EUROBAT

Lead REACH CONSORTIUM

Lead Monoxide, Lead Tetroxide, Pentalead Tetraoxide Sulphate, Tetralead Trioxide Sulphate

REACH AUTHORISATION EXEMPTION REQUEST

About EUROBAT

EUROBAT acts as a unified voice in promoting the interests of the European automotive, industrial and special battery industries to the EU institutions, national governments, customers and the media. With 47 members from across the continent comprising more than 90% of the battery industry in Europe, EUROBAT works with stakeholders to help develop new battery solutions to issues of common concern in areas like e-mobility and renewable energy storage.

Please refer to Appendix B for a list of all Eurobat members

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About the ILA

The International Lead Association is a membership body that supports companies involved in the mining, smelting, refining and recycling of lead. The ILA represents the producers of about 3 million tons of lead and almost two thirds of lead production in the western world. As secretariat to the Lead (Pb) REACH Consortium, ILA Europe (a regional branch of the International Lead Association) is acting on behalf of the Lead Registrants for several lead substances.

Please refer to Appendix C
for a list of all the Lead (Pb) REACH Consortium members.

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These below-mentioned comments represent the views of EUROBAT and the Lead (Pb) REACH Consortium member companies representing the predominant use of lead monoxide, lead tetraoxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based batteries in the EU.

The use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production should **not be subject to authorisation** for two reasons:

- They are used as **intermediates** (in the meaning of Article 3(15) REACH) in the manufacture of lead-based batteries; and
- The use of lead monoxide. lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in the manufacture of lead - based batteries would in any case meet the conditions for an exemption under **Article 58(2) REACH**

The following substances *used in the manufacture of lead-based batteries* are included in this request for exemption from authorisation requirements.

Use exemption requested for: *Use of lead monoxide/lead tetroxide/pentalead tetraoxide sulphate/ tetralead trioxide sulphate in lead-based battery production*

1. Substance Identity (s)

1.1. Chemical name: **Lead monoxide** (Lead oxide)

EC Number: 215-267-0

CAS Number: 1317-36-8

IUPAC Name: Lead monoxide

1.2. Chemical name: **Lead tetroxide** (Orange lead)

EC Number: 215-235-6

CAS Number: 1314-41-6

IUPAC Name: Lead tetroxide

1.3. Chemical name: **Pentalead tetraoxide sulphate** (tetrabasic lead sulphate)

EC Number: 235-067-7

CAS Number: 12065-90-6

IUPAC Name: Pentalead tetraoxide sulphate

1.4. Chemical name: **Tetralead trioxide sulphate** (tribasic lead sulphate)

EC Number: 235-380-9

CAS Number: 12202-17-4

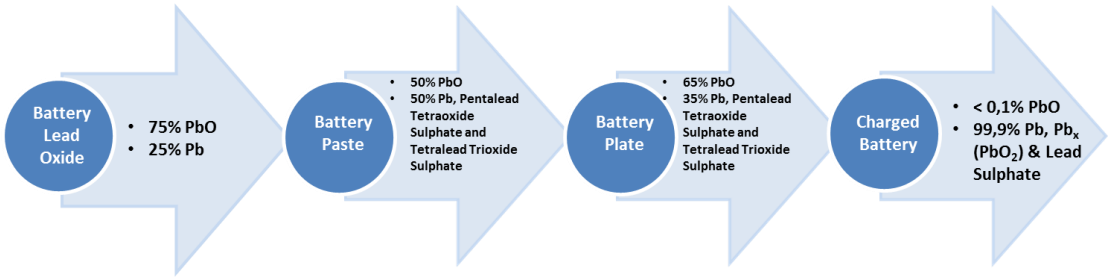
IUPAC Name: Tetralead trioxide sulphate

2. Use of Lead Substances in Battery Manufacturing

Lead Monoxide: The EU battery industry uses 510,000 t/a of lead monoxide. Thereof, 500,000 t/a are produced by the battery industry itself, the remainder is purchased from EU Lead monoxide manufacturers. Lead monoxide is used for the production of lead-based batteries, both for automotive (330,000 t/a) and industrial applications (180,000 t/a).

Lead monoxide is used in the production of battery plates for automotive and industrial lead-based batteries. It is transformed in the course of the battery manufacturing process into **pentalead tetraoxide sulphate** and **tetralead trioxide sulphate**, which are themselves ultimately transformed within the battery into **lead metal** (Pb) and **lead dioxide** (PbO_2). It is these latter two substances that are present in the charged battery (an article) and perform the electrochemistry that provides the electrical storage functionality.

The chemical reactions for lead oxides, leading into the transformation of the substances to a mix of lead sulphates, and further into lead metal and lead dioxide take place throughout the battery production process as outlined below.



Lead tetroxide: Over 80% of the total volume **(36,000 tonnes)** of lead tetroxide produced in the EU is used for the production of lead-based batteries, both for automotive but mainly for industrial applications. Lead tetroxide is used in the production of battery pastes for positive battery plates. In common with the use of lead monoxide, lead tetroxide is transformed in the course of the battery manufacturing process into **pentalead tetraoxide sulphate** (also known as tetrabasic lead sulphate) and **tetralead trioxide sulphate** (also known as tribasic lead sulphate), which are themselves ultimately transformed into **lead metal** (Pb) and **lead dioxide** (PbO_2) within the battery itself.

Pentalead tetraoxide sulphate (tetrabasic lead sulphate) and tetralead trioxide sulphate (tribasic lead sulphate) : These lead sulphates begin to be produced when

battery lead oxides (including lead monoxide/ lead tetroxide) react with water and sulphuric acid during the formation of the positive and negative battery pastes. They are not present in the battery placed on the market as they are transformed during the manufacturing process within the battery into lead metal and lead dioxide.

Lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate have been identified as substances meeting the criteria of Article 57(c) of REACH due to their classification as toxic for reproduction category 1A, for eventual inclusion in Annex XIV (authorisation list) of REACH. However, their use in lead-based battery manufacturing is considered "non-dispersive and controlled". They are **converted into other substances during the manufacturing process and are only present in trace amounts (<0.1%) in the charged battery (an article) when placed on the market**. Risk of exposure of the consumer and environment to the four lead compounds or any other substances during use of a lead-based battery is therefore not possible as indicated in the REACH registration dossier chemical safety report.

