Extract from the ISSF presentation sent to the European Chemical Agency on December 23, 2019

The International Shooting Sport Federation (ISSF) is the sole controlling body in the Olympic Movement administering the shooting sport at world level encompassing its member organizations, administering the shooting sport on the national level. The ISSF is formally recognized by the International Olympic Committee (IOC).

The ISSF is committed to its responsibility for up-to-date environmental and nature conservations.

The ISSF is composed of those National Shooting Organizations that are members of their National Olympic Committees and recognized by the respective National Olympic Committee as the governing body of the shooting sport related to the ISSF recognized events in the country. Currently the ISSF has 160 Member Federations from 147 countries of 5 continents.

The ISSF organizes World Championships, World Cups and other competitions for the ISSF recognized events for juniors and seniors.

The ISSF cooperates with the IOC and Organizing Committees in carrying out the organization of the shooting sport events at the Olympic Games.

The ISSF encourages and supervises other international championships and competitions that include the ISSF recognized events upon request of the Organizers, such as the Continental Games, the Mediterranean Games, the Commonwealth Games, the Universiades, the World Military Games etc.

The ISSF develops Olympic (that form part of the next Olympic Games program) and non-Olympic events. All those events are distributed among the following disciplines: Rifle and Pistol shooting, Shotgun shooting, Running Target shooting, Target Sprint.

There are four types of shooting within the ISSF disciplines:

1. Air weapons shooting (10m Rifle and Pistol)
2. Small boar shooting (25m and 50m Rifle and Pistol)
3. 300m shooting (Rifle)
4. Shotgun shooting (shot guns with the weight of pellets up to 24,5 grams)

There are 50 countries in Europe that practice events recognized by the ISSF.

The ISSF has a close cooperation with the International Paralympic Committee (Para Shooting), International Committee of Sports for the Deaf, International Master Games Association as well other international bodies that are administering shooting events not recognized by the ISSF. For example, Federation International de Tir aux Armes sportives de chasse (FITASC) or British Association for Shooting and Conservation (BASC).

The main age group includes people from 12 to 65 years old. There are about 50,000,000 people world-wide involved in shooting sport activities per year.

Thus, the ECHA initiative affects the interests of at least 10 million EU citizens and indirectly affects global consumers and users from all of the other 5 continents, i.e. at least 50 million people (product consumers, participants of national and international competitions, experts, owners of shooting complexes and galleries, their families and relatives, subsidiary companies in the EU and their partners, as well as their competitors in other countries of the world).

Moreover, this request of the European Chemicals Agency affects the interests of most existing federations and associations, developing and promoting shooting sports, manufacturers of both - ammunition and joint products, as well as goods producers.

It appears that the proposed bans will affect negatively not only the shooting sport in Europe, but sports competitions of hunting communities, private property and even the ability of people to do what they love.

Subject of the ECHA request

The *ECHA*'*s* request is based on a request by the European Commission to develop the 2018 study on limiting the use of lead in gunshot in wetlands. The European Commission's request addresses the following topics.

"*- Lead in gunshot for use* ***in terrains*** *other than wetlands;*

- Lead in other types of ammunition (i.e. bullets or pellets) for use in either wetlands or ***terrains*** *other than wetlands;*

- Lead in fishing tackle (i.e. weights, jigs and sinkers)".

Thus, the European Commission's request refers to "terrains", i.e. territories (the request concerns the environment specifically), but not to the facilities that may be found on a given territory.

The ECHA'*s* request expands and "*gives more detail on*" the European Commission's request, including such ***facilities*** that fall outside the scope of the European Commission's request as:

