

Summary of the Meeting on Ethylene Oxide (ETO): Regulatory and Technical Aspects

Webex, Monday 04.10.2021

Participants:

Experts from EU Member States, Switzerland, Norway, the European Food Safety Authority (EFSA), the European Commission (DG Health and Food Safety, Legal Service) and the EU Reference Laboratories (EURLs)

The Commission introduced the scope and objectives of the meeting and clarified that the purpose of the meeting was not to discuss the Conclusion of the Crisis Coordinators (CC) meeting of 13 July 2021¹, but to provide clarifications on the regulatory and technical aspects in support of the enforcement action taken by Member States. The documents sent by stakeholders and Member States in preparation of the meeting were distributed to the participants in advance.

A. Regulatory Aspects

The Commission referred to the conclusion of the (CC) meeting of 13 July 2021 on a harmonised approach for handling the incident of ethylene oxide findings in the additive locust bean gum (E410) used in the production of ice creams.

Two Member States recalled that they had agreed with that conclusion on condition of receiving answers to their questions regarding the legal basis supporting it and considering the need for a harmonised solution. A Member State indicated that it might not be in a position to continue to apply the agreed approach in the absence of clear answers from the Commission. Another Member State regretted the shortness of time and pressure under which the conclusions had been reached.

Several Member States commented that the measures concluded in the CC meeting of 13 July 2021 are disproportionate and deplored that the Commission had failed to provide them timely with a written legal statement to support the enforcement action taken.

EFSA provided an overview of the use of the Margin of Exposure (MOE) approach and clarified that it cannot be used to assess the safety of non-threshold genotoxic carcinogen substances deliberately added in the food chain. The MOE approach is applicable for substances whose presence in the food chain cannot be avoided, which is not the case for intentional uses and cross-contaminations that can be avoided by applying Good Hygiene/Manufacturing Practices (GHPs/GMPs).

While there is information from stakeholders suggesting that 2-chloro-ethanol (2CE), the metabolite of ETO, might not be present due to the use of ETO, but to other sources, such as natural occurrence or as process contaminant, sufficient proof of the presence of 2CE through such mechanisms is still to be provided. The MOE approach is a tool for risk managers to prioritise risks in their decision

¹ https://ec.europa.eu/food/system/files/2021-07/rasff_ethylene-oxide-incident_e410_crisis-coord_sum.pdf

making process. It does not provide a safety level. For this reason the Scientific Committee of EFSA decided that it does not apply to substances deliberately added.

EFSA confirmed not to be aware of new information on the toxicity of 2CE compared to the studies assessed by the German Bundesinstitut für Risikobewertung (BfR) in their opinion². BfR recommended, given the uncertainties and pending further notice, to evaluate the genotoxicity and carcinogenicity of the metabolite 2-chloroethanol in line with that of ethylene oxide in order to ensure the highest possible health protection. In this sense, 2CE as a metabolite of ETO that is classified as mutagenic and toxic for reproduction, is suspicious of similar properties and should therefore be treated as such. The Commission clarified that cases of such substances should be treated on a case-by-case basis, considering all available information on the substance and its use and that there is no one-fits-all solution.

Member States were invited to provide any additional data (e.g. on toxicity, not assessed by BfR) supporting the need for a risk assessment for 2CE. In the absence of such data, it was suggested by the Commission services to request EFSA's view if the risk assessment currently available by the BfR could be endorsed by EFSA. Member States welcomed this proposal.

While the Commission clarified that the Legal Service of the Commission provides internal legal advice to the Commission's policy services, as a support to their risk management decisions, the Commission explained the legal considerations supporting the approach chosen in a more detailed explanation supporting the agreement in the CC meeting of 13 July 2021 and announced to share them with Member States (see Annex).

In doing that, the Commission used the example of a finding of presence of ethylene oxide (ETO) at a level above 0.1 mg/kg (i.e. above the limit of quantification (LOQ) in the additive locust bean gum (E410)), subsequently used in a processed or composite product. The Commission highlighted that it considered such findings as both a non-compliance and a safety issue.

