Paper on Mineral Oil for FEFCO member companies as a base for customer communication

1. FEFCO

FEFCO represents the European Corrugated Packaging Industry, which operates around 700 plants all over Europe. Its members produce corrugated packaging, predominantly made of paper and starch-based glue. About half of the production volume is used for packaging fresh and processed food.

Corrugated packaging is a perfect circular product. It has a well-established market for secondary raw materials, which ensures that all collected material is recycled and used again. On average, 88% of the input into corrugated packaging paper comes from recycled paper. That makes it a unique product in the frame of the circular economy.

2. What is the issue (MOSH/MOAH)?

During the past years, Mineral Oil Saturated Hydrocarbons (MOSH) and Mineral Oil Aromatic Hydrocarbons (MOAH), commonly known as mineral oils, have been criticised as a potential hazard to human health. Mineral oil hydrocarbons do not cover hydrocarbons naturally occurring in food.

Migration is a complex process linked to the concentration of substances, their chemical parameters (polarity/chemical chain length) and also to storage conditions (temperature), food contact time, etc.

Foodstuffs stored in cold environments have shown a limited migration risk. Shorter contact time is also considered with lower risk, compared to longer storage. Cross-contamination is negligible within the first 2-4 weeks. Substances with high molecular weight (long chains) usually show lower migration and thus have lower risks.

a. Potential health risk, views:

Information on how MOSH and MOAH affect the human health is limited. NGO's are claiming potential dangers from these substances, but in depth knowledge is missing. The German Federal Institute for Risk Assessment (BfR) regrets the lack of toxicological studies but also claims potential dangers that could come especially from MOAH. Recent studies indicate that the cause of concern relates only to the MOAH fractions of 3-7 fused rings (Polycyclic Aromatic Hydrocarbons or PAH). However, the exposure level that may adversely affect human health have not been defined.

Three institutions commented in detail:

RIVM (Institute for Public Health and the Environment, the Netherlands): The report, published in June 2018, concludes that "*no health effects are to be expected if people are exposed to MOSH via food*" and that „*the estimated exposure to MOSH and MOAH via paperboard packaged foods … was shown to be limited compared to the exposure via the total diet. Measures aimed at reducing the exposure resulting from the use of paperboard packaging would therefore have only a limited effect.*"

EFSA (European Food Safety Authority): The EFSA scientific report from 2012 is a comprehensive collection of literature publications and research results. It emphasizes that mineral oils are common in our world and that they find access into food from different sources. It considers both the exposure to MOSH and MOAH of potential concern.

FSA (Food Standards Agency, UK), Dec 2011: they did "*not identify any specific food safety concerns*" and concluded that "*there is no need for consumers to change their eating habits*".

b. Sources of Mineral Oils in food: explanation of MOSH and MOAH

MOSH and MOAH are hydrocarbons containing between 10 and 50 carbon atoms and are derived by physical separation or chemical conversion processes from crude oil or from synthetic products originating from coal, natural gas or biomass.

Mineral oil hydrocarbons in food can result from everywhere, it is a ubiquitous substance. According to EFSA, the potential sources of MOSH and MOAH in food are:

- natural occurrence in biota (air, soil, water)
- environmental contamination (atmosphere, marine, fresh water ecosystems)
- food processing
- food contact materials (e.g. jute and sisal bags, waxed materials, plastic materials, lubricating oils for cans, printing inks, recycled board, adhesives)
- food additives
- pesticides
- fat substitutes in food
- unidentified sources in food

The list shows that recycled board is only one of many possible sources of MOSH and MOAH in food. Carcinogenic MOAH are mainly found in crude or insufficiently refined mineral oils and in oils that have been heated. However, it is very difficult to identify the actual source of MO into foodstuff.

c. Analytics: State of the Art

The analytical methods for MOSH and MOAH show high variety in the results; there is no universally accepted method so far.

It is not possible to analytically quantify the presence and concentration of all individual components of a complex hydrocarbons mixtures. Therefore, the analysis attempt to quantify the concentration of total MOSH and MOAH fractions. However, contamination with polyolefin oligomeric saturated hydrocarbons (POSH), e.g. from plastic bags, heat sealable layers or adhesives (all possible components of recycled papers/boards impurities) or the natural traces of phytosterol in paper may interfere with MOSH analytics. The analytical methods are based on gas chromatography (GC). Nevertheless, none of the methods applied today is validated and the test results scattering between the laboratories often exceeds 100 %.

3. Solving the issue

a. What has our industry done?