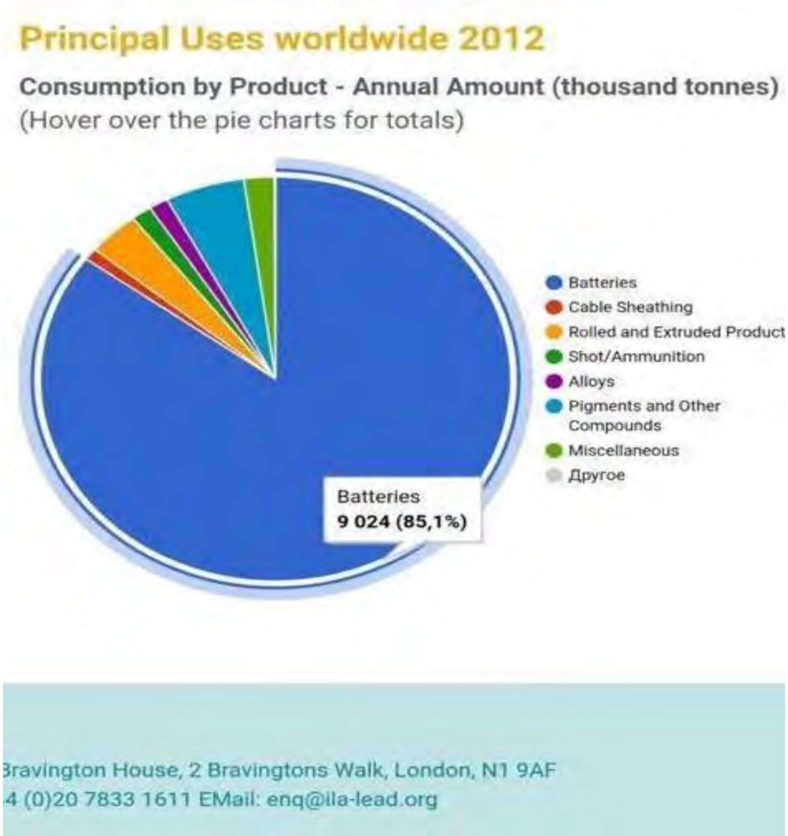
"*- Lead used in gunshot for* '*sports*' *shooting, including training i.e. clay pigeons, item B;*

- Lead used in bullets/pellets for '*sports*' *shooting, including training (indoor and outdoor) i.e. targets*"*, item D.*

Moreover, the request notes that "*military uses of lead are outside of the scope of the Commission*'*s request*".

Since the *ECHA* is concerned about the state of the environment and the request addresses "*the risks posed by lead to the environment as well as to humans via the environment (i.e. through the consumption of food)*", it is necessary, first of all, to unambiguously pin down the concept of "environment". Secondly, in the interests of the environment, we must take into account all sources of lead without exception (diagram 1, diagram 2). The proposed restriction will only be meaningful in this case.

Diagram 1



*www.ila-lead.org/ila--cbi
Batteries 85.1% (9 million tons)
Shot/ammunition 1.4% (150 thousand tons)

