10 November 2016

Background document for orange lead (lead tetroxide)

Document developed in the context of ECHA's seventh Recommendation for the inclusion of substances in Annex XIV

ECHA is required to regularly prioritise the substances from the Candidate List and to submit to the European Commission recommendations of substances that should be subject to authorisation. This document provides background information on the prioritisation of the substance, as well as on the determination of its draft entry in the Authorisation List (Annex XIV of the REACH Regulation). Information comprising confidential comments submitted during public consultation(s), or relating to content of registration dossiers which is of such nature that it may potentially harm the commercial interest of companies if it was disclosed, is provided in a confidential annex to this document.

Information relevant for prioritisation and/or for proposing Annex XIV entries provided during the public consultation on the inclusion of orange lead on the authorisation list or in the registration dossiers (as of the last day of the public consultation, i.e. 18 February 2016) was taken into consideration when finalising the recommendation and is reflected in the present document.

The background document also describes how ECHA has taken into account the MSC opinion.

Contents

1. Identity of the substance

Chemical name: Orange lead (lead tetroxide)
EC Number: 215-235-6
CAS Number: 1314-41-6
IUPAC Name: Lead tetroxide

2. Background information for prioritisation

Priority was assessed by using the General approach for prioritisation of SVHCs for inclusion in the list of substances subject to authorisation[1]. Results of the prioritisation of all substances included in the Candidate List by June 2014 and not yet included or recommended in Annex XIV of the REACH Regulation is available at http://echa.europa.eu/documents/10162/13640/prioritisation_results_CL_substances_nov_2015_en.pdf.

The prioritisation results of the substances included in the draft 7th recommendation have been updated as necessary after the public consultation. The updated results are available at https://echa.europa.eu/documents/10162/13640/prioritisation_results_draft7threc_substances_feb2016_en.pdf

2.1. Intrinsic properties

Orange lead was identified as a Substance of Very High Concern (SVHC) according to Article 57 (c) as it is classified in Annex VI, part 3, Table 3.1 (the list of harmonised classification and labelling of hazardous substances) of Regulation (EC) No 1272/2008 as Toxic for Reproduction, Category 1A, H360D ("May damage the unborn child."), and was therefore included in the Candidate List for authorisation on 19 December 2012, following ECHA's decision ED/169/2012.

2.2. Volume used in the scope of authorisation

The amount of orange lead manufactured and/or imported into the EU is according to registration data in the range of 10,000 - <100,000 t/y (min. 45,000 t/y according to information submitted in the public consultation on the 6th draft Annex XIV recommendation (ComRef, 2015)).

Part of the volume is for uses that appear not to be in the scope of authorisation, such as use as intermediate in manufacture of certain pigments, technical ceramic materials (PZT, PTC, PLZT), frits and glass (including crystal and special glass). It is recognized that the intermediate/non-intermediate status of some of these uses (e.g. in glass and frits) is a complex issue, and it is stressed that this prioritisation exercise is not taking a formal position whether certain uses of the substance are regarded as uses as intermediates in accordance with the definition in Article 3(15).

The volume in the scope of authorisation is estimated to be in the range of 10,000 - <100,000 t/y based on registrations and further information.

More detailed information on the main uses and the relative share of the total tonnage is provided in Annex I.

[1] Document can be accessed at http://echa.europa.eu/documents/10162/13640/gen_approach_svhc_prior_in_recommendations_en.pdf

2.3. Wide-dispersiveness of uses

Registered uses of orange lead in the scope of authorisation include uses at industrial sites (e.g. use in the production of batteries, rubber and explosives, use in adsorbents) and uses by professional workers (use in paints) (ECHA, 2016). In addition, according to the information from industry (ComRef, 2015) the substance can be used in lubrication and corrosion protection products in the aerospace industry.

Finally, based on registration information the substance is used in articles (e.g. rubber articles and painted articles).

