Precious Metals Consortium

Precious Metals & Rhenium Consortium

PM Refiners Work Group Meeting

4 October 2016 | Brussels

Precious Metals Consortium

1. Welcome and introduction

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1.1 Reminder on confidentiality and competition law

DO	DON'T
Application of competition law	
Art. 101 and 102 TFEU may be applicable to the conclusion of any preliminary agreement and activities of any preliminary phase.	Don't assume that conflicts with competition law are excluded simply by the fact that the Agreement complies with the provisions of the REACH Regulation.
Consultation in Matters of Competition Law	
Consult an in-house legal expert or the compliance officer of your company or an external lawyer whenever there are uncertainties respecting compliance with competition law. Stop all meetings/discussions which are not in compliance with these Compliance Guidelines until a legal expert has been involved.	Don't assume that these Compliance Guidelines deal with all competition law issues exhaustively. Basically, compliance with Art. 101 and 102 TFEU can be determined only on the basis of market impact in each individual case. These Compliance Guidelines may therefore be regarded only as a means of providing general conduct recommendations.
Activities in any preliminary phase and at any other stage of operation of the Consortium	
Restrict cooperation within the scope of the preliminary phase to the initially defined goals and purposes of the cooperation.	Pursuant to Art. 101 and 102 TFEU, activities which have the object of the effect of preventing, restricting and/or distorting competition are prohibited within the scope of this Agreement, including: · Coming to agreement, including arrangements or collusions, about prices, markets and customers (see Art. 101 paragraph 1 a)-e) TFEU); · Joint boycotting of other companies; · The unjustified unequal treatment of trade partners; · The abusive exploitation of a dominating market position.
Exchange of Confidential Information	
Involve a Trustee for the exchange of Confidential Information.	The exchange of information concerning market behaviour and having the object or the effect of preventing, restricting and/or distorting competition is inadmissible; in particular, this relates to : · Production capacities; · Productions or sales volumes; · Import volumes; · Market shares; · Price policy; · Distribution and marketing terms; · Marketing strategies; · Information regarding the relationship with suppliers.
Documentation on Cooperation	
Keep minutes of all meetings which detail the subject of the meeting. In case of uncertainty, have the contents of the minutes reviewed by an external legal expert prior to sending them to all parties of the Agreement. Stop all meetings which are not in compliance with these Guidelines until a legal expert has been involved.	

1.2 Tour de table and apologies

- Cf. participants list included in agenda

1.3 Approval of the agenda

1. Welcome and Introduction (9:00 - 9:15)
2. Substance Identity of PM Refinables (9:15 - 10:30)
   - 2.1 Update on ECHA / Eurometaux discussions
   - 2.2 Updated refined SID PM Refinables
3. Workplan and budget (10:30 - 10:45)
4. AOB, next meetings/calls and closing remarks (10:45 - 11:00)

1.4 Approval of the minutes of the last meeting (21 Apr. 2016) and status of action points

	What?	Who?	Status
Substance Identity (SID)			
1	Check if Doré slag number 7 is a Cu slag	PMC Sec	Ongoing
2	Identify parameters allowing a structural representation PM Refinables	PMC Sec	
3	Circulate refined SID sheets for all PM Refinables	PMC Sec	
4	Review refined SID sheets taking into account comments made at the meeting + send updated full composition information of PM Refinables to PMC Sec	Ref WG	
5	Update the refined SID sheets + PM Refinables decision tree / process definitions document following the outcome of the structural representation exercise and SID refinement	PMC Sec	
6	Draft internal document Refinables SID approach (including clarification that it is common practice in the PM sector to process primary and secondary feeds together)	PMC Sec	
7	Check possibility to register Doré as mono-constituent substance	PMC Sec	
8	Check statistical approach Heraeus to analyse PM sludges	PMC Sec	
9	Suggest to EM to look into possibility to merge 'common' UVCBs/check sameness criteria across different consortia	PMC Sec	
Classification update			
11	Derive updated classifications based on updated SID	PMC Sec	Q3-Q4 2016
Environmental exposure assessment			
12	Return environmental exposure questionnaire with all available emissions data on the driving constituents present in the PM Refinables at their site	PM Ref WG	Ongoing
13	Compilation of emission data from questionnaires for all driving constituents to update the environmental risk assessment	WCA	
14	Follow up access to exposure modelling parameter values + sign data-sharing agreements	PMC Sec	

2. Substance Identity (SID) of PM Refinables

2.1 Update on ECHA / Eurometaux discussions (1)

- Face-to-face meeting 2 Dec 2015 on iUVCB identification
- ECHA open for cooperation but still concerned about high variability sources, processes, compositions + speciation / mineralogical composition insufficiently reported
- **EM recommendation to consortia**: improve / refine SID of their iUVCB dossiers following a transparent approach (excel template)
  - Wait to update dossiers until EM / ECHA have agreed on guidance and common principles
  - Try to reduce / define factors of variability
  - Splitting of existing dossiers upon better analysis of source, process and composition information cannot be excluded
- **Preliminary examples shared with ECHA:**
  - 'simpler' iUVCB: Cu matte, PM matte, Ni matte
  - more complex iUVCB: Cu slag, PM slag

Update on ECHA / Eurometaux discussions (2)

EM strategy in practice: how ?