The use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production should **not be subject to authorisation** for two reasons:

- They are used as an **intermediate** (in the meaning of Article 3(15) REACH) in the manufacture of lead-based batteries; and
- The use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in the manufacture of lead-based batteries would in any case meet the conditions for an exemption under **Article 58(2) REACH.**

3. Exemption from Authorisation requirement as substances destined for intermediate use

Article 3(15) REACH defines as intermediate "a substance that is manufactured for and consumed in or used for chemical processing in order to be transformed into another substance."

This definition clearly covers the use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in the battery manufacturing process. Lead monoxide and lead tetroxide are consumed in the chemical processing and transformed into pentalead tetraoxide sulphate and tetralead trioxide sulphate, and then ultimately into lead metal (Pb) and lead dioxide (PbO_2) within the battery as indicated below:

Stage 1: Battery Lead Oxide Production

Lead ingots are first melted and then fed into a vessel or pot, where the molten lead is rapidly stirred and atomized into small droplets. The droplets of molten lead are then oxidized by air drawn through the pot and conveyed to a product recovery system. Alternatively a process with the same results uses a so called "ball" or "ingot mill".

The chemical reaction taking place in this step is:

$2Pb + O_2 \rightarrow 2\ PbO$

The battery lead oxide produced by this reaction is a mixture of lead monoxide and lead metal.

Stage 2: Mixing and Production of Battery Paste

Battery paste for both the negative and the positive plate is a mix of lead monoxide (approx. 50%), lead metal and lead sulphates (approx. 50%). The lead sulphates produced at this stage of the process are tetralead trioxide sulphate ($3PbO{\cdot}PbSO_4.H_2O$) and pentalead tetraoxide sulphate ($4PbO{\cdot}PbSO_4$).

The chemical reactions occurring during the production of battery paste are the following:

$4\ PbO + H_2SO_4 \rightarrow 3PbO{\cdot}PbSO_4.H_2O$

$3\ PbO{\cdot}PbSO_4.H_2O + PbO \rightarrow 4PbO{\cdot}PbSO_4 + H_2O$ (above 71°C).

In some types of battery, lead tetroxide is added in various amounts (according to manufacturer and plate design) to supplement the lead monoxide on the positive plate. However, in common with lead monoxide, the lead tetroxide undergoes a chemical reaction such that it is transformed into lead dioxide in the positive plates and spongy lead in the negative plates at the stage of formation of batteries.

Stage 3: Pasting

During the pasting process, the battery pastes are pasted onto grids composed mainly of lead metal in a pasting machine, to fill the spaces of the grids.

Stage 4: Curing

After pasting, battery plates are flash dried in a tunnel to a moisture content of 8 to 9%. Due to the battery oxide production process, the plates will contain about 12 to 15% of residual free lead, which needs to be converted to PbO during the curing process.

During the curing process, the lead, which is embedded in the paste, reacts with oxygen to produce further lead oxide:

$2Pb + O_2 \rightarrow 2\ PbO$

Stage 5: Battery Assembly

After curing, the plates are stacked so that positive and negative plates alternate with an insulating separator in between. These assembled plates are then placed into the battery boxes to become the semi-finished battery. No specific chemical reaction occurs at this stage of the process.

Stage 6: Formation & Charging

The formation and charging process is slightly different for dry and wet lead-acid batteries.

- For dry lead-acid batteries: Semi-finished batteries are placed into tanks containing sulphuric acid and are charged in these tanks. After forming, the sulphuric acid is removed and the batteries are sealed and are ready to be placed on the market.

- For wet lead-acid batteries: Semi-finished batteries are filled with sulphuric acid and the cover of the battery is placed on them. These batteries are then formed and fully sealed after the forming process. They are then ready to be placed on the market.

For both dry and wet lead-acid batteries, the formation phase is the phase during which the sulphuric acid electrolyte is added to the batteries and the electrochemical reactions occur. The pH in the battery goes under pH6 and *therefore all the lead oxide (and the lead tetroxide in the case of advanced batteries) is transformed into lead sulphate.*

The following chemical reactions take place for the PbO and $PbSO_4$ constituents of the tetralead trioxide sulphate and pentalead tetraoxide sulphate during the formation process:

<u>Positive plate (anodic process or oxidation)</u>

$PbSO_4 + 2H_2O \rightarrow PbO_2 + H_2SO_4 + 2H^+ + 2e^-$

$PbO + H_2O \rightarrow PbO_2 + 2H^+ + 2e^-$

<u>Negative plate (cathodic process or reduction)</u>

$PbSO_4 + 2H^+ + 2e^- \rightarrow Pb + H_2SO_4$

$PbO + 2H^+ + 2e^- \rightarrow Pb + H_2O$

The formation process is complete when the lead compounds have been fully converted to lead dioxide and spongy lead in the positive and negative plates respectively.

Therefore, the use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in the manufacture of lead-based batteries is intermediate use and thus falls outside the scope of the authorisation procedure under Title VII of REACH.

Based on a literal interpretation of Article 3(15) of REACH, a substance amounts to an intermediate if it is transformed into another substance during chemical processing irrespective of: the purpose of the process during which it is transformed; whether the transformation is the immediate step after manufacturing, or a subsequent step in the intermediate's life cycle; whether the resulting substance is used further in the same process and is placed on the market in a mixture or in an article, or is placed on the market as such; whether, in some cases, the substance can be used as an intermediate,

and in other cases, the same substance would not benefit from the special regime granted to intermediates under REACH; and whether the substance into which the intermediate is transformed may be covered by specific provisions or exemptions from REACH.