Some uses have been mentioned in the past in registrations, which however may not take place anymore:

During the public consultation on the SVHC identification (RCOM, 2012) non-registered, potentially professional, uses in graphite containing dispersion pastes, machining, scraping compounds and friction breaks were mentioned by industry. However the lead registrant in a recent update of its registration dossier specified that these uses did not happen/do not happen anymore and provided further information on why these uses were mentioned before.

Consumer use of artists' paints[2] containing orange lead were mentioned in the past in the lead and members' registration dossiers. The lead registrant and most of the member registrants have updated their registrations in April-June 2014 and they have removed this use from their dossiers and CSR. There are some members who have not updated their registrations, and the use remains in their dossiers. However, these members refer to the lead registrant's CSR which no longer supports the use. No own CSRs have been received from these members.

More detailed information on uses is provided in Annex I.

2.4. Further considerations for priority setting

Orange lead is used in similar applications (batteries) with lead monoxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate, also included in the Candidate List. However, it has not been assessed whether the function of these substances in these applications is the same and whether or under which conditions substitution could happen in practice.

[2] This use is derogated from the restriction to supply CMR substances on their own or in mixtures to the general public.

2.5. Conclusion

Verbal descriptions and Scores			Total Score (= IP + V + WDU)	Further considerations
Inherent properties (IP)	Volume (V)	Wide dispersiveness of uses (WDU)		
Orange lead is classified as toxic for reproduction 1B meeting the criteria of Article 57(c) Score: 1	The amount of orange lead used in the scope of authorisation is > 10,000 t/y. Score: 15	Orange lead is used at industrial sites and by professional workers. Initial score: 10 Furthermore, the substance is used in articles Refined score: 12	28	Grouping of orange lead with other lead substances used in batteries

Conclusion
On the basis of the prioritisation criteria further strengthened by grouping considerations, orange lead receives priority among the substances in the Candidate List (see link to the prioritisation results above). Therefore, **orange lead is recommended for inclusion in Annex XIV.**

3. Background information for the proposed Annex XIV entry

Draft Annex XIV entries were determined on the basis of the General approach for preparation of draft Annex XIV entries for substances to be included in Annex XIV[3]. The draft Annex XIV entries that underwent public consultation are available at:
http://echa.europa.eu/documents/10162/13640/7th_recom_draft_axiv_entries_en.pdf .

The final draft Annex XIV entries that ECHA recommends are available at:
https://echa.europa.eu/documents/10162/13640/7th_axiv_recommendation_november2016_en.pdf.

3.1. Latest application and sunset dates

The LAD slots are set in 3-month intervals (normally 18, 21 and 24 months after inclusion in Annex XIV but more slots can be considered on a case-by-case basis). In its draft recommendation ECHA had seen no reason to deviate from the three LAD slots of 18, 21 and 24 months after inclusion in Annex XIV that are normally assigned in a recommendation. Orange lead had been considered to be placed in the same slot with the other lead substances in this draft recommendation. Lead substances (including orange lead) were assigned to the 3rd LAD slot due to the potentially high number of uses and overall complexity of supply chain.

During the public consultation, based on the same considerations (high number of uses and complexity of the supply chain) the International Lead Association (ILA) and one company required extending the LAD of lead monoxide and orange lead to 35 months. The comments

[3] Document can be accessed at
http://echa.europa.eu/documents/10162/13640/recom_general_approach_draft_axiv_entries.pdf

referred also to the precedent created by chromate compounds (Regulation 348/2013) and to the MSC opinion on the draft 6th recommendation adopted on 11 June 2015 (in which the MSC recommended a 35 months LAD for lead monoxide and orange lead). The request for a latest application date of 35 months was also seconded by the Aerospace and Defence industry on the basis that the sector operates very long life cycle products for which the upkeep of legacy products need to be ensured.

In its opinion[4] the MSC proposes the consideration of a latest application date of 30 months for orange lead and lead monoxide. This proposal is based on the comments made during the public consultation.

