https://doi.org/10.46756/sci.fsa.mip511

Joint Expert Group on Food Contact Materials

Position Paper on Ocean Bound Plastic (OBP)

Background

1. The Food Standards Agency (FSA) and Food Standards Scotland (FSS) are currently undertaking work on the potential use of plastic materials from the open environment in food contact applications, specifically plastic materials intercepted before entering the marine environment. These plastic materials are widely referred to as ocean bound plastic (OBP) and are sourced, recycled and subsequently used in new applications. The FSA sought an opinion from the Joint Expert Group on Food Contact Materials (FCMJEG) whether such recycled material could be safely utilised in food packaging, either directly in contact with food or behind a functional barrier.

2. To aid the FCMJEG with their assessment of OBP and environmental plastic more generally, the FSA undertook a call for evidence between March and October 2022. This was followed by additional data kindly provided by the companies that responded to the call for evidence, upon enquiry by the FCMJEG. Additional companies were also identified as suppliers and users of these materials between November 2022 and January 2024 and were contacted for any information they may hold.

3. The following evaluation of environmental plastic and OBP focusses on the potential risk from use of such materials in recycled FCMs, environmental aspects are outside the remit of this evaluation. The discussion, considerations and

conclusions by the FCMJEG are based on all available information received to date, including any information and data submitted to the FSA by the end of January 2024.

Introduction

4. Plastic pollution is an environmental hazard affecting both terrestrial and marine environments. The majority (approximately 80%) of plastic in the ocean originates from land, mostly from coastal areas, and an estimated 0.4 - 4 million tonnes of plastic debris enter the ocean via rivers per year (Smidt et al., 2017; Wayman, 2021).

5. The term OBP currently covers a broad range of plastic disposed of in the environment, i.e. terrestrial, aquatic and marine. While there are several definitions of OBP available in the literature (Annex A), there is no standardised international or widely accepted definition of OBP to date. For the purpose of this assessment, the FCMJEG has broadened the scope to include not only OBP but also environmental plastic more generally, as the only distinction is proximity to the aquatic environment. They consider environmental plastic or OBP as any discarded or abandoned plastic material that has been exposed to and collected from the open environment. Plastic material that was acquired from established waste and recycling collection systems, for example deposit return schemes or kerbside collection, or collected from any other controlled environment (e.g. households, venues), is considered outside the scope of this evaluation.

6. Any recycled plastic FCM produced needs to be compliant with the current EU/UK regulations and legislation (FSA). This includes the requirement that plastic

must not contain carcinogenic and mutagenic substances or substances affecting reproduction (CMR substances).

Views of the FCMJEG

7. The FCMJEG's assessment of environmental plastic and OBP focuses on polyethylene terephthalate (PET) based OBP that is subsequently mechanically recycled and used in food contact applications. In the UK, PET is currently the most established polymer type to be recycled and used in (recycled) FCMs. Therefore, the information available from the literature and provided to the FCMJEG via the call for evidence was predominantly on PET based environmental plastic and OBP; very limited information was available on any other plastic materials.

8. Under the current recycled plastics legislation, mechanical recycling processes are required to ensure that any potential contamination is removed to an acceptable level, i.e. where further use of the material in food contact applications does not pose a risk to consumers. The European Food Safety Authority (EFSA, 2011) considered mechanical recycling processes for PET as efficient if the individual process can reduce an input reference contamination (3 mg/kg) of kerbside collected PET to levels that result in a worst-case dietary exposure not higher than 0.0025 µg/kg bodyweight (bw) per day. Individual recycling processes are assessed and approved for plastic materials collected from controlled environments, such as UK kerbside collection. Substantial work has been undertaken in the past to ensure that the current criteria and standards for mechanical recycling processes are being met. Therefore, recycled PET (rPET) acquired from an approved mechanical recycling process using input plastic from

established collection systems is generally considered to be without appreciable risk when used in FCMs.

