

## **Committee for Risk Assessment (RAC)**

Ad-hoc RAC Supporting Group

Evaluation of an  
Annex XV dossier proposing a restriction on  
Lead and its compounds  
in outdoor shooting and fishing

### **Work Package WP A.4**

**Human health risk assessment home-casting, hand-to-mouth and  
oral exposure**

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## 1. Description of the Work Package

### 1.1. Background

When assessing the risk for lead exposure related to hunting, sports shooting and fishing, all steps in these processes need to be considered. Sometimes the first step of potential exposure is the 'home-casting' of ammunition and fishing sinkers. The Dossier Submitter has evaluated the exposure from these processes as part of the overall assessment of human exposure and risk from lead in ammunition and fishing sinkers. In this work package, RAC evaluates the data used by the Dossier Submitter and their conclusions as presented in the Background Document to the opinion on the Annex XV dossier proposing restrictions on lead in outdoor shooting and fishing.

### 1.2. Objectives

The following topics are covered in the present work package:

1. Does home-casting of ammunition and fishing sinkers occur in the EU?
2. Are there data showing exposure that could be related quantitatively or qualitatively to home-casting?
3. Is home-casting as such of concern when it comes to lead exposure?
4. How much does home-casting contribute to human exposure to lead in relation to overall exposure to lead from ammunition and fishing?

## 2. Summary of the Dossier Submitter proposal

According to the Dossier Submitter, home-casting of fishing sinkers is common in parts of the EU, and home-casting of lead bullets may occur. Many studies have shown increased blood lead levels in populations involved with home-casting sinkers, and the chemical safety report of the registration for lead (CSR, 2020) provides an exposure estimate for home-casting of bullets. There is also evidence of people swallowing fishing sinkers, and of keeping bullets in the mouth during hunting, making oral exposure to lead highly likely. Based on this information, a risk from home-casting is concluded.

## 3. Relevant information from the consultation of the Annex XV restriction report

Numerous comments were submitted in the consultation on the Annex XV report, some confirming that home-casting does occur, especially in western Europe and perhaps mainly by sea anglers. However, no information that could allow for a quantitative risk assessment was provided.

Most comments concerned the proposed transition period for the entering into force of a ban of lead fishing sinkers and lures and the availability of alternatives to lead, indicating that many alternative materials exist but that more time (i.e., a longer transition period) is needed

to ensure a wide availability. Iron putty (iron and a polymer such as PHA - Polyhydroxyalkanoate) was proposed as alternative for small lead split shot, while recognising that also tin is available on the market for this purpose. The comments also indicated that zinc and copper are not, or seldomly, used as alternatives. The need for a transition period was recognised in many comments. However, RAC supports the Dossier Submitter in that no robust justification was provided to support a longer transition period from that originally proposed, i.e., 3 and 5 years for lead fishing sinkers and lures weighing  $\leq 50$  g and  $> 50$  g, respectively.

Although the comments in general were positive towards restricting the release of lead to the environment, many requests for derogations were submitted.

One request for a derogation concerns the use of lead in the smallest split shot ( $<0.06$  g). However, RAC notes that split shots are easily dropped, and as they are generally applied to the fishing line at the shore, there is a risk that birds will ingest these shot which, because of their small size, are likely to be highly bioavailable. Thus, from a risk perspective, a derogation is not supported. Furthermore, alternatives to lead split shot are available (e.g., iron putty and tin), and although the alternatives are claimed to damage the line, it is possible that also lead split shot may damage the line if too much pressure is applied when attaching the shot. Reference is made to some fishing competition rules requiring the use of lead split shot, but RAC does not find that a sufficient reason for a derogation.

A derogation is requested for those sinkers whose size will prevent ingestion by birds, e.g.,  $> 50$  g. However, lead sinkers  $>50$  g are not proposed to be banned based on their risks to birds, but to limit the risks to humans while home-casting. Therefore, RAC supports the ban of lead sinkers  $>50$  g and a transition period of 5 years considering the currently more limited availability of alternatives. The 50 g threshold was also contested in the consultation (referring to a lower threshold in corresponding UK legislation), but RAC supports this limit based on observed cases of ingestion of such weights ( $<50$  g) in birds and that there is no need to harmonise with the thresholds used in the UK legislation.