Diagram 2

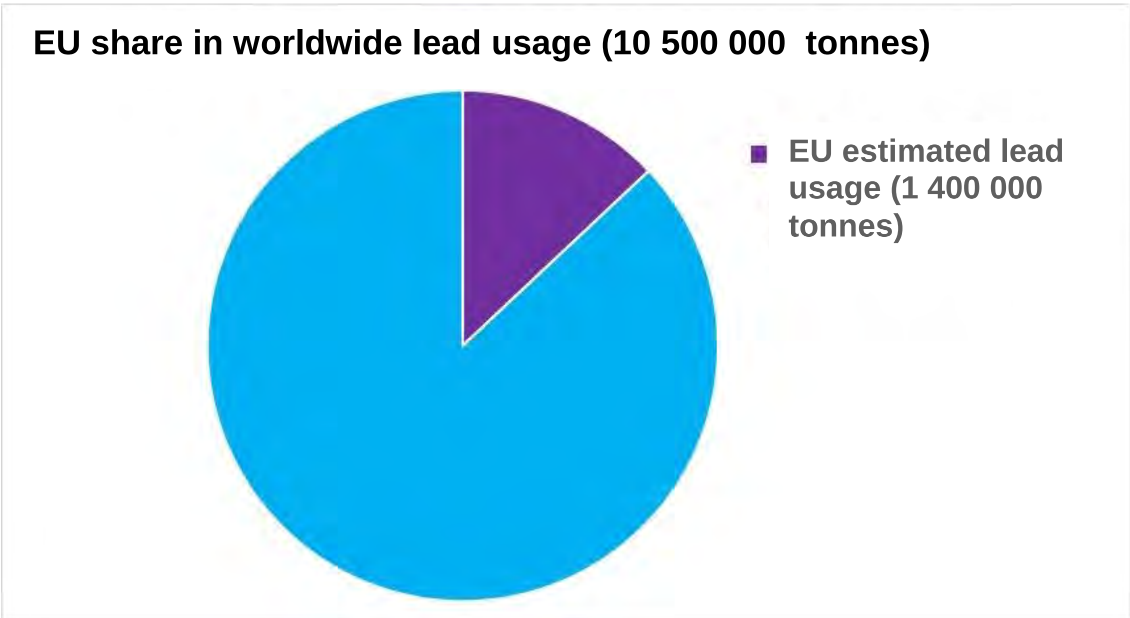
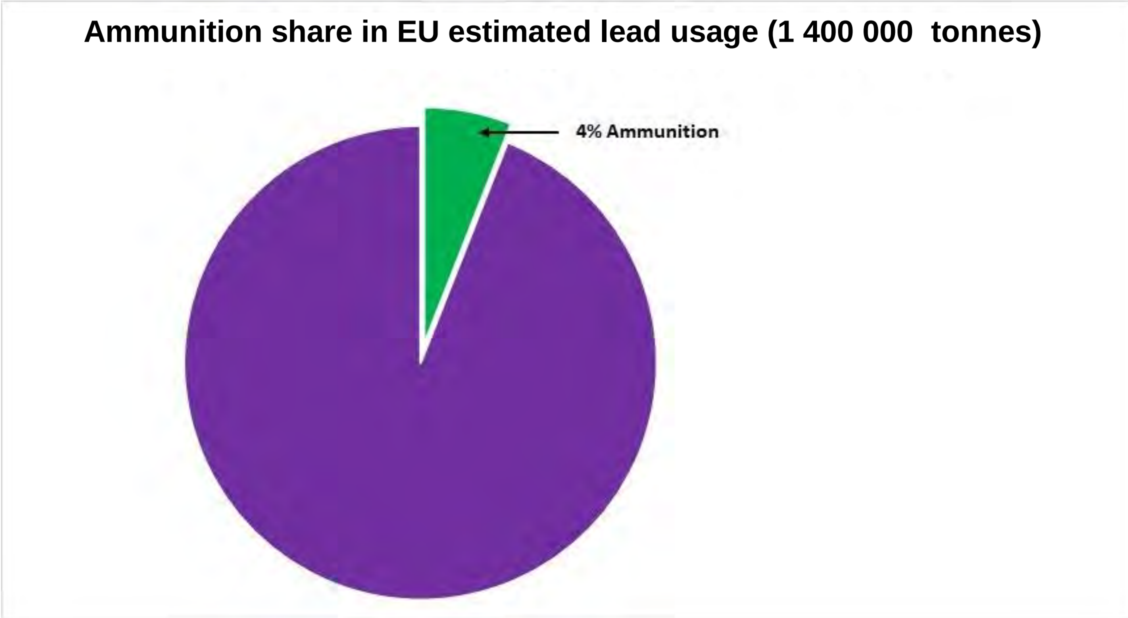


Diagram 3



From the presented consumption figures, it can be seen that ammunition occupies a rather small portion of the total lead production and consumption both worldwide (Diagram 1) and in European Union (Diagram 2). In total, in terms of the interests of the European community, we may evaluate that only 50,000 tonnes out of 1,400,000 tonnes of manufactured products (Diagram 3) are used for ammunition, including the ammunition used for military and police purposes. Given that another part of this ammunition is intended for hunting purposes, the shooting sports is only responsible for about 10-15 thousand tonnes. The Olympic shooting occupies an even smaller part of this amount. Therefore, we can understand that the amounts of lead use in shooting sport are extremely low and are absolutely insignificant from the point of view of their environmental impact.