REACH does not specify that the transformation of a substance must take place in a subsequent step for it to be regarded as an intermediate. Neither is REACH concerned with the aim of the chemical process during which the substance is transformed; instead, it is concerned with the aim of the manufacturing and consumption/use of the substance to be transformed into another substance as such. ***The legal definition under REACH simply requires that the intermediate undergoes transformation, as is the case during the chemical reactions that involve the four lead substances in the battery manufacturing process****.*

4. Exemption under Article 58(2) REACH for use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production

Should ECHA disagree with the assessment that the four lead compounds are used as an intermediate in the manufacture of lead-based batteries, a REACH 58(2) exemption is requested for use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production and covers the tasks indicated below (as indicated in the REACH registration lead registrant dossiers):

Workplace	Description	Involved tasks
ES 4.1	plate manufacturing	Casting/production of grids, oxide production, mixing, pasting, and curing operations
ES 4.2	plate treatment	jar/tank formation, plate washing, drying, cutting
ES 4.3	Assembly	stacking, assembly, welding and joining operations
ES 4.4	battery formation	acid filling, formation (wet batteries), finishing
ES 4.5	internal logistics	storage of raw materials and finished goods, intra-facility transport, shipment
ES 4.6	Others	cleaning and maintenance

Once assembled and charged during the manufacturing process a lead-based battery becomes an article under the definition described in REACH (Article 3(3)), i.e. an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition that is not subject to the authorisation procedure under REACH.

The vast majority of lead-based batteries placed on the market for automotive and industrial use are sealed units such that there is no possibility for users to access the contents. In sealed batteries placed on the market in ready for use condition lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate may be present in trace amounts (but <0.1%).

A very small percentage of batteries are so called "dry charged lead-based batteries" which may initially contain lead monoxide above 0.1% when placed on the market. However once the consumer or professional user adds sulphuric acid, a necessary step prior to using the battery, a chemical reaction occurs that ensures that only trace amounts of lead monoxide (<0.1%) would be present once the battery is used (see description of formation & charging above). There is no potential for consumer or professional users to be exposed to the residual lead monoxide, lead tetroxide, pentalead tetraoxide sulphate or tetralead trioxide sulphate in the dry charged battery before addition of acid and no lead monoxide, lead tetroxide, pentalead tetraoxide sulphate or tetralead trioxide sulphate is present in the end of life phase.

In both cases of sealed and dry charged batteries there is no intended release of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate or tetralead trioxide sulphate from the article (battery) under (normal or reasonably foreseeable) conditions of use. *As such exposure of humans and the environment from use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate or any other lead substance in the article and end of life phase of a lead-based battery can be excluded.*

Should lead monoxide, lead tetroxide, pentalead tetraoxide sulphate or tetralead trioxide sulphate be the subject of an authorisation, that authorisation could in any event be restricted to use of these substances in lead-based battery production and hence this is the scope of the REACH Article 58(2) exemption hereby requested.

Article 58(2) of REACH allows to exempt from the authorisation requirement uses or categories of uses '*provided that, on the basis of the existing specific Community legislation imposing minimum requirements relating to the protection of human health or the environment for the use of the substance, the risk is properly controlled*'.

The piece of legislation has to define the measures to be implemented by the actors and to be enforced by authorities in a way that ensures the same minimum level of control of risks throughout the EU and that this level can be regarded as proper.

According to guidance issued by the European Chemicals Agency, legislation imposing "minimum requirements" means that Member States may adopt more stringent, but not less stringent requirements when implementing the specific EU legislation in question. By contrast, harmonization measures such as legislation imposing EU-wide occupational exposure limits amount to maximum requirements; the European Chemicals Agency states in its guidance on Article 58(2) of REACH that where occupational exposure limits exist, applications for an exemption under that provision is more likely to succeed.

The following elements shall be considered when deciding whether to include an exemption of a use of a substance in its recommendation

(i) There is existing Community legislation[1] addressing the use (or categories of use) that is proposed to be exempted. Special attention has to be paid to the definition of use in the legislation in question compared to the REACH definitions. Furthermore, the reasons for and effect of any exemptions from the requirements set out in the legislation have to be assessed.

(a) *Existing lead specific Community legislation exists for this industrial use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production/manufacturing, as follows*:

- Council Directive 98/24/EC on the protection of the health & safety of workers from the risks related to chemical agents at work (CAD), as implemented by Directives 2000/39/EC, 2006/15/EC, 91/322/EC and 2009/161/EU establishing lists of indicative occupational exposure limit values in implementation of Directive 98/24/EC as amended
- Council Directive 92/85/EEC - Protection of pregnant/breast feeding workers
- Council Directive 94/33/EC on the protection of young people at work
- The Industrial Emissions Directive 2010/75/EC replacing Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC)
- Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe
- Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy
- Council Directive 98/83/EC on the quality of water intended for human consumption
- Council Directive 2006/118/EC on the protection of groundwater against pollution and deterioration
- Council Directive 86/278/EEC on the protection of the environment, and in particular soil, when sewage sludge is used in agriculture

Other lifecycle stages of the battery (although not subject to Authorisation) are also covered by substance specific Community Legislation as follows:

(b) *Existing Community legislation applicable to lead-based battery use and end-of-life includes but is not restricted to:*

[1] Only existing EU legislation is relevant in the context to be assessed (not national legislation).

- Council Directive 2000/53/EC on end-of-life vehicles
- Council Directive 2008/103/EC amending Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators
- Council Regulation 1013/2006 on shipments of waste

(ii) This Community legislation properly controls the risks to human health and/or the environment from the use of the substance arising from the intrinsic properties of the substance that are specified in Annex XIV.

Lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate were identified as a Substance of Very High Concern (SVHC) according to article 57 (c) as they are 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 were therefore included in the candidate list for authorisation on 19/12/2012, following ECHA's decision ED/169/2012. It is this intrinsic property that can result in their proposal for inclusion in Annex XIV.

It is therefore important to assess whether existing community legislation already properly controls risks to human health and the environment arising from this intrinsic property. In doing so, ECHA has to conduct a detailed assessment of the relevant legislation so as to determine not only whether such legislation exists but also whether it sets out measures that already adequately control the relevant risks. Such assessment must be conducted by ECHA *in concreto* on a case-by-case basis. This analysis is described below:

a. Worker health controls

The health hazards of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate are well established and an EU wide harmonised classification exists through an entry in Annex VI, part 3, Table 3.1 (the list of harmonised classification and labelling of hazardous substances) of Regulation (EC) No 1272/2008. This triggers requirements for specific packaging and labelling and through REACH article 31 the provision of Safety Data Sheets to provide downstream users (including workers) with information on hazards and risk management measures.