B. Technical Aspects

ETO Maximum Limits for Additives (including gums)

The Commission clarified that the level of 0.1* mg/kg (as sum of ethylene oxide and 2-chloroethanol, expressed as ethylene oxide) as the analytical Limit of Quantification (LOQ) is applicable as the maximum limit for ETO on food and feed additives for the purpose of the management of this contamination incident. The maximum level was inspired by the maximum residue level (MRL) of ETO on carob beans, which is set at the level of the analytical LOQ (0.1* mg/kg) in Regulation (EC) 396/2005³ (the MRL Regulation) and was confirmed by the EU Reference Laboratories (EURLs) to be achievable for all additives. Recourse to the levels of the MRL Regulation was necessary since, apart from the illegal use of ETO for sterilisation purposes, limits in the additives legislation are currently limited to certain additives only, and only refer to ETO and not to the sum of ETO and 2-CE. Where there are conflicting levels (e.g. guar gum), for the management of this incident, the level of 0.1*

² <https://www.bfr.bund.de/cm/349/health-risk-assessment-of-ethylene-oxide-residues-in-sesame-seeds.pdf>

³ Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC, OJ L 70, 16.3.2005, p. 1–16.

mg/kg prevails for food and feed additives. It is the intention to update of Regulation (EC) 231/2012⁴ with the inclusion of a specific maximum level, i.e. 0.1* mg/kg as the LOQ applicable for the conformity assessment of the non-use of ETO for sterilization purposes. This applies to all additives including e.g. calcium carbonate (CaCO₃) used either as additive, as nutrient or as feed material. It was furthermore confirmed that the raw material used for the production of a food or feed additive must comply with the MRL Regulation, insofar as covered by Annex I of that Regulation.

Specific ETO purity criteria (specification) have been set at < 0.2 mg/kg for specific additives (such as polysorbates and polyethylene glycol – see list in footnote⁵) and prevail in case of findings of ETO in these additives.

Findings of ETO in feed

In the case of feed, as there is no evidence that there is transfer from feed to food of animal origin, the presence of ethylene oxide (and its metabolite) in feed at low levels appears does not to represent a risk for the consumer. There is also no evidence of a serious animal health risk in case of presence in feed of low levels of ethylene oxide and its metabolite (i.e. below the LOQ). Contrary to most food-producing animals, animals kept as pets can potentially be exposed to ethylene oxide (and its metabolite) for a longer period when a lot has been found contaminated with ethylene oxide. Therefore, the carcinogenic properties of ethylene oxide are a higher animal health risk for long living animals kept as pet animals than for food producing animals.

Therefore, the following measures were agreed for feed following the finding of ETO (sum of ethylene oxide and 2-chloroethanol, expressed as ethylene oxide):

a) The use of locust bean gum (E410) or of any other additive contaminated with ETO above the LOQ of 0.1*mg/kg for feed is prohibited⁷. The use of a non-compliant feed material is also prohibited (MRLs as established by the MRL Regulation are applicable with a processing factor of 1 – see below).

b) Compound feed for which there is evidence that it was produced with a contaminated (ETO above LOQ) additive or feed material, has to be withdrawn from the market if ETO is found above 0.02*mg/kg. In addition, feed for animals kept as pets with ETO levels exceeding 0.02*mg/kg shall be recalled. Feed for food-producing animals has not to be recalled. The residue definition⁶ for ETO as expressed in the MRL Regulation.

⁴ Commission Regulation (EU) No 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council, OJ L 83, 22.3.2012, p. 1–295.

⁵ Additives for which a specification for ETO at <0.2 mg/kg has been established: polyoxyethylene(40)stearate (E431); polyoxyethylene sorbitan monolaurate (polysorbate 20) (E432); polyoxyethylene sorbitan monooleate (polysorbate 80) (E433); polyoxyethylene sorbitan monopalmitate (polysorbate 40) (E434); polyoxyethylene sorbitan monostearate (polysorbate 60) (E435); polyoxyethylene sorbitan tristearate (polysorbate 65) (E436); polyvinyl alcohol-polyethylene glycol-*graft*-copolymer (E1209); polyethylene glycol (E1521).

⁶ Sum of ethylene oxide and 2-chloro-ethanol expressed as ethylene oxide.

⁷ Presence of ethylene oxide and 2-chloroethanol in choline chloride: conclusion reached at the Standing Committee on Plants, Animals, Feed and Food, section Animal Nutrition on 14 December 2021:

The presence of 2-chloroethanol in choline chloride is not the consequence of an illegal use of ethylene oxide (ETO) as disinfectant/biocide, but an unavoidable impurity of the production process following the use of ethylene oxide and hydrochloric acid as starting materials;

Based on the information contained in the [FSA opinion on choline chloride in 2011](#) indicates that choline chloride (75 % purity) is ethylene oxide free and that 2-chloroethanol can be present in levels from 10 to 55 mg/kg, a maximum level of ETOsum (sum of ethylene oxide and 2-chloroethanol expressed as ethylene oxide) in choline chloride of 40 mg/kg(*), relative to choline chloride with 99 % purity, is to be applied for enforcement in the frame of the management of this incident.