Fundamental claim

The introductory part of the request provides the following summary information about lead, which distinguishes it from other heavy metals: "*There is no evidence for a safe threshold for a number of critical endpoints, including developmental neurotoxicity and nephrotoxicity.* ***This means that there is no level of exposure below which effects in humans are not expected.***"

This claim is perplexing to say the least, since there are hygienic standards (as detailed in the national regulations and the World Health Organization) which have been developed on the basis of the concept of zero risk (meaning that there are no consequences for humans and future generations over their entire lifetime).

For example, the critical level of tap water lead contamination in the USA is 15 µg/l (actions are required if the concentration of lead in 10% of tap water samples exceeds that level [40 CFR 141.80, USA]), the critical level for ground waters in the EU is 20 µg/l.

In addition, if the claim is being made that any arbitrarily small amount of lead is dangerous to humans, this makes the request itself meaningless.

Risk assessment

According to the statements of ammunition manufacturers, there is no evidence of any specific illnesses caused to full-time employees working in ammunition companies.

Lead bullets, including pellets for airguns, are lubricated on the surface to prevent accumulation of lead into the barrel. The lubricant may be synthetic or natural based and it covers the whole bullet surface. The exact composition of the lubricant may vary, but it absolutely prevents human skin contact with lead.

As our studies of the behavior of metallic lead in the form of gunshot in the environment have shown, during the transformation process in the environment (soils), metallic lead can form soluble, slightly soluble, and insoluble compounds and complexes.

The impermeable surface cover which is formed on lead particles during oxidation remains intact in the atmosphere (the passivation effect). This is the reason why lead is used as a protective material, but due to the presence of organic and inorganic acids in soil, the surface cover undergoes transformation and a number of changes. Thus, lead is bound for the second time: now in the form of insoluble compounds.

Lead is relatively stable when poorly soluble or insoluble compounds (slow-moving complexes) are formed, which prevents the transfer of lead into soil solutions and its filtration into underground aquifers. This creates the conditions for lead to accumulate in the soil (it does not migrate to the aquatic environment or plants, does not sublime, does not disperse in the atmosphere, but stays in place). Adjustable concentrations of gross lead content in soils depend on the type of soil as well as on the type of agriculture being practiced on the land (in the European Union it can vary within the range of 25–2,500 mg of lead/kg of soil). For example, in Belgium (Wallonia region) the regulatory concentration mg of lead/kg of soil is equal to 200 for soil in residential areas and 385 - for industrial areas, the maximum (interventional) concentration is respectively 700 for residential areas and 1360 for industrial areas (Regulations of the soil management as of December 5, 2008. Annex 1 – "Norms", published in "Moniteur Belgrade 06.03.2009). In the USA it can vary within the range of 400-5000 mg of lead/kg for residential areas [U.S. EPA's OSWER Directive # 9355.4-12]. Despite the fact that there may be high concentrations of gross lead content in the soil, the presence of lead in this form in the soil is quite safe for the environment.

The latest data from Dutch ecologists (the Dutch National Institute for Public Health and the Environment, official website: https://www.rivm.nl; the study was conducted upon the request from the Dutch Ministry of Housing, Spatial Planning and the Environment), who have studied the effect of heavy metals on soil life, the development of microbiological processes, and the reactions of plants confirms this understanding: heavy metals belong to one hazard class, and within this class lead is classified as a low-hazard substance.

On the basis of existing assessments of the gross lead content in soils in the Netherlands, quantitative standards for 17 heavy metals were obtained, including the Maximum Permissible Addition, hereinafter referred to as MPA, for water, soil and sediments, expressed as MPC = MPA + Cb. The presented concentration list for MPA (and MPC) in soils based on the soil's ecotoxicological indicators reflects that lead is a non-priority pollutant with MPA over 100 mg/kg: the group which also includes Zn, Ba and Mo. (**Crommentuijn T., Polder M.D., Van de Plasshe E.J. Maximum Permissible Concentrations and Negligible Concentrations for metals, taking background concentration into accout//RIVM Report 601 501 001. Bilthoven, Netherlands, 1997, 260 p.)**

The background lead concentration of 85 mg/kg in Dutch soils is rather high, which indicates the impact of significant pollution sources. The maximum permissible soil lead concentration is set at 140 mg/kg (respectively, the rated maximum permissible load is 55 mg/kg). In such case, the maximum concentration (interventional) limit is 290 mg/kg. It is the limit which demands the environmental management (soil conditions).

