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Preventing plastic pollution from pellet loss

**Taking a supply chain approach
to reduce pollution and waste**

**Prepared by Zero Waste Scotland and published
by the Scottish Government on behalf of the
Pellet Loss Steering Group**



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(This report has been prepared by Sarah Archer, Zero Waste Scotland on behalf of the Pellet Loss Steering Group)

1 Introduction

The Scottish Government is committed to implementing a suite of measures to reduce plastic pollution from a range of sources. To understand how best to do this the Scottish Government set up the Plastic Pellet Loss Steering Group. This document is a summary of work commissioned on behalf of the Group to develop new ways to respond to the issue of plastic pellet pollution and to reduce the plastic pellet loss which causes this pollution problem in Scotland and beyond.

1.1 The Group

In 2018, the Scottish Government established a steering group with the purpose of exploring how best to maximise pellet loss prevention. The steering group comprised of representatives from businesses, environmental organisations, regulators, standards organisations, officials and industry bodies. The group agreed that while progress had been made to tackle pellet loss by industry, further action was needed. Group members agreed that standards and certifications could provide a robust solution to prevent pellet pollution at each stage of the plastic supply chain. Critically, standards and certifications should build on industry-led advice laid out in Operation Clean Sweep (OCS)¹. Furthermore such a system of standards and certifications should allow businesses of all sizes to participate, incorporate audits by a certified body which are compatible with existing auditing systems and logging of compliant businesses with a single central authority.

1.2 The Issue

The raw materials for most of our plastic products are pellets, powders and flakes, more commonly known by the public as nurdles. Spills can occur whenever these materials (hereafter referred to as pellets) are handled along the supply chain, from production and manufacturing processes to transport and storage. If spills aren't prevented and cleaned up properly then pellets can enter drains and end up in waterways, rivers and oceans. The widespread loss from the supply chain of all of these materials is a key cause of marine microplastic pollution worldwide. It is estimated that, after vehicle tyre particles, plastic pellets are the most significant source of primary² microplastic pollution³; the inclusion of powders and flakes would increase this. It is also an economic issue due to the waste of valuable resources. This environmental and financial 'leak' of plastic urgently needs to be addressed.

Plastic pellet pollution is an international problem, which requires an international response. The Scottish Government and members of the steering group wish to explore the proposed solutions to ensure responsible pellet handling practices are applied in Scotland. However, the Scottish Government recognises that collaboration with others beyond Scotland is also necessary to allow a coordinated and compatible international response.

¹ [British Plastics Federation](#) and [Plastics Europe](#) provide guidance and support on Operation Clean Sweep.

² Primary microplastics enter the environment at less than 5mm in size. Secondary microplastics are formed when macroplastics break down into tiny particles.

³ Eunomia (2016) *Plastics in the Marine Environment*

1.3 The Supply Chain approach

During its considerations the steering group was keen to understand and develop a supply chain approach to managing pellet loss. Zero Waste Scotland supported this through commissioning, on behalf of the group, a programme of stakeholder engagement, site visits and research to propose a system to prevent pellet loss from the supply chain. The system needed to balance functionality, ease of use and cost in order to achieve that goal. It also needed to take account of existing developments and identify problem areas that might remain.

This summary report by Zero Waste Scotland outlines the group's proposed approach, based on members' extensive discussions and expertise, as well as the programme of stakeholder engagement and site visits. It also sets out some of the next steps required to put these recommendations into practice.

By sharing this report, and through further collaboration with industry representatives and decision makers, it is anticipated that a coordinated approach to prevent further pollution from plastic pellets can be taken which is effective, feasible and affordable.

Further detail on the stakeholder engagement can be found in the full report by Eunomia - commissioned by Zero Waste Scotland for the steering group - which has been published with this summary.

2 The proposed system

The proposed approach is a well-designed system, based on a set of principles, which gives assurance to everyone with an interest in plastic products (including retailers, brand-owners, government, regulators, investors, industry, non-governmental organisations, buyers and the public) that supply chains are handling pellets responsibly and effectively to prevent pollution caused by their loss to the environment.

2.1 Principles of the proposed system

Following discussions with the steering group and interviews with other actors in the supply chain, a set of principles was proposed. These principles should be the basis of a system to ensure it builds on progress to date, underpins a solution that can apply across the full chain of custody and is externally verifiable and transparent.