Based on the use levels of choline chloride, the level in the compound/complete feed could exceed the level of 0.02 mg/kg (LOQ). Compound/complete feed exceeding the level of 0.02 mg/kg has not to be withdrawn from the market on the condition that the fraction of ETOsum above 0.02 mg/kg can be attributed to the use of choline chloride with a maximum level of 40 mg/kg (relative to choline chloride with 99 % purity).

(*) 40 mg/kg is 55 mg/kg x 0.55 x 1.32, whereby 0.55 is the factor used to express 2-chloroethanol in ethylene oxide equivalents and 1.32 (99/75) is the factor used to express the maximum level relative to choline chloride with 99 % purity.

The Commission clarified that the above-mentioned approach applies in the case where there is evidence for use of a non-compliant⁸ additive and/or feed material (or any other ingredient).

When there is no evidence of the use of a non-compliant additive and/or feed material, the competent authority should calculate the composite LOQ based on the ingredients' list to verify the compliance of a compound feed.

The Commission clarified furthermore that the processing factor to be applied is 1 (unless the feed business operator can provide robust and for the competent authority satisfactory evidence that another processing factor should be applied).

Feedback from the meeting of the working group on import controls

With reference to the recent working group for increased border controls, the Commission provided an overview of the crop/countries combinations to be included in the Annexes of the 5th update of Regulation (EU) 1793/2019⁹ including xanthan gum, guar gum, spices, CaCO₃ supplements containing botanicals and noodles. It is expected that this update will be applicable as from January 2022. The Commission supported the view of certain Member States, that for these products only ETO should be analysed and no other pesticides. Furthermore, it was specified that these entries will apply to food and also to feed, where applicable.

Composite products/Food supplements

Some Member States questioned how to assess conformity for imported products such as noodles and food supplements where no specific MRL is established.

As regards composite foods such as noodles, without information on the use of a non-compliant ingredient, the Commission clarified that by default the MRL at the LOQ of 0.02* mg/kg should apply (considering the two components of the residue definition for ETO). In case of information on the use of a non-compliant ingredient, the conclusions as agreed at the (CC) meeting on 13 July apply (withdrawal/recall of the product from the market, or in case of imports rejection at border). In case there is detailed information on the composition and/or processing factors (PF), then Article 20 of the MRL Regulation is applicable to calculate the composite LOQ to assess compliance. In the absence of any information on PF for either ETO or 2CE, the default PF is 1.

As regards food supplements, the Commission clarified that for harmonization and consistency purposes, the LOQ applicable is 0.1* mg/kg, including for the capsules used for production of food supplements.

⁸ Considering measurement uncertainty 50%.

⁹ Commission Implementing Regulation (EU) 2019/1793 of 22 October 2019 on the temporary increase of official controls and emergency measures governing the entry into the Union of certain goods from certain third countries implementing Regulations (EU) 2017/625 and (EC) No 178/2002 of the European Parliament and of the Council and repealing Commission Regulations (EC) No 669/2009, (EU) No 884/2014, (EU) 2015/175, (EU) 2017/186 and (EU) 2018/1660, OJ L 277, 29.10.2019, p. 89–129.

Food Waste

The Commission recalled its commitment to reduce food waste in line with Sustainable Development Goals, as laid down in the Farm to Fork Strategy. This however cannot undermine food safety. There can be no compromise as food safety is a key prerequisite for a sustainable food system. While it is regrettable to discard food, it is essential that unsafe food should be removed from the food supply chain and discarded in accordance with relevant EU legislation.

Some Member States recalled that though they agree with this statement, they question the approach by which a food is considered unsafe and how far in the food supply chain would a non-compliance extend to, as the ETO/2CE content of composite food products would be diluted a few thousand times. The Commission acknowledged the need to further discuss this matter, building on the experience gained and the evolving situation.

Food for Infants and Young Children (IYC)

The Commission made reference¹⁰ to recital 12 of Directive 2006/125/EC¹⁰, on the careful selection of raw materials to ensure compliance of the final product with the level of 0.01* mg/kg. This default level was established on the basis of the precautionary principle to protect this vulnerable consumer group¹¹, hence also calling for competent authorities to select laboratories able to analyse at such low levels, which is the case also for other pesticides included in that Directive, which sets levels lower than 0.01mg/kg.

Where an additive used for the production of a food for IYC is contaminated with ETO at a level above 0.1* mg/kg, the final product should be withdrawn from the market and recalled from the consumers, regardless of the ETO level in the final product. If ETO was used in an additive but in compliance with the limit (< 0.1* mg/kg) but leaves measurable residues in the final product (>0.01 mg/kg) then it should be withdrawn from the market/recalled from consumers.