ECHA has carefully assessed the requests made in the comments submitted in the public consultation as well as the MSC opinion. The use of a substance in legacy spare parts as described above appears to ECHA not to be a reason to prolong LADs. ECHA fully agrees that complexity of the supply chain seems to be one of the main factors affecting the time needed to prepare an application for authorisation. Furthermore, ECHA agrees that lead monoxide and orange lead have a high number and a high diversity of uses. In recognition of the concerns raised and to support a better spread of the workload for the Committees (RAC and SEAC), Commission and ECHA secretariat, ECHA recommends a longer LAD for lead monoxide and orange lead than proposed in the draft recommendation.

ECHA recommends the following transitional arrangements:

Latest application date (LAD):	Date of inclusion in Annex XIV plus **27 months**
Sunset date (SSD):	18 months after LAD

It is recognised that lead monoxide and orange lead are used in similar applications as pentalead tetraoxide sulphate and tetralead trioxide sulphate for which a LAD of 24 months is recommended (e.g. production of batteries). The recommended LADs do not impede joint applications for authorisation for those uses that are similar for the 4 substances. Applicants can always submit an application for authorisation before the latest application date.

More information on the structure and complexity of the supply chain of orange lead is provided in Annex I (section 3).

3.2. Review period for certain uses

In its draft recommendation ECHA had seen no ground to include in Annex XIV any review period.

During the public consultation ECHA did not receive comments requesting upfront review period for certain uses.

ECHA therefore **does not recommend to include in Annex XIV any review periods** for uses of orange lead.

[4] MSC opinion on ECHA's 7th draft recommendation

3.3. Uses or categories of uses exempted from authorisation requirement

3.3.1. Exemption under Article 58(2)

In its draft recommendation, ECHA had not proposed any exemption for (categories of) uses of orange lead on the basis of Article 58(1)(e) in combination with Article 58(2) of the REACH Regulation.

During the public consultations on the draft 6th recommendation and on the draft 7th recommendation[5], ECHA received a number of requests for exemptions, for specific uses or broader spectrum of uses (e.g. covered by certain legislation) (ComRef, 2015; ComRef, 2016). The list of uses for which an Article 58(2) exemption request has been received is presented in the table below for the 4 lead substances included in the draft recommendation. Many of these requests refer to the extensive body of legislation relevant to lead and its compounds.

Table 1. Uses of lead compounds for which an Article 58(2) exemption request has been received.

Substance	**Use**
Lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate	Batteries
Lead monoxide and lead tetroxide	Manufacture of pyrochlore antimony lead yellow
Lead monoxide and lead tetroxide	Technical / Piezo-ceramics
Lead monoxide and lead tetroxide	Frits
Lead monoxide and lead tetroxide	Glass (including special glass and crystal glass)
Lead monoxide	Glass frits (semiconductor industry)
Lead monoxide and lead tetroxide	Rubber
Lead monoxide	Electroplating
Lead monoxide and lead tetroxide	Airlines e.g. lead oxide is used in dry film lubricant products (and in batteries)
Lead monoxide	Laboratory reagent / processing aid for analysis of precious metal content of secondary and complex materials
Lead monoxide	Propellants in rocket motors
Lead monoxide	Catalysts and adsorbents
Lead monoxide and lead tetroxide	Explosives and detonators
Pentalead tetraoxide sulphate and	PVC stabiliser (virgin and recycled PVC)

[5] All exemption request submitted during the public consultation on the 6th and on the 7th draft recommendation are assessed in the 7th recommendation round, this is as the substance was not included in the 6th recommendation.

tetralead trioxide sulphate	
Lead monoxide	Manufacture of PVC stabilisers
Tetralead trioxide sulphate	Production of microporous plastic separators for lead-based batteries

After assessing the information provided in the public consultations, the MSC in its opinion concludes that there could possibly be grounds for exemptions from authorisation for the uses of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate that are regulated under the RoHS[6] and ELV[7] legislation. However, MSC notes that these pieces of legislation do not regulate the whole lifecycle and may therefore not offer the same level of protection for the environment or human health as could be achieved under the authorisation scheme.