9. To the FSA, FSS, and FCMJEG's knowledge, environmental plastic or OBP appears to be a relatively new input material to produce recycled FCM. Hence, the FCMJEG raised concern over potential contaminants, and questioned whether the current reference value for PET of 3 mg/kg would be applicable. The reference value of 3 mg/kg was based on substantial data from EU controlled collection systems, which did not include OBP (EC, 2004; Franz et al., 2004). There was insufficient evidence to demonstrate that environmental plastic or OBP is not contaminated with different substances as material from controlled collection systems in the UK or that current mechanical recycling processes can remove either a) higher levels of contamination or b) different substances due to environmental exposure. The FCMJEG noted that data on misuse of PET plastic materials, specifically bottles, has fed into the EU assessment and specifications for approved mechanical recycling processes. Misuse of, or chemicals stored in, plastic materials may vary in non-EU countries.

10. The FCMJEG also noted that there is currently a lack of specific data/studies on the potential presence of CMR substances in environmental plastic and OBP. In addition, information on the potential degradation of environmental plastic and OPB and the effect such degradation may have on the stability of the material itself or the uptake of contaminants is lacking. The challenges in the recycling process could therefore differ depending on the source of the input material, especially after being in the environment for prolonged periods of time.

11. As the definition of environmental plastic or OBP is not standardised, the FCMJEG was not always able to exactly establish the source/origin of the material in the reports reviewed, e.g. the country of origin, but also whether the material in question was collected from the open environment or from a more controlled environment/system within range of either a waterway or coastline.

12. The composition of both EU and UK plastic materials, including any potential plastic additives, are well studied and any potential risks or migration are well defined. If plastic material is sourced from other parts of the world, it may be challenging to ascertain if it meets EU/UK regulatory requirements, especially if it is produced for local markets. Additionally, it may not be easy to establish whether additional/unknown plastic additives have been used in its original production. Again, there has been extensive work in the EU/UK (EC, 2004; Franz et al., 2004) to ensure that any potentially harmful substances are removed during approved mechanical recycling processes of EU sourced input material. The data presented to the FCMJEG were insufficient to demonstrate how companies mitigate potential differences in the composition between EU/UK and non-EU/UK plastics and whether these differences could change the potential uptake of contaminants from the open environment.

13. The FCMJEG acknowledges the scale of the task to provide sufficient data to assess the safety of environmental plastic and OBP. Hence, the data submitted in response to the call for evidence, including non-intentionally added substance (NIAS) testing, has been welcomed by the FCMJEG. However, the Group has not seen or received sufficient evidence that the current mechanical recycling processes are appropriate for environmental plastic and OBP, as an input material, especially with a view to reducing potential contamination.

14. Data were also lacking on whether packaging applications incorporating environmental plastic or OBP could be further recycled (depending on the material type).

15. The FCMJEG recognises the benefits of recycling environmental plastic and OBPs to reduce environmental plastic pollution and promote a circular economy. However, as food packaging only accounts for a relatively small percentage (~ 8-16%) of total plastic applications the Group considered that other, more appropriate, applications for OBP could be found (Smithers; Nistico, 2020). The FCMJEG considered that the use of recovered/recycled environmental plastic and/or OBP in food contact applications over virgin or other suitable recycled plastics, i.e. recycled plastic acquired from established collection systems, is associated with much greater uncertainties and difficulties in obtaining compliance.

Conclusions and recommendations

16. Environmental plastic or OBP appears to be a relatively new input material for mechanical recycling and use in final recycled PET FCMs, hence the available information on these materials is limited. Uncertainty remains regarding the definition and therefore sources of the input material referred to as environmental plastic or OBP, i.e. whether it has been exposed to the open environment for prolonged periods of time or is collected from more controlled systems. There was also insufficient evidence as to whether plastic obtained from sources outside of the EU/UK would contain any additional plastic additives or contaminants, which differ from EU/UK kerbside collected plastic.

17. While there is currently no international or standardised guidance on the use of such materials in established recycling processes, work is being undertaken by industry to contribute to the overall body of evidence. However, sufficient evidence is required to inform and ensure compliance with the relevant assimilated UK regulations. To inform compliance it would need to be demonstrated that contamination of environmental plastic or OBP collected for use as input material in established mechanical recycling processes was comparable to that of UK kerbside plastic. At the present time there remains uncertainty as to the overall contamination of environmental or OBP or the appropriate reference standards or contamination levels to use in an assessment. Therefore, it is challenging to carry out an accurate risk assessment. More work is required to address the data gaps to derive the reference contamination level from this source (e.g. is the 3 mg/kg reference level derived from the FAIR recyclability project for kerbside collections (EC, 2004) also applicable to environmental plastic and OBP) and to allow an appropriate approach to be undertaken. Work will also be needed to assess the standard of proof/evidence that is required.