The EURL for Single Residue Methods reminded that the LOQ for ETO depends on the analytical method applied. In general, for laboratories using the German standard method, where ETO is transformed to 2CE, the LOQ is in the range of 0.01*mg/kg to 0.02*mg/kg, but this varies depending on the matrix and the equipment. The EURL acknowledged that there may be problems with gums leading to higher LOQ due to matrix effects but that the 0.1* mg.kg has been achieved (validated at 0.075 mg/kg). For foods for IYC additional effort is needed as no validated method is yet available.

In terms of accredited analytical methods for certain food products (e.g. noodles), Article 42 of the Official Controls Regulation (EC) 2017/625¹² applies, providing derogations in the case of emerging risks for the specific food matrix, until the laboratories include the analytical method in their scope.

¹⁰ Commission Directive 2006/125/EC of 5 December 2006 on processed cereal-based foods and baby foods for infants and young children, OJ L 339, 6.12.2006, p. 16–35.

¹¹ Article 5, Regulation (EU) No 609/2013 of the European Parliament and of the Council of 12 June 2013 on food intended for infants and young children, food for special medical purposes, and total diet replacement for weight control and repealing Council Directive 92/52/EEC, Commission Directives 96/8/EC, 1999/21/EC, 2006/125/EC and 2006/141/EC, Directive 2009/39/EC of the European Parliament and of the Council and Commission Regulations (EC) No 41/2009 and (EC) No 953/2009, OJ L 181, 29.6.2013, p. 35–56

¹² Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products, amending Regulations (EC) No 999/2001, (EC) No 396/2005, (EC) No 1069/2009, (EC) No 1107/2009, (EU) No 1151/2012, (EU) No 652/2014, (EU) 2016/429 and (EU) 2016/2031 of the European Parliament and of the Council, Council Regulations (EC) No 1/2005 and (EC) No 1099/2009 and Council Directives 98/58/EC, 1999/74/EC, 2007/43/EC, 2008/119/EC and 2008/120/EC, and repealing Regulations (EC) No 854/2004 and (EC) No 882/2004 of the European Parliament and of the Council, Council Directives 89/608/EEC, 89/662/EEC, 90/425/EEC, 91/496/EEC, 96/23/EC, 96/93/EC and 97/78/EC and Council Decision 92/438/EEC, OJ L 95, 7.4.2017, p. 1–142.

In concluding the meeting, the Commission summarized the following action points:

- ✓ Request EFSA to possibly endorse BfR's assessment in the form of a statement as an urgent priority.
- ✓ Make publicly available the legal considerations regarding the conclusion of the Crisis Coordinator's meeting of 13 July 2021 in an Annex to the Summary Report of this meeting.
- ✓ Taking account of the experience gained, assess whether there is need for a refined approach to risk management in the future.
- ✓ Update the document on feed according to the discussion held in this meeting.
- ✓ Include ETO controls for both food and feed at imports. Controls will be related to ETO (as sum of ETO and 2CE expressed as ETO) only and will not include analyses for other pesticides amenable to multi-residue methods.
- ✓ For foods for infants and young children, to work on the ETO analytical challenges to achieve the legal requirements.

ANNEX – Legal considerations regarding the conclusion of the Crisis Coordinators’ meeting of 13 July 2021 on an EU wide harmonized approach regarding measures under the General Food Law for the additive locust bean gum (E410) and products containing it

In June 2021 (following up on incidents involving sesame seed and related products that occurred since autumn 2020) a Member State notified, under the RASFF mechanism, its action to withdraw food containing ETO-contaminated locust bean gum (E 410), regardless of the actual level of presence in the final product. As a consequence, several Crisis Coordinators’ meetings took place, which concluded, on 13 July 2021, that a harmonized approach on withdrawal and recall appeared to be the most appropriate course of action against the background of the specificities of the incident.

At the technical meeting of 4 October 2021, the Commission presented details of the legal considerations supporting the conclusion of the Crisis Coordinators’ meeting.

The following situation was used as an example: Finding of presence of ethylene oxide (ETO) at a level above 0.1 mg/kg (i.e. above the limit of quantification (LOQ)) in the additive locust bean gum (E410), subsequently used in a processed or composite product.

ETO, formerly used as a pesticide in the EU, is no longer approved for use as a pesticide in the EU under Regulation (EC) 1107/2009 and has a harmonised CMR classification under the CLP Regulation¹³ as (inter alia) Muta 1B, Repr 1B, and Carc 1B. For substances with such properties, a safe threshold for consumer exposure cannot be set.

