensive estimation of total losses to the environment from a site.

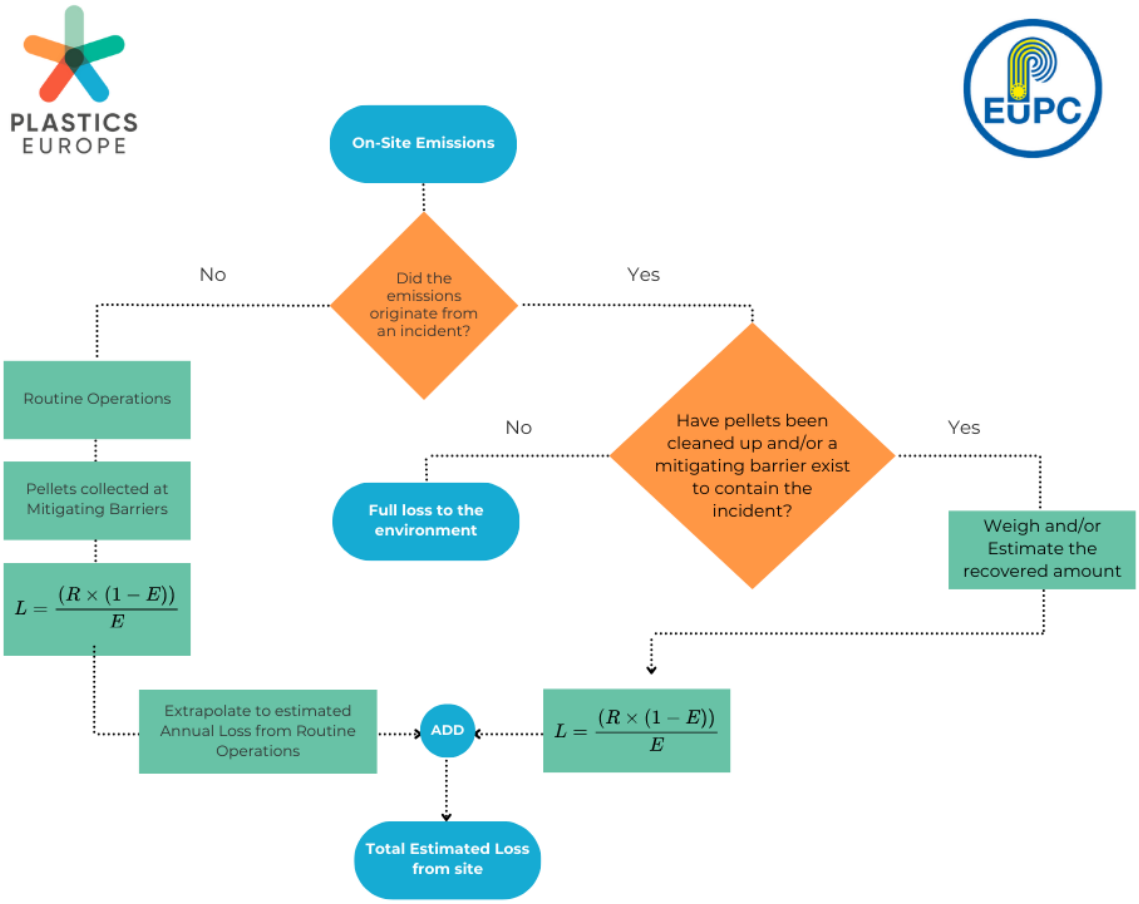

***Figure 3**. Flow Chart on On-site emissions.*

Off-site Losses

Under **Commission Regulation (EU) 2023/2055**, operators are required to include in their annual report an estimate of the quantity of synthetic polymer microparticles (SPMs) released to the environment during transportation. To achieve this, this guidance provides a step-by-step methodology, supported by a decision flowchart (Figure 4) and reference loss factors based on the transport context. These values are derived from best practices associated with the Safety and Quality Assessment System (SQAS), developed by cefic (see Table 1 below).