The proposed system should be based on the following principles:

- a The proposed system is built around all organisations carrying out the procedures laid out in the Operation Clean Sweep (OCS) guidance or equivalents. It contains no additional technical standards of its own.
- b Organisations of all sizes can participate in the proposed system. No exemptions will be applied to smaller organisations or lower levels of throughput (although assistance may be available, for example from economic development agencies).
- c Voluntary participation – organisations are not obliged to participate in the proposed system. However, buyers may include certification as a requirement in their procurement policy. The final system should be compatible with a regulatory approach should that be required, and appropriate, to drive uptake.
- d Mandatory disclosure – compliant organisations will be listed on a publicly available online database.
- e Centralised accreditation body – organisations can be audited by any certified body, but compliance is logged with a single central authority.

2.2 The scope of the proposed system

The proposed system applies to all forms of pre-production plastic pellets, including recycled material. It is based on a chain-of-custody approach, not simply chain-of-ownership. This means that all companies physically handling pellets, or the products they are made into, must be included to maintain responsibility for the safe handling of this material. Organisations which do not physically handle pellets, or the products they are made into, need not be included.

The chain-of-custody companies includes:

- Industrial businesses that physically handle pellets;
- Companies which handle but do not at any point own the pellets (such as haulage or shipping companies)
- Companies which form part of the supply chain, but which do not physically handle pellets

This includes companies within the following supply chain sectors:

- Plastics industry
 - Resin manufacture, reprocessor;
 - Interim processors of pellets (masterbatchers, compounders);
 - Product and packaging manufacture (converters);
 - Recyclers.
- Logistics industry

- Warehousing;
- Haulage;
- Repackagers;
- Shipping;
- Port handling;
- Port authorities;
- Retail;
- Any business selling plastic products.

2.3 Structure of the proposed system

The proposed system is based on several components:

- I. Integration into everyday operational practices with recognition that this is a continual process of improvement;
- II. Enabling individual sites and operations to demonstrate compliance using standardised best practices based on OCS guidance and accredited external auditors;
- III. Creating a chain-of-custody system which ensures only compliant sites and operations are included in the supply chain of compliant products.

Each component is outlined in the following sections. Figure 1 provides an overview of the system.

2.3.1 *Integration of proposed system into everyday operational practices*

Integration into the everyday operational practices of the business is a key part of the proposed new system. This is also central to the premise of OCS, which is a toolkit of guidance, procedures and templates developed to help plastic industry operations managers improve worksite set-up to prevent and address spills of pellets, maintain internal procedures to achieve zero pellet loss goals, provide employee training and check performance regularly through a process of continual improvement.

In the UK, OCS is offered as a voluntary solution to pellet handling companies by the British Plastics Federation (BPF). Plastic Europe is the principle host of OCS in Europe and plans to develop an OCS certification scheme⁴.

⁴ [Plastics Europe Operation Clean Sweep Report 2018](#)