For other uses of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate MSC is of the opinion that no information was submitted during the public consultation that would form the basis for inclusion of a specific exemption under Article 58(2) in Annex XIV.

ECHA has carefully assessed the requests made in the comments submitted during the public consultations as well as the MSC opinion.

ECHA's detailed assessment of the requests taking into account the relevant EU legislation is provided in the section 'C.2.1. Response to requests for exemptions under Art. 58(2)' of the Response document to the comments submitted during the public consultation (RCOM, 2016).

ECHA concludes that it is not clear if there is sufficient basis to propose Art 58(2) exemptions for any uses of lead compounds. **ECHA has therefore not suggested exemptions** for uses of orange lead on the basis of Article 58(1) (e) in combination with Article 58(2) of the REACH Regulation in its recommendation.

If the Commission were to consider Art 58(2) exemptions possible, uses of lead compounds exempted and subject to regular review under RoHS and ELV legislation may have a stronger case for Art 58(2) exemption than other uses.

During the public consultation (both on the 6th and 7th draft recommendation) a large number of comments were submitted stating that some uses should be exempted from authorisation based on the statement that the use would fulfil the definition of an intermediate use according to Article 3(15) of REACH. ECHA notes that if a use falls under the generic exemptions from authorisation, there is no need to propose an additional specific exemption.

3.3.2. Exemption of product and process oriented research and development (PPORD)

In its draft recommendation ECHA had not proposed to include in Annex XIV any exemption from

[6] Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011L0065&from=en

[7] Directive 2000/53/EC on end-of life vehicles: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02000L0053-20130611&qid=1405610569066&from=EN

authorisation for the use of orange lead for PPORD.

During the public consultations on the draft 6th recommendation and on the draft 7th recommendation[8] ECHA did not receive requests for such type of exemption.

ECHA therefore **does not recommend exempting any use of orange lead for PPORD** from authorisation.

[8] All exemption request submitted during the public consultation on the 6th and on the 7th draft recommendation are assessed in the 7th recommendation round, this is as the substance was not included in the 6th recommendation.

4. References

ComRef (2015): "Comments and references to responses". Document compiling comments and references to respective answers from commenting period 01/09/2014 –01/12/2014 on ECHA's 6th draft recommendation of priority substances for inclusion in the list of substances subject to authorisation (Annex XIV).

http://echa.europa.eu/documents/10162/13640/6th_axiv_rec_comref_lead_tetroxide_en.pdf

ComRef (2016):"Comments and references to responses" document. Document compiling comments and references to respective answers from commenting period 18/11/2015 – 18/02/2016 on ECHA's proposal to include orange lead (lead tetroxide) in its 7th recommendation of priority substances for inclusion in the list of substances subject to authorisation (Annex XIV).

https://echa.europa.eu/documents/10162/13640/7th_recom_comref_orange_lead_en.rtf

ECHA (2016): Orange lead (lead tetroxide). ECHA's dissemination website on registered substances. Accessed on 18 February 2016.

https://echa.europa.eu/search-for-chemicals

RCOM (2012): "Responses to comments" document. Document compiled by ECHA from the commenting period 03/09/2012-18/10/2012 on the proposal to identify orange lead (lead tetroxide) as a Substance of Very High Concern.

https://echa.europa.eu/candidate-list-table/-/dislist/details/0b0236e1807dc54f

RCOM (2016): "Responses to comments" document. Document compiling the responses to comments from commenting period 18/11/2015 – 18/02/2016 on ECHA's proposal to include lead monoxide, orange lead, pentalead tetraoxide sulphate and tetralead trioxide sulphate in its 7th recommendation of priority substances for inclusion in the list of substances subject to authorisation (Annex XIV).