A derogation is also requested for lures having a hard plastic cover (i.e., plugs, wobblers). However, it seems that lead has been already substituted with tungsten in such sinking lures. RAC does not support this derogation request.

Other topics raised concerns, e.g., the concentration limit of lead (1%), tax on lead, labelling and communication, but RAC supports that they do not warrant revising the restriction proposal.

## 4. Evaluation

### Fishing sinkers

Lead has a low melting point ( $325^{\circ}\text{C}$ ), which enables 'home-casting' of fishing sinkers and ammunition. According to the ECHA Market Survey (2020), 'home-casting' of fishing tackle seems rather common in many countries (concerning up to 30% of the fishers in some regions). There are also surveys conducted in Member States (NL and DK) supporting that home-casting does occur. Lead fumes and (subsequently) lead dust may be formed when the temperature exceeds  $482^{\circ}\text{C}$ , potentially resulting in inhalation exposure and dermal contamination that through hand-to-mouth exposure can result in ingestion and thus oral

exposure. Direct dermal exposure of hands from the solid lead may also contribute to exposure (through hand-to-mouth exposure).

Artisanal melting of scrap lead is a relatively simple process, e.g., on a gas stove, using a small cooking pot, pan or crucible. Scrap lead produces dross on the surface as it becomes fully molten; this is usually removed with an implement by hand. The molten lead is then poured into moulds and left to harden. Remaining lead in the pot can be left to cool for the next time and the dross is discarded. In terms of exposure, the fisher or shooter is working with molten metal at arms-length, quite possibly with their head occasionally over the vessel in a position to inhale any fume. While lead melts at 325°C, it is easy to overheat the vessel to the point of fuming (above 482°C). Risk management measures such as extraction or personal protective equipment are likely to be absent, with the possible exception of gloves to prevent burns.

There is no information on how likely fume formation is during home-casting considering that fumes, according to the Dossier Submitter, are formed when the melting temperature exceeds the melting point by approximately 150°C. However, several studies indicate that home-casting may lead to lead exposure. As a worst case, an Alaskan adult male patient suffered from lead poisoning, (blood lead level 1 330 µg/L) as a result of inhaling lead dust and fumes from melting and casting lead for several years (State of Alaska Epidemiology, 2001). Other studies described in the Background Document include an epidemiological study showing that lead melting practices were strongly associated with elevated blood lead levels in South African remote subsistence fishing communities (Mathee et al., 2013), and an epidemiological study indicating that the main sources of lead exposure in children in Cartagena, Colombia (Olivero-Verbel et al., 2007) were from their parents working in a metal melting factory or with producing fishing equipment (fishing net sinkers).

The Background Documents also refers to a few other studies (melting batteries to produce fishing sinkers and handling lead sinkers) but their relevance to home-casting is unclear to RAC. Reasons are, e.g., that melting a (car?) battery seems much more difficult than starting from small scrap lead pieces, and that it is not clear how much dermal exposure during the attachment of the sinkers to the fishing nets contribute to the total exposure.

Overall, RAC concludes that these studies show that lead exposure during home-casting is possible. The exposure routes could be both inhalation of fumes and oral exposure to dust through hand-to-mouth movement. However, it is not clear to RAC if the conditions in subsistence fishing communities in South Africa and Colombia are relevant for the EU (considering i.e., magnitude of expected exposure to lead and confounding from industrial activities), whereas the single case in Alaska (with very high blood lead levels) perhaps is relevant. RAC concludes that exposure to lead during home-casting is possible, but quantification of exposure and risk is not possible.