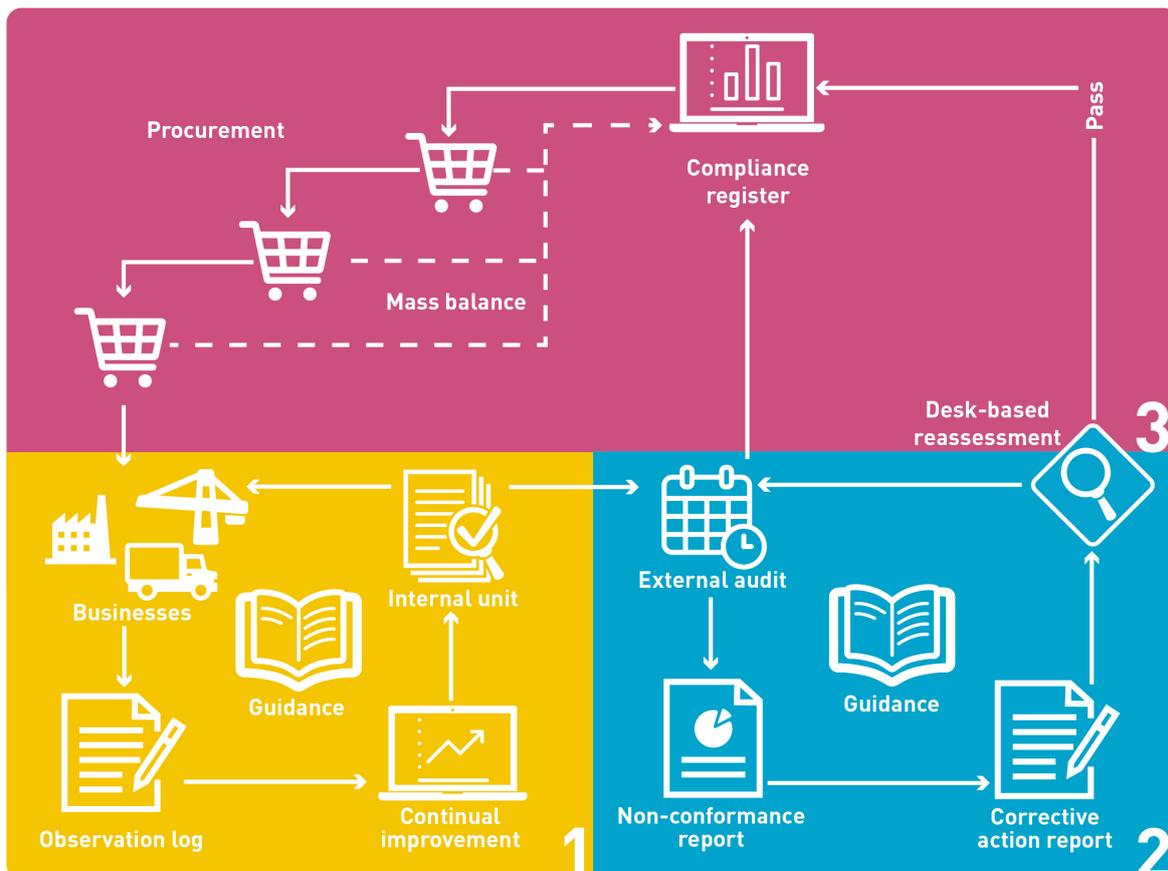


Figure 1: Proposed chain-of-custody system to prevent pellet loss across the supply chain. The proposed system is based on several components: 1. Integration into everyday operational practices with recognition that this is a continual process of improvement; 2. Enabling individual sites and operations to demonstrate compliance using standardised best practices based on OCS guidance and accredited external auditors; 3. Creating a chain-of-custody system which ensures only compliant sites and operations are included in the supply chain of compliant products.

2.3.2 Demonstrating compliance using standardised best practices and accredited external auditors

2.3.2.1 Development of a standardised approach

For companies to be fairly assessed on whether they are handling pellets responsibly, there needs to be an agreed approach. Standards can provide a reliable basis for businesses to share the same expectations about how a product, service or process is carried out – in this instance the management of pellets.

A Publicly Available Specification (PAS) is a fast track standardisation process pioneered by the British Standards Institution (BSI), the UK's national standards body. In early 2020 development of a PAS for pre-production plastics in the supply chain, sponsored by the Scottish Government and others, is set to be initiated. BSI is responsible for managing this well-recognised and consensus-based process. A distinct steering group and review panel for the PAS development process will need

to be established to ensure fair and transparent representation of all stakeholders across the supply chain.

Once a standard, such as this PAS, has been developed it can be used directly by auditors to assess the compliance of a site or operation that handles pellets as part of existing audits. Alternatively, it can be used as the basis of a certification scheme which can provide an additional level of guidance, support and recognition.

2.3.2.2 Using accredited external auditors

Under the proposed system, integration of best practice into everyday operational procedures for a business is demonstrated through an annual audit by an accredited external auditor. This could be a standalone process (such as a pellet certification scheme) or integrated into existing audit programmes.

The audit should involve the following process:

Annual (at least) assessment to include:
<ul style="list-style-type: none"> - Checks of training and operational records and procedures, see Annex A for full list - Visual inspection of the site (or other operation e.g. haulier).
Based on the findings of the assessment, the site (or operation):
<ul style="list-style-type: none"> - Passes as compliant; or - Is issued with a non-conformance report, including corrective actions.
If a non-conformance report is issued:
<ul style="list-style-type: none"> - The site must submit a corrective action plan⁵ within a short period (usually two weeks) to the auditor for approval; - Once approved, the site must implement this corrective action plan within the agreed timescale (no longer than three months) - Evidence must be provided to the auditor to show implementation of the corrective action plan within agreed timescales - If the auditor is then satisfied, the site will be declared compliant - If the auditor is not satisfied, then the site will be declared non-compliant.

This approach to non-conformance and corrective action will be familiar to companies operating ISO management systems⁶. Integrating auditing into existing audit programmes, such as ISO 14001, would avoid a company being required to have an additional auditing process, and minimise duplication, disruption and cost where effective systems are already in place. However, if required, a company could choose to adopt a separate standalone scheme. Both should use a standard, such as the PAS, as the basis to ensure continuity in standards across the supply chain.