During the industrial use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in lead-based battery production, the health risk associated with lead exposure is properly controlled by the specific requirements of three of the aforementioned legislative acts: Council Directive 98/24/EC on the protection of the health & safety of workers from the risks related to chemical agents at work; Council Directive 92/85/EEC – Protection of pregnant/breast feeding workers; and Council Directive 94/33/EC on the protection of young people at work. Moreover, the so called OSH "Framework Directive" (Council Directive 89/391/EC) also contains minimum safety and health

requirements throughout Europe that are applicable to workers employed in the manufacture of lead-based batteries such as use of personal protective equipment (through Directive 89/656).

- **Council Directive 98/24/EC on the protection of the health & safety of workers from the risks related to chemical agents at work**

The Chemical Agents Directive (CAD) seeks to protect workers from the effects of chemical agents that are present at the workplace or as a result of any work "activity involving chemical agents", which is defined as "any work in which chemical agents are used, or are intended to be used, in any process, including production, handling, storage, transport or disposal and treatment, or which result from such work". This would include the industrial use of lead compounds in lead-based battery production. The risks to the health of workers at work that is linked to occupational exposure to lead are controlled (in particular) by the imposition of a *binding* occupational exposure limit of 0.15mg/m^3 as specified in Annex 1 to the Directive and a *binding* biological limit value of 70µg Pb/dL blood and health surveillance measures. Lead (and its ionic compounds) remains the only substance listed in the CAD for which binding occupational exposure and biological exposure limits are mandated.

Article 10 of Directive 98/24/EC, indicates that where a binding biological limit value has been set for a chemical, health surveillance is compulsory and employees shall be informed of this requirement before being assigned to the task involving risk or exposure to the hazardous chemical agent indicated (currently this is only relevant to Lead and its ionic compounds).

These binding limits are clearly sufficient to adequately control the risks from the four lead compounds used in lead-based battery manufacturing; in fact, they even go beyond imposing *minimum community wide standards* on Member States by way of establishing harmonized occupational exposure limits.

Looking at those measures *in concreto* reveals that regular exposure reports and studies are collected by several Member States authorities on a yearly basis [see UK HSE statistics at http://www.hse.gov.uk/Statistics/causdis/lead/lead.pdf] that show that the industry fully complies with these exposure limits and that, as a result, any risks to workers' health are already adequately controlled.

Moreover CAD also defines additional measures to be implemented by the actors and to be enforced by authorities in a way that ensures the same minimum level of control of risks presented by lead and lead compounds throughout the EU. This is highlighted by the requirements outlined in Articles 4 to 11 and Annex II to the Directive, which impose positive obligations on the employer, to be assessed against measurable indicators. For instance Annex II specifies that biological monitoring of lead exposed workers *must* include measuring blood lead levels using absorption spectroscopy (or an equivalent method), and detailed medical surveillance *must* be carried out if exposure to lead in air is greater than 0.075mg/m^3 (8hr TWA) or if a blood lead level greater than 40µg/dL is measured in individual workers. Thus mechanisms exist to identify and, if necessary, remove workers should risks from lead exposure be such that occupational ill-health could result and before any statutory limits are exceeded.

In addition, the European Battery Industry through their Trade Association, EUROBAT, has for many years operated a voluntary blood lead reduction programme. Adherence to the Blood Lead Reduction Guidelines is a precondition of being a Member of EUROBAT. In 2013, EUROBAT updated the programme to set a new target that no employee would have a blood lead value in excess of 30µg/dL by the end of 2016. At the end of 2013 only approximately 10% of employees in participating companies representing EU-28 had blood lead levels in excess of 30µg/dL. Moreover, company employee blood lead data collected for purposes of conducting a chemical safety assessment as required by REACH Articles 10 & 14 has indicated that for the European battery sector the 90th percentile of all the measured blood lead data was 31µg/dL in 2012 and thus below the DNEL of 40 µg/dL.

- **Council Directive 92/85/EEC – Protection of pregnant/breast feeding workers**

As lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate are classified as Toxic for Reproduction, Category 1A, [H360D ("May damage the unborn child") it is important to evaluate whether this intrinsic property is adequately addressed by existing Community legislation.

Moreover, in the recent RAC opinion for harmonised classification of *lead metal* it was concluded that effects on or via lactation (Lact. - H362 (R64)) should be considered in a harmonised classification proposal as a result of evidence in humans that under extreme conditions levels of lead in breast milk could exceed WHO guidelines. This opinion could also be extrapolated to other lead compounds.

Specific risks to the unborn child and to infants that are breastfeeding are addressed by the requirements of Article 6 to Directive 92/85/EC that *specifically lists* lead and lead derivatives (in Annex II A and B) as substances for which pregnant workers and workers breastfeeding are *prohibited* from exposure if a risk assessment has indicated exposure would jeopardise safety or health. In specifically listing lead and its compounds as substances impacted by the requirements set out in Article 6 prohibiting exposure, we believe that this Directive also imposes *binding minimum standards* for protection of pregnant and breastfeeding workers to lead compound exposure that are applicable across the EU.

- **Council Directive 94/33/EC on the protection of young people at work**

It has been proposed that the developing brain of young people is particularly sensitive to the effects of lead.

It is therefore re-assuring that this element of risks to workers is also covered by long standing Community legislation in the form of Council Directive 94/33/EC on the protection of young people at work. Article 7 (2) b ensures that Member States prohibit the employment of young people for work involving harmful exposure to agents which are toxic, carcinogenic, cause heritable genetic damage or harm to the unborn child or which in any other way affects human health. Lead and its compounds are *specifically described* in Annex to this Directive as agents for which Article 7 (2) applies.

b. Environmental controls

Although the proposal for inclusion of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in Annex XIV relates predominantly to health risks it is also relevant to report that manufacturing facilities using lead and compounds are also covered by existing Community legislation ensuring that environmental releases are appropriately managed.