While taking in consideration the concentration, it is to mention that the background concentration of areas with a military history is 110 mg/kg, so it is incorrect to disregard lead use for military purposes. In addition, it is advisable to take into account rather significant effects of the following aspects when considering lead contamination (especially in view of close interest to sport shooting facilities):

- disposing waste at landfills (including their unauthorized use in some countries);
- impact of the oil and gas industry;
- food industry (use of tin cans with lead solder), etc.

The use of tetraethyllead as a motor fuel additive until the 2000s increased the background lead content around an extensive highway network.

This last point especially proves the low mobility of lead, because the impermeable surface cover which is formed on lead particles during oxidation remains intact in the atmosphere (the passivation effect). This is the reason why lead is used as a protective material, but due to the presence of organic and inorganic acids in soil, the surface cover undergoes transformation and a number of changes. Thus, lead is bound for the second time: now in the form of insoluble compounds.

Soluble lead compounds formed during transformation, the so-called mobile lead, can potentially migrate to adjacent environments through filtration into underground aquifers and runoff, thus creating environmental risks. The share of soluble lead compounds in the total volume of transformation products depends on the gross lead content, soil type and environmental conditions, is generally small, ranging, according to various assessments, from 5 to 20 percent for different climatic zones.

This is the reason why the the production site monitoring of sport shooting facilities should mostly concern the “mobile” lead forms which are subject to statutory regulations (the maximum permissible concentration of mobile lead forms in soil is 5 mg/kg when using the TCLP test), or the composition of surface waters.

American researchers [the “Mobile Lead” report] also share this point of view. A number of analytical procedures used to assess the mobility and bioavailability of lead in the environment may be misleading. The Toxicity Characteristic Leaching Procedure (the TCLP test) does not simulate the actual environmental conditions of shooting ranges and is likely to overestimate lead mobility at most shooting ranges. The easiest and most reliable indicator of lead mobility in surface water at existing or former shooting ranges is water analysis of the corresponding water body.

The most toxic lead compounds are: tetraethyllead ($Pb(C_2H_5)_4$) and lead arsenate ($Pb_3(AsO_4)_2$) which are not formed in the environment but only as products of chemical manufacturing. Until recently, tetraethyllead had been used to improve the octane number of motor fuels, but it was initially synthesized for use as a chemical warfare agent. Lead arsenate has been used in pest control, especially in winegrowing.

Such lead compounds can be formed in the environment (humid atmosphere, soil containing organic and inorganic acids) as oxides, hydroxides, carbonates, sulfates, acetates and nitrates. Subsequently, these compounds tend to stabilize with the formation of insoluble carbonates, phosphates, silicates. Mineral composition of compounds is determined by X-ray phase analysis (a common control method).

Properties of shooting sports facilities

Anthropogenic origin of shooting sports facilities

Apart from the fact that shooting sports ***facilities*** cannot in any case be classified as “***terrains***” (see item 1 above), a shooting sport facility is not part of “the environment” either.

Shooting sports facilities (shooting ranges, shooting galleries, and shooting complexes) are anthropogenic facilities (or anthropogenic facilities within a landscape) that are constructed on the basis of particular designs. They have specific boundary coordinates, and they are delimited by a fence or building perimeter. As a rule, they are represented by concrete structures or structures made of other hard construction materials, constructed on loose soils with artificial (not natural) greenery and landscaping, lawns, and even ponds (by the way, they are used as test facilities), if the size of the facility allows it.

In other words, a shooting sports facility is essentially an industrial site for sports activities, not a part of the environment.

Manageability of shooting sports facilities

In contrast to “***terrains***” where lead management is difficult due to large distances (areas) and a number of other uncertainties, shooting sports facilities can be managed.