18. The FCMJEG recognises the benefits of recycling environmental plastic and OBP and the value of any measures that recycles and puts these materials to a sustainable use. However, based on the current evidence, the FCMJEG could not exclude a safety risk from the use of environmental plastic or OBP in food contact materials, either in direct contact with food or behind a functional barrier. Should, in the future, appropriate evidence derived from additional data sets become available to support the safe use of these materials in FCM’s then the FCMJEG and FSA/FSS would carry out a safety assessment at that point.

FCMJEG Position Paper

March 2024

Abbreviations

CMR	Carcinogenic, mutagenic or toxic to reproduction
EC	European Commission
EU	European Union
FCM	Food contact materials
NIAS	Non-intentionally added substance
OBP	Ocean bound plastic
(r)PET	(recycled) Polyethylene terephthalate
UK	United Kingdom
COT	Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment
EFSA	European Food Safety Authority
FCMJEG	Joint Expert Group on Food Contact Materials
FSA	UK’s Food Standards Agency
FSS	Food Standards Scotland

References

EC (European Commission) - Bayer F, Welle F, Franz R (2004). Guidance and criteria for safe recycling of post consumer polyethylene terephthalate (PET) into new food packaging applications.

EFSA (2011). Scientific Opinion on the criteria to be used for safety evaluation of a mechanical recycling process to produce recycled PET intended to be used for manufacture of materials and articles in contact with food. EFSA Journal, 9(7): 2184.

doi.org/10.2903/j.efsa.2011.2184

Franz R, Mauer A, Welle F (2004). European survey on post-consumer poly(ethylene terephthalate) materials to determine contamination levels and maximum consumer exposure from food packages made from recycled PET. Food Additives and Contaminants, 21:3, 265–286.

doi.org/10.1080/02652030310001655489

Nistico, R (2020). Polyethylene terephthalate (PET) in the packaging industry. Polymer Testing, 90: 106707.

doi.org/10.1016/j.polymertesting.2020.106707

Schmidt C, Krauth T, Wagner S (2017). Export of Plastic Debris by Rivers into the Sea. Environmental Science and Technology, 51(21): 12246–12253.
doi.org/10.1021/acs.est.7b02368

Wayman C, Niemann H (2021). The fate of plastic in the ocean environment – a minireview. Environmental Science: Processes Impacts, 23(2): 198–212
doi.org/10.1039/D0EM00446D

Joint Expert Group on Food Contact Materials

Position Paper on Ocean Bound Plastic (OBP) – Annex A

Definition of ocean bound plastic

1. The term ocean bound plastic (OBP) is currently used as an “umbrella term” covering a broad range of plastic disposed in the environment. There is no one international, standardised or widely accepted definition.

2. The concept of and term OBP itself is based on a publication by Jambeck et al. (2015), in which a detailed model was used to estimate the amount of plastic waste generated annually by populations living within 50 km of a coastline. However, it should be noted that even though this publication has been used to loosely define OBP, the term was not actually used in the publication itself.

3. Further examples of defining OBP include a) abandoned plastic waste of all size that is located within 50 km from the shore in areas with poor or non-existing waste management systems, b) plastic waste in uncontrolled or informal dumps if located within 50 km from shore, c) abandoned plastic waste located within 200 m from rivers/streams and d) plastic that is located within 50 km from an ocean coastline or a major waterway or e) more generally as plastic that would otherwise end up in the ocean or coastal areas at risk of plastic pollution (Zero Plastic Ocean; Prevented Ocean Plastic; Tide).

4. The term OBP generally refers to plastic originating from countries with poor waste management infrastructure and/or existing infrastructures which are often overwhelmed by population growth or tourism. However, the initial publication by

Jambeck et al. (2015) considered coastal countries all over the world, including the USA and European countries. According to the authors, countries with good waste management systems however contributed significantly less to the overall amount of plastic emissions entering the ocean.