Consumers' safety is of highest priority for corrugated packaging and the paper & board industry. Although no toxicological studies on the effects of human exposure to mineral oil traces exist, the industry takes precautionary measures and is actively working to address consumers' concerns.

In 2011, the paper & board industry made a European wide self-commitment to phase out the use of printing inks based on mineral oils for printing paper & board packaging. These commitments are still followed today. Companies are also developing innovative solutions

to protect foodstuff from potential migration of mineral oils via packaging on a case by case basis.

The European paper & board industry is a pioneer in developing and setting standards for food contact paper & board packaging. The voluntary Industry Guideline for the Compliance of Paper and Board Materials and Articles for Food Contact, last updated 2012 (revision 2018 expected), is broadly implemented throughout the industry. This guideline enabled the industry to work on a solid base and has become a reference for the authorities and other stakeholders.

b. Eliminating root causes

The paper and board Industry in Europe agrees that the best way of moving forward would be to eliminate the root causes. In paper and board, inks containing mineral oils are the main root for migration. As our industry already refrained from using these kind of inks, we would like to encourage other industries as well to follow our example.

This appeal goes mainly to newsprint: technology and mineral oil free inks are available and can be applied to print newspaper and magazines as well. We support the request from food associations to push the newsprint to use mineral oil free formulated inks. The German Food Association (BLL) reminded newspaper publishers to stand up to their social responsibilities. In 2018, the food industry published a “Toolbox for preventing the transfer of undesired mineral oil hydrocarbons into food”.

c. Functional barriers

A possible solution (preferred by the German authorities) is to put a functional barrier between the food and the primary packaging. An effective functional barrier could prevent the migration of MOSH and MOAH from the environment into the food, as well as of other unwanted substances into the food, if the barrier is designed for that purpose. There is no universal barrier, some solutions are already on the market. Several solutions, like polyethylene (PE) and polypropylene (PP) are not considered suitable as barriers for mineral oil. Very important: the property and design of the barriers must also include their full recyclability, to avoid any dysfunction or even destruction of the paper and board recycling loop.

4. What does FEFCO expect at EU level?

FEFCO members are in active dialogue with national and European food safety authorities and other relevant key stakeholders such as ink producers. The cooperation and commitment from all those parties is indispensable to finding durable solutions that contribute positively on advancing the circular economy and consumers‘ safety.

Eliminating the root cause is the most sustainable option and remains the ambition of the industry when working in the area of food contact. Large scale newspaper print trials with mineral oil-free inks have been carried out with positive results including good recyclability of these printed products, mirroring what is already successfully implemented in the paper & board packaging printing.

We expect the European Commission to establish a dialogue with all stakeholders and initiate measures leading to eliminating the intended and unintended man-made contribution of mineral oils into the supply chain, considering all potential sources of contamination. The corrugated packaging industry is committed to work with the authorities and the supply chain to preserve consumers’ safety.

Appendix: State of Art of legislation

European legislation

The EU Regulation 1935/2004 is the framework regulation setting requirements for materials and articles intended to come in contact with food, it is under review in 2018-2019. There are several materials already covered by specific EU measures, among them plastic materials, ceramics and others. Paper & board is among the materials which do not yet have such a measure.

The EU Regulation 2023/2006 sets good manufacturing practice requirements for materials and articles intended to come in contact with food. It includes requirements for printing inks and printed materials but not specifically on mineral oils.

The **European Parliament** Committee on Environment adopted in July 2016 an own initiative report on the implementation of the Regulation 1935/2004 on food contact materials. The report urges the Commission to continue developing specific EU measures, paper & board being among the priority materials. It also stresses the need to address the consumers' concern related to mineral oils in the food supply chain.

The **European Commission** issued a Recommendation 2017/84 on the monitoring of mineral oil hydrocarbons in food and in materials and articles intended to come into contact with food. The goal is to investigate at national level all potential sources of mineral oils into food over a period of two years and create an EU database with results.

The **Joint Research Centre** of the Commission is expected to publish soon two guidelines that will support the monitoring and reporting of data.

Council of Europe

The Council of Europe's Resolution on paper & board materials and articles intended to come in contact with foodstuff was adopted in September 2002, last updated in 2009. The Resolution has no binding status but Members States may choose to introduce it in national legislation. It does not contain specific requirements on mineral oils. A review of this Resolution is currently ongoing.

National legislation

The national legislation is fragmented. German BfR Recommendation XXXVI is the most widely recognised existing standard within the EU for food contact testing of paper and board and for demonstrating compliance with the EU Framework Regulation 1935/2004. Several other Members States, among them The Netherlands, France and Italy, have strong legislation regarding food contact materials.

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