During the operation of outdoor shooting sport facilities, the content of gross lead and mobile forms of lead in soil, as well as in the surface and underground waters, is monitored as part of the industrial environmental control.

When the maximum permissible concentration of mobile lead forms is reached, the necessary compensatory measures for binding the mobile forms are implemented (immobilization of mobile lead). Such methods are already known, and we continue to search for new technical solutions for the immobilization of mobile lead forms based on studying the binding mechanisms and developing effective measures for environmental indicators.

Lead waste (fired lead gunshot) recovery can be organized at shooting sport facilities. Lead is a valuable material, and its recycling can compensate the costs of its recovery.

Indoor or semi-outdoor shooting ranges are used in Olympic rifle and pistol shooting. Air rifle and air pistol as well as .22 rifle and .22 pistol shooting competitions are mainly done indoor. Such kind of shooting range is a facility that does not affect the environment in any way, and metal lead does not escape its territory.

In confined indoor facilities, full lead control is carried out and its recovery is quite effective. Any target that is installed at Olympic shooting facilities has special bullet traps (Figures 1 and 2), allowing to fully recover all lead and splinters that may form after hitting the target. Bullet traps are highly regulated.

In shooting galleries, the process of lead recovery and disposal is already established and does not require any special measures. Shooting ranges are recommended to carry out the recovery of lead from the ground (the ground surface) in the following cases: either once the lead quantity on the shooting ground is enough to cover the cost of its recovery, or when the shooting range ceases its activity.

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Moreover: Air filters are used for ventilation of shooting ranges. They eliminate the contamination of the environment by lead dust or gases.

Figure 1

BULLET TRAPS

SIUS SWISS PRECISION

OFFICIAL MODELS

KFS2550R2
Approved calibers .22, .32, .38
(w/o steel jacket bullets)

HS10D003R3
bullet trap for HS10 with wall mounting kit

PROTOTYPES

KFS22R0
bullet trap for KFS22

KFS22V1R0
bullet trap for KFS22 with handle

VARIANTS OF HS10D003R3

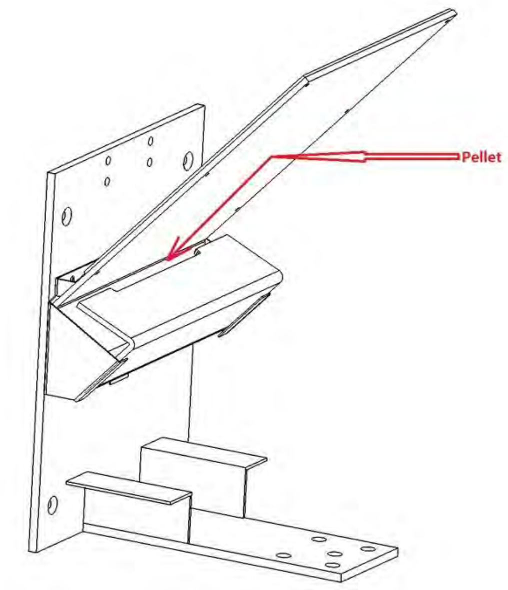
SRTD005R0
bullet trap for SRT01 preassembled

LS10G2D006R1
bullet trap with holder for LS10G2

PURCHASED BULLET TRAPS

KFS300R1 bullet trap for big bore, Leu und Helfenstein, without granulate filling

Figure 2. A 300 m bullet trap



An analysis of the availability and technical performance of alternatives:

The main alternative considered is the substitution of lead ammunition for ammunition made of steel or other materials (solid copper/brass, bismuth, tungsten).

Iron, as opposed to lead, actively decomposes in the environment: while the oxide film formed on the lead shot is so dense that it “passivates” (protects) the surface, a loose oxide hydroxide film is formed on steel gunshot, which is able to effloresce. Micron particles (2.5 µm) are formed as a result, which are very dangerous to the respiratory tract.

Iron forms soluble compounds which migrate to soil, groundwater and surface water. In other words, transformation of steel gunshot in soil leads to pollution of all adjacent environments – the atmosphere, underground and surface waters.