- **Ambient Air Quality Directive 2008/50/EC**

The Air Quality Directive requires that ambient air quality *must* be monitored throughout the territory of the Member States, who must ensure that the levels of lead in ambient air do not exceed the limit value of 0.5µg/m^3. In doing so this legislation can be seen to meet the requirement to specifically refer to lead compounds and set a minimum requirement for control of risk in establishing a limit value for lead in Annex XI that Member States shall ensure ambient air does not exceed.

- **The Industrial Emissions Directive (IED) 2010/75/EC**

This Directive is a recast of six previous directives concerning integrated pollution prevention and control (2008/1/EC12), waste incineration (2000/76/EC), solvent emissions (1999/13/EC) and three concerning waste from the titanium dioxide industry and sets out to achieve a high level of protection for the environment taken 'as a whole' from harmful effects of industrial activities. As from January 2016 IED will also replace Directive 2001/80/EC on the limitation of emissions of certain pollutants from large combustion plants. The key processes in manufacturing lead-based batteries are regulated directly by requirements of the IED.

Permit conditions and pollutant emission limit values (ELVs) therein have to be set on the basis of the application of best available techniques (BAT). Competent Authorities shall set emission limit values that ensure that, under normal operating conditions, emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions. Binding EU-wide Associated Emission Limit Values (A-ELVs) have recently been established for several industries manufacturing or using lead. The processes of manufacturing lead-based batteries are regulated directly by IED requirements.

- **Water Framework Directive (WFD) 2000/60/EC**

The WFD commits European Union Member States to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015. The strategy for achieving this involves the identification of priority substances amongst those that pose a significant risk to, or via, the aquatic environment at European Union level. The Water Framework Directive foresees in its articles 16 and 17 two crucial Daughter Directives, on quality of groundwater and on quality of surface waters. The Priority Substances Directive (2008/105/EC) lists lead and its compounds and lays down associated Environmental Quality Standards (EQS) that Member States should take into account for the first time in river basin management plans covering the period 2015 to 2021. Inclusion of a lead EQS in the Priority

Substances Directive meets in our opinion the REACH article 58(2) requirement to specifically mention the substance and establish a Europe wide standard.

(iii) This Community legislation imposes minimum requirements[2] for the control of risks of the use. Attention should be paid as to whether and how the risks related to the life-cycle stages resulting from the uses in question (i.e. service-life of articles and waste stage(s), as relevant) are covered by the legislation.

From the analysis made above it would appear that the existing workplace legislation for lead imposes specific minimum requirements for the control of health risks of the **industrial use** of the four lead compounds used in lead-based battery manufacturing. Whilst not directly applicable to the intrinsic hazards for which inclusion in Annex XIV is being considered (i.e. reproductive toxicity) it is also evident that existing environmental legislation contains elements intended to properly control the risks to human health and/or the environment resulting from release of lead from battery manufacturing facilities.

However, one needs to consider if there is potential for human or environmental exposure and hence risks related to other life-cycle stages resulting from the use of lead compounds in batteries. As indicated previously, risks to humans and the environment from use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in the finished article (i.e. battery) and during its end of life phase can be excluded as they are not present in the battery in its charged state (apart from trace amount of lead monoxide). *We therefore conclude that the scope of authorisation would be limited to the Industrial use of the substances as intermediate stages in the battery manufacturing process itself-not the use phase of the battery*. Notwithstanding this being the case we would like to highlight that irrespective of this situation there is existing EU legislation covering the marketing and end of life phases of lead-based batteries that are highlighted below:

- **Council Directive 2000/53/EC on End-of-Life Vehicles**

The End of Life Vehicle Directive was adopted in September 2000 with the aim of reducing waste from end of life cars as well as at the improvement in environmental performance of all the economic operators involved in the lifecycle of vehicles by ensuring that the constituent parts of a car can be recycled. As a key component in the functioning of a car, this directive also applies to car batteries. *Under Article 4(2)(a) a number of substances, including lead may not be used in cars*. Annex II provides for exceptions to these restrictions, including the use of a number of these substances in batteries. An exemption was granted for use of lead in car batteries. In May 2010, the Oeko Institute prepared a report for the European Commission on whether to continue

[2] There needs to be binding and enforceable minimum requirements in place for the substance(s) used. Legislation imposing minimum requirements means that:

- The Member States may establish more stringent but not less stringent requirements when implementing the specific EU legislation in question.

- The piece of legislation has to define the measures to be implemented by the actors and to be enforced by authorities in a way that ensures the same minimum level of control of risks throughout the EU and that this level can be regarded as appropriate.

this exemption for lead. The report concluded that the use of lead in batteries is unavoidable at this point in the technology as there are no other alternatives which are as efficient or reliable. The European Commission and the Member States therefore decided to continue the exemption and will review the situation again in 2015. The ELV Directive therefore already restricts the use of lead (and lead compounds) in cars and offers incentives for automakers to identify suitable alternatives to lead-based batteries.

- **Council Directive 2006/66/EC (as amended by 2008/103/EC) on Batteries and Accumulators and Waste Batteries and Accumulators**

The Batteries Directive has the aim of minimising the negative impact of batteries and accumulators on the environment and improving their overall environmental performance. It restricts the use of some materials in batteries (particularly mercury and cadmium) and tasks Member States with encouraging the development of improvements to the environmental performance of batteries and putting in place battery collection schemes. Member States must also ensure that storage and recycling of spent batteries is appropriate and fit for the purpose. Member States are required to regularly report on progress in the areas covered by this Directive. It also provides instruments to regulate the management of hazardous substances, for controlling potential risks and for proposing substitution options for all substances used in batteries.

Under the Batteries Directive, Member States have to ensure that, as of 26 September 2009 batteries and accumulators that have been collected are treated and recycled using the best available techniques. As a minimum, treatment must include removal of all fluids and acids. Batteries and accumulators must be treated and stored (even if only temporarily) in sites with impermeable surfaces and weatherproof covering, or in suitable containers.