Handling of lead fishing weights was shown by Sahmel et al. (2015) to result in lead contamination of hands, and subsequent transfer from skin to saliva of 24% of the skin content. That handling of lead fishing sinkers can result in lead exposure is also supported by an epidemiological study from Thailand, showing that parental occupation in producing fishing nets with lead weights in their homes in coastal fishing communities was associated with a marked increase in the prevalence of high blood lead levels in the (parent) workers as well as in their children (Yimthiang et al., 2019). However, it is not clear how extensive their contact with lead sinkers were and other working conditions. RAC concludes that exposure to lead from direct contact with lead fishing sinkers is possible, but quantification of exposure

and risk is not possible.

Direct oral exposure to lead from fishing weights is also likely when closing lead split shot by biting while applying the fishing weight on the fishing line. This habit may be rather common among fishers applying small weights, but the weights might also accidentally be swallowed as reported by US poison control centres (Gummin et al 2017). RAC concludes that direct oral exposure to lead from fishing sinkers is possible and likely to occur, but quantification of exposure and risk is not possible.

## **Ammunition**

There are no studies in the Background Document reporting lead exposure when 'home-casting' ammunition. However, such data may be available as the CSR (2020) report exposure up to 20 µg lead/event in reloading activities (involving home-casting), and a Norwegian study has reported statistically significantly higher blood lead levels (31.4 vs 15.6 µg/L) in 13 hunters reporting self-assembling of lead-containing bullets than in 134 hunters not doing that (Meltzer et al., 2013). In a South African study (Mathee et al., 2017), home-casting (in 22% of participants) did not affect blood lead concentrations, whereas 17% of shooters (i.e., 14 shooters) at shooting ranges reported that they keep bullets in the mouth, making direct oral exposure possible. The blood lead measurement indicated higher levels in shooters keeping bullets in the mouth, but the difference was not statistically significant. RAC concludes that exposure to lead from home-casting ammunition and from keeping lead ammunition in the mouth is possible, but quantification of exposure and risk is not possible.

## **Overall conclusion**

Overall, RAC concludes that 'home-casting' fishing weights and ammunition is likely to result in lead exposure via fumes, dust and direct contamination of skin from lead. The magnitude is likely to depend on many factors, such as local practices and conditions, source of lead, and type of product home-casted. The Dossier Submitter estimates that 1 ton of lead per year is used per Member State for home-casting, but it is not known to RAC how plausible this figure is. Although 'home-casting' may be common in some European regions, there is no European data to support a quantitative risk characterisation. However, if 'home-casting' is performed under inadequate conditions (e.g., temperatures >482°C and with poor ventilation), exposure of the person conducting the 'home-casting' as well as of family members is possible and potentially of concern, as shown by data from other parts of the world.

## **5. Uncertainties**

The main uncertainty concerns the lack of European data to support that 'home-casting' fishing weights and ammunition results in exposure to lead. There is however data clearly showing that home-casting occurs in Europe, although the extent of the practice is uncertain. Data from other parts of the world show that lead exposure from home-casting is likely, but it is questionable if the conditions and magnitude of work in, e.g., subsistence fishing communities in South Africa or Colombia are relevant for Europe.

## 6. Conclusions

1. Home-casting of ammunition and fishing sinkers occurs in the EU, as shown by the selling of moulding forms and various surveys. Home-casting fishing sinkers may be common in some regions, but an overall estimate of how common these practices are is not available.
2. Data from other parts of the world indicate that home-casting can result in substantial exposure to lead, but it is not clear to RAC how relevant these data are for European conditions. Thus, RAC concludes that exposure is possible, but a quantitative assessment is not possible.
3. It is not possible to conduct a risk assessment specifically for home-casting, but when it occurs, RAC concludes that this practice can contribute to exposure and in worst-case conditions the exposure can be substantial.
4. Home-casting of fishing sinkers and ammunition can contribute to human exposure to lead, but the quantitative contribution is probably highly case-specific, and no quantitative assessment is currently possible in relation to overall exposure to lead.
5. Lead exposure through direct contact with lead fishing sinkers and ammunition is likely, resulting in oral exposure via hand-to-mouth transfer, but quantification of exposure and risk is not possible.

## 7. References

All references cited are included in the Background Document to the Opinion on the Annex XV dossier proposing restrictions on lead in outdoor shooting and fishing.