https://echa.europa.eu/documents/10162/13640/7th_recom_respdoc_leads_en.pdf

ANNEX I: Further information on uses

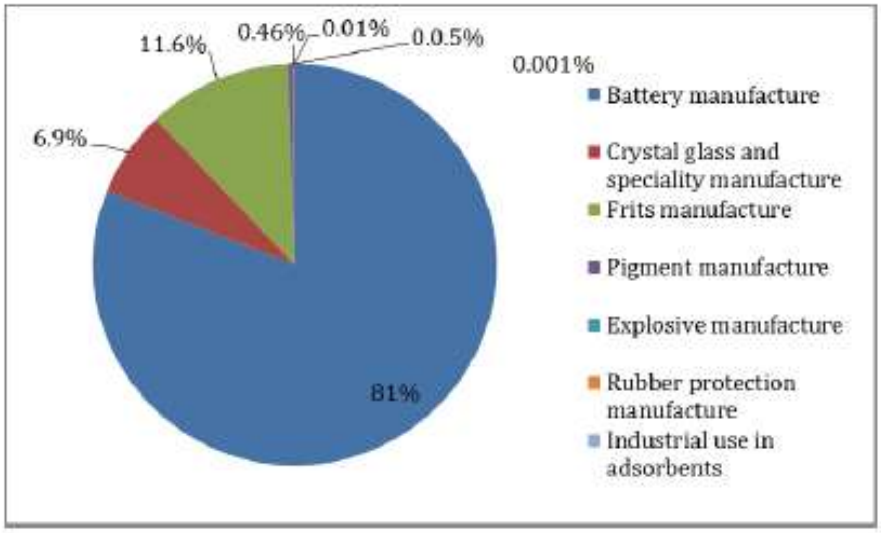
1. Main (sector of) uses and relative share of the total tonnage

The amount of orange lead manufactured and/or imported into the EU is according to registration data in the range of 10,000 - <100,000 t/y (~ 45,000 t/y according to information submitted in the public consultation on the 6th draft Annex recommendation (ComRef, 2015).

The substance has several uses in a range of EU industries. Based on information provided by the Lead (Pb) Reach Consortium[9] during the public consultation on the draft 6th recommendation (ComRef, 2015) the uses can be summarised as follow:

- the production of lead-acid batteries represents the main use of orange lead since it represents over 80% of its total use;
- the (intermediate) uses of orange lead in crystal, special glass and frits comprise most of the rest of the relative share (approx. 19 %)[10];
- and all the other uses represent less than 1% of the total volume (ComRef, 2015). However, as the total EU tonnage is high (10,000 - <100,000 t/y), the tonnage corresponding to some of the uses representing a low relative share may still be in the range of tens or hundreds of tons per year.

The figure below presents the end-use pattern of orange lead as defined by the Lead (Pb) Reach Consortium.



Estimated volumes for uses in the scope of authorisation (based on information from the registrations and from industry provided in the public consultation on the 6th draft recommendation (ComRef, 2015)) are given below:

[9] representing 5 of the orange lead registrants, ~80 companies and 12 industry associations representing the predominant uses of orange lead

[10] Based on current interpretation, these uses may fulfil the intermediate definition and is therefore of less relevance in the context of recommendation for inclusion in Annex XIV

- use in production of a battery paste for certain types of positive battery plates which are used in the production of industrial and automotive lead-acid batteries: 36,000 t/y;
- use in rubber compounds used for specific article applications, e.g. hoses and damping elements in the automotive sector, insulation and lining of cables: > 20 t/y
- use in delay elements of detonators in explosives used in civil works and mining: 30-90 t/y;
- use as pigment in anti-corrosive paints: 100 t/y
- use in adsorbents: unknown tonnage

In addition, during the public consultation on the draft 6th Recommendation (ComRef, 2015) industry stated that the substance can be used for surface treatment (plating) and in mixtures that provide lubrication and corrosion protection on critical aerospace products.