By September 2011 Member States had to ensure recycling of at least 65% by average weight of lead-based batteries and accumulators and to ensure the recycling of the lead content to the highest degree that is technically feasible. Typically the recycling efficiency of lead-based batteries is >>85% with the lead, acid, plastics and other components, being recovered from the spent battery and recycled to produce materials for other value added products. Moreover, the vast majority (99%) of industrial and automotive lead-based batteries are collected and recycled by the battery industry and other smelters in a closed-loop system, with the secondary lead being reused in the manufacture of refined lead metal, lead compounds and ultimately new batteries and other value added products.[3]

- **Council Regulation 1013/2006 on shipments of waste**

Treatment and recycling may take place outside the Member State concerned or even outside the Community, provided EU legislation on the shipment of waste is respected. Lead-based batteries are covered by the provisions of the Basel Convention as well as the revision of the Decision on the control of trans-boundary movements of wastes destined for recovery operations, adopted by the OECD in 2001. Parties to the

[3] The availability of automotive lead-based batteries for recycling in Europe. IHS Report 2014.

Convention must cooperate with each other in order to improve and achieve environmentally sound management of hazardous wastes and other wastes. The aim is to implement all practical measures to ensure that wastes covered by the Convention are handled in such a way that protection of human health and the environment from their harmful effects is guaranteed.

- **Other "Lead-Specific" EU Legislation**

Lead and lead compounds also have an additional plethora of existing EU legislation to mitigate residual risks and drive substitution in products where technically and economically feasible. In the interests of brevity these are not further discussed in this document but add to the weight of evidence that REACH authorisation for use of the four lead compounds in manufacturing of lead-based batteries *would not be an appropriate regulatory action in terms of proportionality*.

A comprehensive list of lead specific product legislation is included in Appendix A.

Summary & Conclusion

I. The industrial use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate for production of lead-based batteries falls outside the scope of REACH authorisation requirements as they are intended for intermediate use.

II. In the alternative, the use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate for production of lead-based batteries should be granted a REACH Article 58 (2) exemption on the following grounds:

- **Existing Community legislation already addresses the use categories to be exempted.**

- **The existing legislation provides binding and enforceable minimum requirements for the control of risks from industrial use of lead monoxide, lead tetroxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate in battery manufacturing. In having a *binding* occupational exposure and biological limit for lead, supported by additional measures such as medical surveillance, Council Directive 98/24/EC ensures that harmonized, EU wide standards operate (although Member States can establish more stringent but not less stringent requirements).**

- **Existing National statistics and exposure data gathered by Industry to support development of REACH chemical safety reports and voluntary sector wide voluntary blood lead reduction targets shows the effectiveness of the measures already in place under existing Community legislation such that it properly controls risk to human health from the use of the substances arising from their intrinsic properties specified in Annex XIV.**

- **The existing legislation covers the risks related to the lifecycle stages resulting from the use of the substances in battery manufacturing and this is further supported by additional legislation that covers the service life of lead-based batteries and waste stages.**

- **Pressure for substitution of lead from use in batteries already exists in the form of a restriction on lead in Council Directive 2000/53/EC on End-of-Life Vehicles that is reviewed every 5 years (with the next review scheduled for 2015) and requirements of the Batteries Directive (2006/66/EC as amended by 2008/103/EC)**

Appendix A

Existing and Proposed Lead Specific EU Legislative Acts

Mixtures, articles and consumer products containing lead (and compounds) are regulated through several EU directives with regard to their risk to human health.

EU regulations	Legal requirements
Directive 76/768/EC on cosmetics	▪List of substances that cosmetic products must not contain (including lead and its compounds)
Directive 98/83/EC on quality of water intended for human consumption	▪Member States must ensure that all appropriate measures are taken to reduce the concentration of lead in drinking water in compliance with parametric value of 10µg/L
Directive 98/70/EC on petrol	▪prohibition of leaded gasoline (except aircraft) ▪lead content < 0.005g/l
Annex XVII of REACH: restriction of the use of certain hazardous substances	▪Direct restriction of lead carbonates and sulphates in preparations intended to be used as paints ▪substances classified as CMR may not be sold to the public (lead compounds are Repr. Cat 1 and lead hydrogen arsenate in Carc. Cat 1)
Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) (including 2006 ATP) and Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)	▪substances restricted in a waste management perspective ▪articles concerned: electric light bulbs, luminaires, households appliances, IT, telecommunications and office equipment, home equipment: tv, audio-visual equipment, lighting equipment, electrical and electronic tools (such as watches), toys, leisure and sports equipment and automatic dispensers ▪substances < 0.1% by weight in homogeneous material ▪ electronic modules and used in quartz and watches (2006 ATP): maximum of 37% of lead in solder alloys ▪ promotion of the collection and recycling of such equipment
Directive 2009/48/EC on toys	▪total prohibition of certain substances or preparations in toys except those which are essential to their functioning. In this case, they are submitted to a maximum concentration defined for each substance individually ▪Bioavailability resulting from the use of toys < 0.7µg/day (EN 71-3) ▪lead migration limit from toys = 90 mg/kg (EN 71-3) ▪lead migration limit = 13.5 mg/kg dry, brittle, powder-like or pliable toy material