There is no iron concentration level established for soil but it is controlled in water (0.3 mg/l in surface waters, 0.1 mg/l in fishery waterways, according to the Russian regulations).

Dangerous iron compounds in the atmosphere are dispersions of iron oxide (Fe_2O_3), but not because of the toxic effect, but because of mechanical penetration of the lungs (this disease is called siderosis – similar to silicosis among miners). For dispersed particles (suspended solids with a size of 2.5 µm) the maximum permissible concentration with daily averaging is 0.035 mg/m3, and, for example, for dust particles (analogue of suspended solids) this indicator is 0.15 mg/m3. There is a separate standard established for Fe_2O_3 – 0.04 mg/m3 (according to the Russian regulations).

Other toxic iron compounds are iron sulphate (FeSO4) and iron chloride (FeCl3), which can be formed in the environment (in humid air and soil). Special level standards for atmospheric air concentration are established for the following compounds: iron sulphate – 0.007 mg/m3, iron chloride – 0.004 mg/m3 (in terms of the equivalent amount of iron).

Comparative studies by the University of Munich (TUM) have shown that the alternative shotgun and ball ammunition available on the market have far more toxic effects on the environment than metallic lead, especially in wetlands. A toxicity test was carried out on one of the key organisms for these wetlands, the large water flea (Daphnia magna). In these habitats, the large water flea holds a key position in the food chain of the relevant ecosystems. The studies revealed that the zinc and copper ions released by the alternative ammunition materials have a highly toxic effect on this organism, and mortality rates of up to 100 percent were measured in comparison to the control group. In the solutions contaminated with lead shot, on the other hand, the mortality rate was not different from that of the control group.

The alternative materials or lubricants (nickel, chrome, copper, bismuth) only exacerbate the impact on soil as heavy metals.

The use of steel (or tungsten) bullets leads to higher health and safety risks due to the increased probability of trauma because of higher ricochet of such bullets and shot.

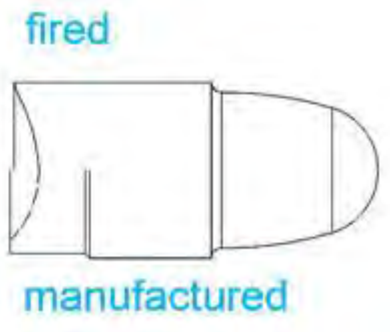
Using steel pellets requires a higher gunpowder load: it makes the shots louder and heavier, thus, negatively impacting the shooters' health.

Other problem of using other metals: the barrels are not constructed for using pellets made of other metals (it is the view of almost all users and manufacturers).

The third reason is that lead has ballistic properties which cannot be ensured when using other metals.

The fourth reason. In some cases, it is impossible to substitute lead with any other material. Rimfire ammunition (mainly caliber 22 LR or 22 Short) is a special case where replacement of lead is practically impossible – even with much higher cost materials. A rimfire bullet has to expand in the tail part to the dimensions of the barrel (large caliber) in the early stage of bullet acceleration (Figure 3), which is impossible with any material harder than lead. Many sports shooting disciplines use only rimfire ammunition, like biathlon and Olympic shooting disciplines.

Figure 3



The fifth reason is the financial costs. In centerfire target shooting (and training for that), the number of shots is large (even compared to hunting) and the high cost of alternative materials (solid copper/brass, bismuth, tungsten) very much prevents the use of them.

Adequate replacement for lead is only gold which is incomparably more expensive.

Moreover, the large number of shots would make the barrel wear a significant problem in sports shooting with harder alternative materials. The greater hardness of the substitutes leads to an increased strain on the barrels and the locking of the firearm. The higher mechanical stress leads to a faster material fatigue and wear on the firearm barrels. Unfortunately, we do not know any scientific studies on that, but as manufacturers of firearms and ammunition, we confirm that the life of test barrels becomes shorter when used with alternative materials. Sports firearms (pistols and rifles) are rather expensive high-technology tools, and their frequent replacement will adequately increase the costs for athletes.