Further information on some of the above listed uses is given below.

2. Further details on the type of applications and/or functions per use[11]

2.1 Battery production

According to information from industry (ComRef, 2015), orange lead is used together with lead monoxide in the production of battery pastes in lead acid battery production (further details on battery production available in ILA and EUROBAT comments - RCOM, 2012; ComRef, 2015).

Lead-based batteries are widely used in automotive vehicles and industrial motive and standby applications, e.g. in forklift trucks and electric wheelchairs, as Uninterruptible Power Supply (UPS) for hospitals, IT applications and telecommunication systems including both landline and mobile telephone base station applications (RCOM, 2012; ComRef, 2016).

It is reported that over 95 % of the tonnage of orange lead used in batteries is used in industrial batteries (RCOM, 2012).

According to industry, the collection and recycling rate of automotive batteries in Europe is 99%. No precise data for the recycling of industrial lead-based batteries was provided.

2.2 Rubber production

Orange lead is currently used in the rubber industry as an accelerator/cross linker for rubber compounds used for specific article applications such as hoses and damping elements in the automotive sector (RCOM, 2012). It is also used as an additive in rubber compounds for insulation, lining and sheathing of materials exposed to sea water and of cables which have to meet electrical performance specifications for safety reasons (ComRef, 2015). All the above applications are industrial.

Depending on the specific application, lead oxides might be used to fulfil one or more functions ranging from corrosion protection/antioxidants, water swelling resistance, rubber metal adhesion promoters, functional fillers (as gas diffusion barriers), bonding agent in materials exposed to sea and water neutralizers forming insoluble and stable salts to co-agents in rubber crosslinking. In some compounds all these functions need to be fulfilled.

[11] The section is limited to uses likely to be in the scope of authorisation

2.3 Explosives

The use of orange lead in explosives is registered. According to information from industry (ComRef, 2015), the substance is used in delay elements of detonators. The explosives are mainly used in civil works and mining, but also uses in other applications including safety systems, aerospace items, seismic studies, special effects and amusement parks are mentioned (RCOM, 2012; ComRef 2015).

2.4 Paints

Professional use of orange lead in paints is registered, and during the public consultation industry confirmed that the substance is used as a pigment in anti-corrosive paints applied to iron and steel (mainly ships) (ComRef, 2015).

2.5 Other uses

No further information is available on the other uses reported in registrations (adsorbent). Some uses in aerospace industry were mentioned but no further details provided (ComRef, 2016).

3. Structure and complexity of supply chains

Detailed information on the structure and complexity of supply chains involved in the use of orange lead is not readily available. Indicative information on the sectors concerned can be retrieved from the identity of the comment submitters during public consultations. The following European sector-specific associations have commented during the SVHC and draft 6th recommendation public consultations[12]:

- ELOA (European Lead Oxide Association, representative of lead oxide manufacturers)
- EUROBAT (Association of European Automotive and Industrial Battery Manufacturers)
- ETRMA (European Tyre & Rubber Manufacturers' Association)
- Europacable
- FEEM (Federation of European Explosives Manufacturers)
- AEA (European Association of Airlines)
- ACEA (European Automobile Manufacturers' Association)

Comments were also received from glass, frits, ceramics and crystal associations[13], which uses of orange lead were claimed as intermediate. Based on information available it was concluded that these uses may indeed fulfil the intermediate definition.

[12] Comments submitted do not necessarily relate to supply chain description
[13] Cerame-Unie (the European Ceramics Industry Association), ESGA (European Special Glass Association), EDG (European Domestic Glass Association), Frit Consortium, LightingEurope , ICF (International Crystal Federation), Inorganic Pigments Consortium

3.1 Suppliers

According to ECHA's dissemination website there are 9 active registrants in the EU (ECHA, 2016).