This approach requires that the system includes a register of accredited, qualified auditors. Alongside the PAS, auditors will be able to make use of OCS guidance to

⁵ This should identify how non-conformance happened; what the underlying cause was; the estimated scale of the (potential) spill; what steps are suggested to remediate; what steps are suggested to prevent recurrence; and the responsibility, resources and timescales to implement these steps.

⁶ <https://www.iso.org/home.html>

inform their site inspections and assessment of the efficacy of procedures developed by the businesses they are auditing.

Businesses which are part of the plastics supply chain, but do not directly handle pellets themselves, will only need to comply with the chain-of-custody elements of the system.

2.3.3 *Creating a chain-of-custody system*

The final part of the proposed system is a compliance register. In its simplest form it is essentially an online database of compliant companies. If a business, such as a retailer or brand-owner, wishes to ensure that its plastic products are manufactured in accordance with best practice, it can select a supplier from this database.

For a supplier that does not handle pellets itself, registration will be straightforward and require procurement from compliant suppliers. Companies that do handle pellets must operate a management system which incorporates, at a minimum, the checks of training and operational records and procedures outlined under the auditing requirements above (and listed in Annex A).

A compliance register system can automate the process of keeping records of materials purchased and whether they come from a compliant supplier. It can also act as a hub for tracking materials and handover points. This would help streamline the whole process and opens the possibility of analysing the data to identify high-risk activities, locations and even operators. This information would be confidential but would provide the system operator and subscribers with valuable insights to accelerate improvements in pellet management.

A digital compliance register also provides a way to automatically calculate the percentage of compliant material in finished products, which would be necessary to implement the scheme. Further work is needed to fully consider how this would apply if, for example, there was a link in the supply chain which was not compliant. Potentially a temporary 'patch' could be applied, particularly in the early stages of implementation, to prevent breaking the chain in an otherwise compliant supply chain. The Scottish Government's steering group wish to explore these options further. Further details and discussions about elements of a compliance register are included in the main report.

3 Next steps

The steering group is due to submit its recommendations to Ministers in September 2020. At this stage it is anticipated that the development of the PAS for plastic pellet management will be underway. The PAS process is an opportunity for this proposed system to be implemented through the established international standards structure, which will make it much easier to disseminate worldwide.

In parallel with the PAS development programme, the steering group will continue to test, explore and seek feedback from industry on the proposed system which can be used to inform that PAS steering group and future developments. It is anticipated that representatives from the Scottish Government's steering group will sit on the PAS steering group.

The Scottish Government and members of its steering group will continue to encourage and engage with others to develop a collaborative solution to preventing pellet loss from supply chains. The following set of interim actions have been identified for the steering group to review and progress. This work, together with development of the PAS, will inform the group's final recommendations to Ministers. Interim actions for further review and progression:

- The proposed system design should be considered while developing the PAS, and promoted through the PAS steering group;
- Development work should be undertaken with audit accreditation bodies to establish criteria for auditor accreditation;
- Further work should be undertaken on the design and implementation of the compliance register;
- In anticipation of the system's implementation, Scottish businesses handling plastic pellets should be encouraged and supported to demonstrate evidence of improvements to their pellet handling practices;
- Further testing of the system developed should be carried out to:
 - Inform the PAS development process,
 - Address any practical issues that may arise, and
 - Inform further recommendations to support implementation, including training and workforce development implications.

Annex A: Auditing assessment

At least annually, an external audit by an accredited auditor should include:

- Risk assessment;
- Relevant procedures, specifically including:
 - transfer of pellets from and to other businesses and intermediaries;
 - implementation of best practice to minimise the risk of spills;
 - action following spills;
 - treatment, handling and disposal of spilled material;
 - site inspection, monitoring and records;
 - control of contractors, including training and records;
 - procurement policy, approved suppliers register and purchasing records;
 - communication of compliance issues with suppliers and customers;
- Training records;
- Incident logs, including:
 - Root cause analysis;
 - Record of remedial action;
 - Record of action to prevent recurrence;
- Internal audit records, including:
 - Regular site inspections, including:
 - Site boundary (where appropriate);
 - High risk locations both within and outside site boundary (e.g. outfall pipes, loading bays);
 - Any material outside primary containment.
 - Regular review of incident logs, including near misses;
 - Review of above procedures;
- Evidence of continual improvement;
- Visual inspection.



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