The EU proposal (item 12) states that the costs of the proposed restriction would be borne mainly by hunters and sports shooters and that the cost increase would be reasonable for them. This testifies an insufficient study of the problem: apart from the costs mentioned above, it is the shotguns that need to be tested for use with alternative materials for ammunition, not only the ammunition itself. This would require establishing necessary infrastructure which is not available in many of the EU member states.

Socio-economic analysis (e.g. costs and benefits to society)

We cannot accurately estimate the amount of investment needed for the development of alternative materials. Companies have been studying it for many years, but there is no solution which would be acceptable for use in all areas. Moreover, so far it seems that there is no suitable alternative to lead. In particular, in shooting disciplines where bullets are used: in such types of firearms as short-barrelled rifles, air rifles, 0.22 caliber rifles, and rifles with powder charge.

Only lead bullets in combination with precision barrels finely tuned and designed deliver an accuracy that outbids anything else and is suitable as a system for international top athletes and their shooting ability. Put simply this high level accuracy is required because athletes are competing at a level where accuracy is maxed out. Any other solution would deliver results less than the capability of the athlete. If winning were to be a matter of lucky punch then this would be the end of all competition shooting. Based on the high level and demand for accuracy in the sporting sector there is no alternative for the projectiles and barrels currently used.

If Europe were to go solo with such ban, it will create inequality of opportunity for European athletes. Non-European competition shooters would have a technical advantage because they would continue to be admitted to compete in championships with their previous systems.
Clearly, no international competition can be attributed to a federation whose national laws prohibit the use of lead.

Any other metal can not just also affect the environment but, first and foremost, the athletes' health.

Substituting lead by any other material will demand considerable changes in sporting rules and gear. Currently it is demanded by law to not exceed 7.5 Joule muzzle energy with airguns. It is unknown if the accuracy delivered by any new airgun technology can stay within this limit.

Companies will have to invest in research and development for new technologies, products, and ways of how to manufacture the new items, with unknown practical and financial results

The need to adopt new applicable sports rules; need to test the effectiveness and safety of alternative materials and their compatibility with shotguns; the need to assess the economic costs of moving to using alternative materials; and their properties do not present data confirming that the goals, which are considered when proposing to ban lead, can be achieved.

Clay shooting is already an expensive sport and if you increase costs further it will remove significant number of sport persons away from clay shooting.

Most shotguns of a certain age will have to be 'hung-up'.

Also, a huge number of firearms that are built to accept only lead loaded cartridges will become useless. Who will compensate all those people or who will ensure their safety if they start using other metals in their weapons? This is a very huge argument and since there is no scientifically proved evidence that lead pellets at shooting galleries and gunshot at shooting ranges cause any pollution the European Union must review its thoughts concerning the matter.

It is necessary to understand whether the use of alternatives complies with applicable legal principles in all countries (e.g. CIP).

Conclusion

Taking into account the arguments presented above, it seems unreasonable, inefficient, and therefore inappropriate to include shooting sports facilities in the ECHA request (items B and D in the request) in light of the following circumstances:

- shooting sports facilities were quite reasonably not mentioned in the European Commission's request;
- shooting sports facilities do not affect the environment outside their site;
- shooting sports facilities do not pose risks to human health;
- the potential risks that may arise at a facility's industrial site in connection with the generation of "migratable" lead are manageable (i.e. they can be controlled and neutralized); the produced lead wastes are disposed of;
- the socio-economic impacts on the development of the shooting sport and its industry have not just not been calculated, but are not even considered.

It is proposed to:

◊ Remove items B and D as they apply to shooting sports facilities from the request;

◊ Before planning the ban of lead, it is necessary to study whether the safe use of alternative ammunition in existing firearms is ensured (system compatibility);

◊ Carry out an analysis of obviously negative socio-economic consequences due to the fact that this ban de facto leads to the unserviceability of millions of shotguns and thus to a quasi-expropriation for a large number of people.

◊ Carry out more reliable, thorough and long-term research on health and environmental effects of alternative gunshot materials before the ban of lead could even be considered.

Best regards,

Alexander Ratner