Both withdrawal and recall of ETO-contaminated food follow from Article 19 of Regulation (EC) No 178/2002¹⁴ (the General Food Law - GFL), which obliges food business operators (FBOs) to withdraw and, as the case may be, to recall food where it considers or has reasons to believe that food is not in compliance with the food safety requirements. These food safety requirements are laid down in Article 14 GFL. More specifically, Article 14(1) stipulates that food shall not be placed on the market if it is **unsafe**, which according to Article 14(2) is the case if it is injurious to health or unfit for human consumption. Article 14(7) stipulates that food that **complies** with specific EU provisions governing food safety is deemed to be safe insofar as the aspects covered by the specific EU provision are concerned.

The Commission is of the view that for the present incidents, even where ETO (sum of ethylene oxide and 2-chloroethanol expressed as ethylene oxide) could not be found in the final product above the LOQ, such final product is not in compliance with the food safety requirements. It is both (i) as such unsafe within the meaning of Article 14(1) GFL and (ii) non-compliant with specific food safety provisions, as a result of which the presumption of safety of Article 14(7) GFL does not apply.

As regards the final product’s unsafe nature, the Commission refers to the CMR properties/classification of ETO under the CLP Regulation as well as to the potentially wide array of products containing ETO-contaminated E 410, thus creating the issue of cumulative effects from consumption of a variety of contaminated products. In the absence of a safe threshold, their use, for the production of the food additive locust bean gum and subsequent production of processed or

¹³ Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006, OJ L 353, 31.12.2008, p. 1.

¹⁴ Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety, OJ L31 of 1.2.2002, p.1.

composite products containing that gum, leads to an unsafe processed product which may not be placed on the market. As regards 2CE, this substance is suspected of having the same CMR properties as ETO although some uncertainty persists. In that case, the precautionary principle of Article 7 GFL applies.

As regards the final product's non-compliance with specific food safety provisions, two possible contamination routes have to be distinguished:

- a) treatment (sterilisation) with ETO of the food additive (locust bean gum) took place, or
- b) contamination with ETO at a level above the LOQ of the carob beans that were used for the production of locust bean gum.

In case of a), the prohibited treatment of sterilisation would manifest itself through a finding of ETO > LOQ in the food additive. Such treatment is explicitly forbidden by Commission Regulation (EU) No 231/2012¹⁵ laying down specifications for food additives (see header in Annex II to that Regulation). As a consequence, the food additive is non-compliant and neither the food additive nor any final product containing that additive shall be placed on the market according to Article 5 of Regulation (EC) No 1333/2008 on food additives¹⁶, which prohibits placing on the market "*a food additive or any food in which such food additive is present, if the use of the food additive does not comply with this Regulation*". This non-compliance excludes recourse to the safety presumption of Article 14(7) of the GFL.

In case of b), the carob beans used are non-compliant with the MRL Regulation's maximum levels for ETO residues and may therefore not be placed on the market according to Article 18(1) of that Regulation. While the Commission recognises that for processed/composite products, Article 20 of the MRL Regulation may apply, it takes the view that, under the circumstances of the present incident, in which the substance is classified as CMR and there is a clear trace to the use of non-compliant ingredients, Article 20 (and Article 18(2) MRL Regulation) cannot be interpreted as removing the possibility of withdrawing or recalling the products, if such food cannot be considered safe within the meaning of Article 14 of the GFL (regarding its unsafety, see above).

Furthermore, as made clear in recitals 9 and 10 of the MRL Regulation, the basic rules with regard to food and feed law are laid down in the GFL, and - under Article 3 of the MRL Regulation- the definitions in the GFL apply also in the context of the MRL Regulation, which include the definitions of 'risk', 'hazard', 'risk management', etc.

Therefore, the safety presumption of Article 14(7) of the GFL is rebutted for the following reasons:

- Classification of the substance ETO as CMR – no safe threshold for consumer exposure can be established,
- Widespread use of E410 in all types of foods, adding up to the overall exposure.
- Deliberate and/or avoidable use of the ETO for the production of food additive (using one of the two routes outlined above),

¹⁵ Commission Regulation (EU) No 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and the Council, OJ L 83, 22.03.2012, p. 1.

¹⁶ Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives, OJ L 354, 31.12.2008, p. 6.

- The fact that, even if the source may not be clearly established to stem from sterilisation in all cases, there are still grounds to believe that the presence of the substance/metabolite are due to deliberate use as a disinfectant.

In both situations a) and b) the conclusion is the same: the use of an unsafe and non-compliant food or food additives renders the final food unsafe and non-compliant in this specific case, due to the properties of the substance itself (CMR without safe threshold) and its deliberate or avoidable use.

The above considerations are without prejudice of the possible action by Member States in accordance with Article 14(8) GFL.