Estimation procedure for transport emissions:

1. **Define Transport Means**

Identify the type of transport being use (i.e. road, inland waterway, sea) and the Incoterms®

2. **Determine if an accident occurred**
    - **If No**: No losses to the environment are reported.
    - **If Yes**: Continue to Step 3.
3. **Was a Clean-up Performed?**
    - **If Yes**: Apply the appropriate SQAS loss percentages for the transport type/accident type to estimate the loss (described below).
    - **If No**: Assume the entire spilled quantity is lost to the environment.
4. **Report the estimated loss**

The estimated unrecovered loss must be included in your annual REACH report and, where applicable, communicated to the contracting party (customer).

As previously mentioned, the party responsible for reporting transport-related losses is determined by contractual agreement (e.g. Incoterms®) and as mentioned in the explanatory guide of the European Commission.

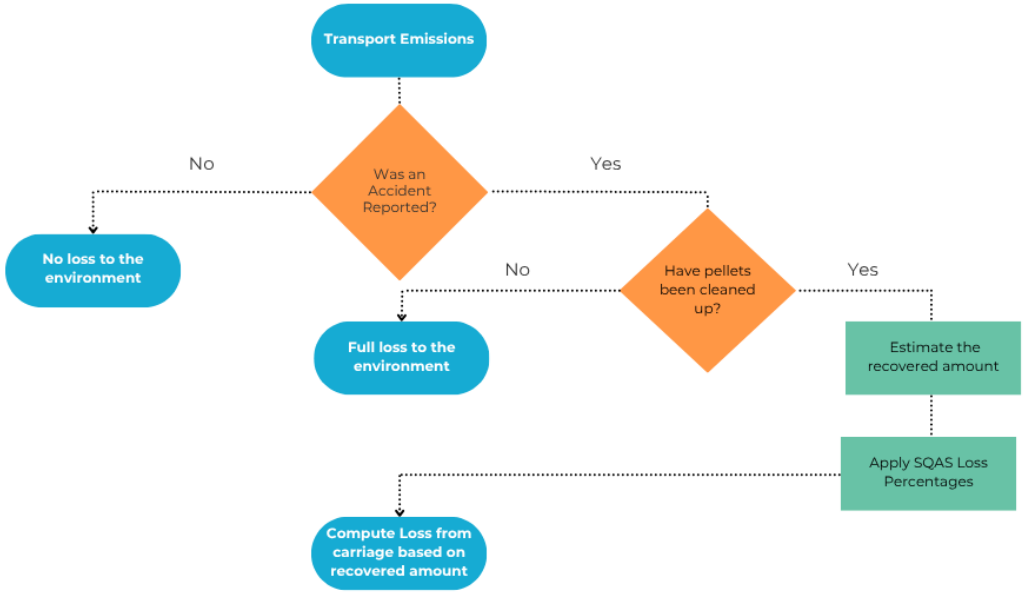

***Figure 4**. Flow Chart on transport-based emissions*

Use of SQAS loss factors in estimating pellet losses

To help companies estimate pellet losses during transport and handling, the Safety and Quality Assessment System (SQAS), developed by cefic, recommends applying standard loss percentages based on the location and circumstances of the spill. These reference values reflect both industry best practices and empirical data and can be applied as multipliers to the estimated volume of spilled material to calculate the portion considered lost to the environment, and therefore subject to reporting under the REACH restriction

Table 1. SQAS Loss percentages

Spill Location	**Estimated Loss to Environment**
At sea	100%
In inland waterways	25%
In warehouse parking (paved or concrete)*	0.05%
Inside a covered warehouse	0.005%
Roadside accident (on soft soil: sand, field, gravel)	0.5%
Roadside accident (on asphalt or concrete pavement)	0.05%
Pellets recovered from sewer sieves	0.005%

**Since warehouse itself is a site/installation, either SQAS guidelines can be used and/or the above on site loss estimation guidelines can be used given there are mitigating barriers used at warehouses where pellets are handled*

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