	▪lead migration limit = 3.4mg/kg liquid or sticky toy material ▪lead migration limit = 160mg/kg scraped-off toy material
Directive 84/500/EEC on ceramics articles intended to come into contacts with foodstuffs	▪.maximum permitted quantity of lead which can be extracted using standard methods is 0.8mg/dm² for articles which cannot be filled or which can be filled but not deep (25mm), 1.5mg/l for cooking ware and storage vessels which can be filled by more than 3 litres and 4.0 mg/l for other articles (+50% of these thresholds tolerated)
Directive 2001/95/EC on General Product Safety	▪only safe products for consumers are placed on the market (conception and/or information) ▪information system (RAPEX)
Directive 94/62/EC on packaging	▪requirements on the design of packaging and packaging waste ▪special article 11 on SVHC (including lead): concentration level in packaging and packaging components < 100 ppm (mg/kg)
Commission Regulation 466/2001 on contaminants in foodstuffs	▪ lead level in milk, meat, fish, shellfish, cereals, vegetables, fruits, berries, oils, fats, fruit juice and wine must be between 0.02mg/kg by wet weight (cow's milk) and 1.5mg/kg w.w. (mussels)
Directive 98/83/EC on quality of water intended for human consumption	▪ lead content < 10µg/l in water for human consumption
Directive 88/344/EEC on extraction solvents in foodstuffs	▪residues of solvents used in food industry ▪lead content in extraction solvents < 1mg/kg
Directive 88/388/EEC on flavourings for use in foodstuffs and to source materials for their production	▪ lead content in flavourings < 10mg/kg
Directive 69/493/EEG on crystal glass	▪prescription of the use of lead in crystal glass ▪>30% of content of lead in "full crystal glass" cat. 1 ▪[24%, 30%[of content of lead in "full crystal glass" cat. 2
Commission regulation (EU) No 836/2012 of 18 September 2012 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards lead	The prohibition of the placing on the market and use of lead and its compounds in metallic and non-metallic parts of jewellery articles, if the lead concentration is equal to or greater than 0,05 % by weight of the individual part, unless it can be demonstrated that the rate of lead released does not exceed the limit of 0,05 µg/cm^2/h (0,05 µg/g/h).
REACH Restriction proposal for lead in consumer articles	In March 2013, ECHA launched a public consultation on the following restriction proposal from Sweden: "Lead and its compounds shall not be (…) used in articles (…), which are supplied to the general public and which can be placed in the mouth by children, if the concentration of

	lead (…) is equal to or greater than 0.05% by weight".
Quality of Petrol and Diesel Fuels Directive 2003/17/EC	Limit values of 0.005g Pb/l gasoline, amends Council Directive 98/70/EC, which itself amended Council Directive 85/210 EEC
Council Directive 1999/45/EC on the classification, packaging and labelling of dangerous preparations	All preparations containing dangerous substance classified under directive 67/548/EEC above a certain threshold have to be classified accordingly. Labels of packages of paints and varnishes containing Pb in quantities exceeding 0.15% (expressed as weight of metal) of the total weight of the preparation must contain warnings
Council Directive 91/689/EEC on hazardous waste	Sets out requirements for management of waste containing Pb above a certain level (other hazardous waste too
Council Directive 76/769/EEC on restrictions on the marketing and use of certain dangerous substances and preparations	Prohibited use of Pb sulphates and Pb carbonates in paints (with minor exceptions). Directive was amended by Council Directive 89/677/EEC which banned the use of all Pb based paint in residential applications
Council Directive 67/548/EEC on the classification, packaging and labelling of dangerous substances	Classifies some Pb compounds in categories depending on their epidemiological and environmental effects

In addition, there is a number of international initiatives and agreements which will have affected emissions to the environment, the results of which are still be realised in terms of changes in environmental concentrations. These include:

- OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic;
- UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP);
- Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal; and
- Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area.

OSPAR

The OSPAR Convention was initiated to protect the marine environment of the North-East Atlantic. As part of the Convention, a number of strategies have been developed to address the main threats to this environment. These include the Hazardous Substances Strategy which is intended to prevent pollution of maritime areas by ongoing reductions in the release of hazardous substances; its ultimate aim is to achieve near background levels for those substances which occur naturally (e.g. Pb, mercury) or close to zero for anthropogenically-generated substances. As part of this strategy, BAT requirements for various industrial processes that result in Pb emissions were published (e.g. OSPAR Recommendation 98/1 concerning Best Available Techniques and Best Environmental Practice for the primary non-ferrous metal industry). It should be noted that much of the reporting requirements under OSPAR have now ceased as they have been surpassed by the IPPC directive BREFs.

CLRTAP

The Convention on Long-Range Transboundary Air Pollution (CLRTAP) was signed in 1979 and entered into force in 1983. As the first regional environmental convention, CLRTAP has been instrumental in the reduction of key harmful pollutants in both Europe and North America. The Convention has been extended by eight Protocols (including the Aarhus Protocol, which is summarised below), focused upon setting strict reduction targets for releases of pollution for the protection of human and environmental health. Each of these Protocols targets pollutants such as sulphur, nitrogen oxide, persistent organic pollutants, volatile organic compounds, ammonia, and toxic heavy metals (including Pb).

The CLRTAP requires Contracting Parties to develop the best policies and strategies including air quality management systems and, as part of these, control measures compatible with balanced development, in particular by using the best available technology which is economically feasible and low and non-waste technology, in particular relation to new or rebuilt installations.

As mentioned, the CLRTAP has been extended by eight specific protocols, one of which, the Aarhus Protocol, relates to heavy metals. The Protocol, adopted in 1998 and entered into force on the 29th December 2003, targets heavy metals, in particular cadmium, Pb and mercury. The main objective of the Protocol is to control emissions of heavy metals caused by anthropogenic activities that are subject to long-range transboundary atmospheric transport and are likely to have significant adverse effects on human health or the environment. One of the basic obligations requires Parties to reduce emissions below 1990 levels (or an alternative year between 1985 and 1995). The Protocol aims to cut emissions from industrial sources (e.g. iron and steel industry, non-ferrous metal industry), combustion processes (power generation, road transport) and waste incineration. Parties are required to implement emission standards for these pollutants for stationary sources, based on the best available technologies suggested in the protocol. In addition, parties undertake to phase out the use of leaded petrol and to introduce measures designed to lower heavy metal emissions from other products.

Under the protocol, parties are to develop strategies, policies and programs, without undue delay, to discharge their obligations under the protocol. A range of measures are suggested for this purpose, including economic instruments, government/industry covenants and voluntary agreements, more efficient use of resources, use of less polluting sources, development of a less polluting transport system, phasing out certain polluting industrial processes and developing cleaner processes. Parties are free to adopt more stringent measures than those required by the protocol. As for other protocols, the heavy metals protocol promotes technology exchange and other forms of co-operation between the parties. Parties must report periodically to the Executive Body on measures taken to implement the protocol, with compliance overseen by the Implementation Committee (Sands 2003). As of 15 November 2011, 31 of the 36 signatories had ratified the protocol to at least some extent.