According to one comment submitted by ELOA (European Lead Oxide Association) during the SVHC public consultation (RCOM, 2012), its 6 member companies are producing 95% of the lead oxide produced in EU, out of the battery industry which produces lead oxide for internal consumption in battery manufacturing process.

ELOA's members have manufacturing facilities in Germany, Spain, Italy and Poland.

The lead metal used for the manufacture of lead oxides by the ELOA members seems to come prevalently from recycling (RCOM, 2012).

3.2 Batteries

During the SVHC and 6th recommendation public consultations, the battery sector has been represented by EUROBAT. EUROBAT is composed of ~ 40 members who according to EUROBAT represent over 90% of the automotive and industrial battery industry in Europe. EUROBAT membership comprises companies who manufacture and sell batteries, companies that are contractors or suppliers of raw materials, systems or of equipment to battery manufacturers, and Battery Systems Integrator Members.

With the exception of one company, EUROBAT's members do not produce orange lead. Instead, orange lead is purchased from other EU suppliers (RCOM, 2012).

Based on registration information complemented by information provided during public consultations (ComRef, 2015; RCOM, 2012), it is assumed that the battery supply chain is composed of a relatively low number of lead tetroxide manufacturers, supplying the substance to the battery producers. According to registration information, orange lead used in the production of batteries, is supplied 'as such' for that use. Therefore, it is assumed that the supply chain does not involve formulators. It needs to be clarified however whether the registrants directly provide orange lead to the battery producers or whether some 'intermediate steps' may occur.

Europe counts many battery production sites (> 50 sites). Based on the process description provided during the public consultation it is assumed that the paste and battery production processes usually take place at the same production plant. The production process is likely to be similar in the different plants.

Key countries for lead-based battery production in Europe include France, Germany, Italy, Spain, Poland, the Czech Republic, Portugal and the UK.

Recycling of lead-based batteries appears to be done partly by the battery industry itself, partly by other smelters with the secondary lead being reused in the manufacture of lead oxide and tetroxide and new batteries (RCOM, 2012). The batteries returned at e.g. vehicle workshops, vehicle dealerships, accessory shops or DIY stores are picked up at collection points by specialised companies who transport and deliver the batteries to secondary smelting plants.

3.3 Rubber

Orange lead is used as additives in rubber materials, further used for specific article applications.

ETRMA (the European Tyre & Rubber Manufacturers' Association) indicates that orange lead is 'used in rubber' at 17 European sites located in Germany, the Czech Republic, Slovakia and Greece, and that there may be between 101-1,000 downstream automobile component manufacturers using the associated rubber products. Moreover, it indicates that 80% of rubber companies using lead oxides are represented by SMEs (RCOM, 2012).

Based on the above mentioned information, it is assumed that the supply chain is composed of few manufacturers (less than 10) supplying relatively few formulators (~17 sites), supplying a high number of article producers (101-1,000), being mainly SMEs.

The supply chain does not seem to include recyclers.

3.4 Explosive

According to information submitted in the SVHC public consultation (RCOM, 2012), there are 9 factories in the EU that produce some millions of detonators each year.

Based on comments submitted during the 6th recommendation public consultation it seems that in some cases lead tetroxide is supplied as such for the production of the explosive items (mixing with other components takes place at the production site) while in other cases, formulators may be involved (ComRef, 2015).

3.5 Paints and other anti-corrosion products[14]

No detailed information is available on the supply chain for paints and anti-corrosion products, however, it can be reasonably assumed that it consists of formulators and end-users. Considering the low tonnage involved and the specificity of the applications, the number of formulators is likely to be limited.

The number of end-users is likely to be high and can involve small actors (e.g. professional workers in the case of paint). Airline companies but also independent MRO (maintenance, repair and overhaul) services are involved in the case of anti-corrosion products.

[14] E.g. as used in the aerospace industry