Basel Convention

Under the Basel Convention, Member Parties must report data on the generation and movement of hazardous wastes (including those containing Pb). Towards this end, an annual questionnaire is sent to Member States requesting information on the generation, export and import of the various hazardous wastes covered by the Convention. It is the responsibility of the designated responsible national Agencies ('focal points') to submit the required information to the Secretariat. This information is reviewed and compiled by the Secretariat and presented as an annual report that routinely includes statistical tables and graphic representations of data.

Helsinki Convention

The most recent Helsinki Convention (governed by HELCOM) for the 'Protection of the Marine Environment of the Baltic Sea Area' entered into force on the 17 January 2000 and covers the whole of the Baltic Sea area, including inland waters as well as the water of the sea itself and seabed. Pb is included under Appendix 3 of HELCOM recommendation 19/5, which establishes a list of selected substances for immediate priority action under the Convention. With specific relevance to industry, HELCOM recommendation 25/3 (adopted 2nd March, 2004), aims to reduce emissions and discharges from industry by effective use of the Best Available Technique (BAT) for the identified hazardous substances, and contains a number of specific provisions for Pb (e.g. for the waste incineration and glass industry).

Appendix B

EUROBAT Membership

EUROBAT membership comprises Regular Members (companies who manufacture and sell batteries within Europe, Middle East and Africa), Associate Members (companies that are contractors or suppliers of raw materials, systems or of equipment to battery manufacturers), and Battery Systems Integrator Members.

EUROBAT's battery manufacturing members are:

- Assad Batteries
- AKOM
- Banner Batterien
- EnerSys EMEA
- Eternity Technologies
- EXIDE Technologies
- FIAMM
- Hoppecke Batterien
- Inci Akü
- Johnson Controls Power Solutions Europe
- Midac
- Moll Batterien
- Powertech Batteries
- S.C. ROMBAT
- SAFT
- Systems Sunlight
- TAB Tovarna Akumulatorikih Baterij
- Yuasa Battery Europe

EUROBAT's associate members are:

- Abertax Group
- Accuma SpA
- Accumalux S.A
- Amer-Sil S.A.
- BM Rosendahl
- Daramic, Inc
- ECOBAT Technologies
- DEKRA Certification B.V.
- Entek International Ltd
- Froetek Kunststofftechnik GmbH

- Glatfelter Gernsbach GmbH
- Hammond Expanders UK
- HOFMANN POWER SOLUTIONS
- Hollingsworth & Vose Company
- IKERLAN
- LITHOPS
- MECONDOR
- Microporous GmbH
- MIDTRONICS
- Mitsui Chemicals
- MTH Metalltechnik Halsbrücke GmbH & Co KG
- NISSAN Motor
- Pyrotek
- Recylex SA
- SOVEMA SpA
- T.B.S Enginieering Ltd.
- Toray International Europe Gmbh
- Water Gremlin Aquila Company S.p.A.

Appendix C

Lead REACH consortium members

5N Plus Belgium SA	Johnson Controls Autobatterie GmbH & Co.
Akkumulatorenfabrik Moll GmbH	Johnson Controls Autobaterias SA (Spain)
Anton Schneider Sohne GmbH	Johnson Controls Autobaterie spol (Czech)
Asua Products SA	Johnson Controls Sachsen-Batterien GmbH
Aurubis GA	Johnson Controls Recycling GmbH
Azor Ambiental SA	KCM 2000 SA SC
BAE Batterien GmbH	KGHM Polska Miedz SA
Baerlocher GmbH	Kovohute Pribram Nastupnicka a.s
Banner GmbH	Le Plomb Francais Sarl
BASF SE	Loxa Sp. Z.o.o.
Berzelius Stolberg GmbH	MECA Lead Recycling SpA
BMG Metall und Recycling GmbH	Metalblanc
Boliden Bergsoe AB	MetAlliance LLP
Boliden Mineral	Metal Processors Limited
BSB Recycling GmbH	Metallo-Chimique NV
Campine Recycling NV	Metalurgica de Medina SA
Chemson Polymer-Additive AG	Midac
Colorobbia Italia spa	Midland Lead Manufacturers Ltd
COPLOSA, Sociedad Anonima	MPI Reciklaza d.o.o
Eco-Bat SpA	Muldenhutten Recycling und Umwelttechnik GmbH
Ecological Scrap Industry SpA	Nederlandse Accumulatoren Produktie
Ecometal Ltd	Nizi International SA
EnerSys Newport	Nyrstar

EnerSys SARL	Penox GmbH
EnerSys Sp. Zoo	Piombifera Italiana Spa
EnviroWales	Piomboleghe Srl
Exide Technologies GmbH (Deutsche Exide)	Portovesme Srl
Exide Technologies Lda (SPAT)	PPUH Autopart Jacek BAK Sp z o.o
Exide Technologies Recycling SL (Oxivolt)	RECOBAT
Exide Technologies Recycling II Lda (Sonalur)	SC Rombat SA
Exide Technologies SA (Centra)	SIA Industria Accumulatori Spa
Exide Technologies SA (Tudor)	STCM-APSM
Exide Technologies SAS (CEAC)	Sunlight SA
Exide Technologies Srl (Exide Italia)	TAB dd
Fenix Metals Sp. z o.o.	Teck Ltd
FIAMM SpA	Traxys Europe SA
Floridienne Chimie SA	Umicore
Glencore Import BV	Union Derivan SA (Undesa)
Glencore International Import BV	Uzimet
Hammond Lead Products	Vippienne SpA
Hakurnas	Uzimet
H J Enthoven Ltd	Vippienne SpA
Hoppecke Batterien GmbH & Co KG	Weser-Metall GmbH
Huta Cynku “Maisteczko Slaskie”	Wilhelm Grillo Handelsgesellschaft mbH
IKa Innovative Kunststoffaufbereitung GmbH & Co.KG	Xstrata Zinc (Britannia Refined Metals Ltd)
Jenox Akumulatory Sp. z o.o	Yuasa Battery UK Ltd
	Zap Sznajder Batterien s.a
Associate member	Association of European Sporting Ammunition Manufacturers (AFEMS)