- **Develop** for each iUVCB a clear overview focusing only on **sameness criteria** for those substance parameters with least variation (or fixed in the ideal case)

Substance identity parameters	Sameness criteria (try to be as specific, measurable, reproducible and accurate as possible)	Indication of variability: describe if FIXED or with very low variation
Process		
Sources (input materials)		
Elemental composition		
Speciation/mineralogical information/composition		
Physical characteristics (e.g. physical state and form, particle size distribution,…)		

- **SID:** assign weights to SID parameters to assess whether the iUVCB is sufficiently and uniquely identified
- **Reporting:** in a next step, work on how to report composition in IUCLID as based on combination of speciation/mineralogical (for the main constituents) and elemental analysis (for minor constituents) or provide both in parallel…

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Update on ECHA / Eurometaux discussions (3)

- Waiting for feedback ECHA
- Conference call suggested
- Site visit PM refining plant?
- **Risk of compliance checks for iUVCBs**
  - SID inconsistencies easily spotted via automated check
  - Timing dependant on how discussions with ECHA proceed…
  - Maintain original commitment to 'work jointly' to find a (workable and acceptable) solution
- ECHA accepted to test IUCLID 6 with iUVCBs, EM will coordinate and develop 2 test cases:
  1) existing IU5 dossier that needs to migrate into IU6 (PM example)
  2) new iUVCB dossier to be created directly in IU6

2.2 Updated refined SID PM Refinables

1.1 - Gold doré
1.2 - Silver doré
2 - Matte, precious metal
3.1 - Slags, doré furnace
3.2 - Slags, production of precious metals containing materials other than doré
4.1 - Slimes, silver electrolysis
4.2 - Slimes, gold electrolysis
4.3 - Residues from precious metal leaching and dissolution
4.4 - Precipitates from precious metal refining
5.1 - Residues, copper-iron-lead-nickel matte, sulfuric acid-insol.
6.1 - Silver electrolyte
6.2 - Gold electrolyte
7 - Flue dust, precious metal refining
8 - Residues, precious metal refining cementation and reduction
9.1 - Materials for reclaim, precious metals with or without supports
9.2 - Materials for reclaim, precious metals in bricks, pots, crucibles and trays, etc.
9.3 - Materials for reclaim, precious metal production by-products
10.1 - Lead bullion, PGM rich
10.2 - Iron bullion, PGM rich
10.3 - Copper bullion, PGM rich

Not reported by any registrants

General comments

- Problem of **imports from outside EU**: information processes and sources lacking… -> negative impact on availability of raw materials
- **Liquid phases**: consider mixtures
  - SID Guidance: mixture definition includes reference to solution ('Mixture or solution composed of two or more substances.') -> liquid intermediates could be considered as a mixture of UVCBs
- Importance of **value of PMs**! Even very small PM concentrations will define PM refinables -> consider as sameness parameter
  - Define minimum PM content for iUVCBs to be considered Refinables
  - E.g. 10x%(Ag+Au) + 100x%(PGMs) > 5%

Ref 1: Doré

- At the 21 Apr WG meeting, it was suggested to split doré into **Au doré**, **Ag doré** and **Cu bullion**

- From literature: Gold Ore Processing: Project Development and Operations", Edited by Mike D. Adams, Elsevier 2016. Chapter 34 "Refining of gold- and silver-bearing doré", M.B. Mooiman and L. Simpson :

  "Doré materials are either high-gold or high-silver, referred to as gold doré and silver doré, respectively. High-gold materials contain from 30% to 98% gold, with the difference made up by silver and varying quantities and types of base metals. High-silver doré typically contains > 50% silver, with smaller quantities of gold (1-30%) and various base metals, most commonly copper and zinc. However, some silver doré material can contain large quantities of deleterious elements such as lead, selenium, and cadmium.

  …...

  Doré materials are highly variable in composition and are very dependent on the location and facilities of the originating mining company, the characteristics of the ore body currently being processed, the nature of the extraction operations, and the level of processing in the smelting operations on the mine site"

Ref 1.1: Gold doré

Substance Identity	EC/list name:	Gold doré		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names	Doré bars, Doré alloys, PM rich bullion, Doré metal		Type of substance:	UVCB
	EC/List no.:	Doré: 273-793-6		origin:	Inorganic
	CAS no.:	Doré: 69029-47-6			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Gold rich primary and secondary sources (anode slimes from copper electro-refining, precious metals enriched alloy from lead refining, leach residues and crude metal from zinc and lead production, returns and sweeps from gold production (such as dust from bag filters, slimes from wet dedusting systems, cement obtained from spent gold electrolyte, slags, crushed refractory) and gold scrap)	medium variability
Process	Enriched phase from smelting with coke, silica, lime and sodium carbonate fluxes to maximise separation from other metals whilst controlling the formation of volatile metal compounds. Different combinations of batch wise processes can be used depending on the composition of the raw materials and the local conditions.	medium variability

	Core	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
Elemental composition	Silver	0,1	49	15	medium variability
	Gold	50	99	83	medium variability
	Copper	0,1	49	1,7	medium variability
	Other constituents	0	1	0,3	low variability
	Sum=			100	
Mineralogical composition	Metallic gold	50	99	83	medium variability
	Metallic silver	0,1	49	15	medium variability
	Metallic copper	0,1	49	1,7	medium variability
	Sum=			99,7	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Solid massive form with grey to dark grey colour			fixed

Conclusion	**Gold doré is a solid massive form with grey to dark grey colour and is the enriched phase from smelting processes applied on primary and secondary feeds with high gold content. Gold doré is rich in metallic gold (50-99%), with the difference made up mainly by silver and copper.**

Ref 1.2: Silver doré

Substance Identity	EC/list name:	Silver doré		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names	Doré bars, Doré alloys, PM rich bullion, Doré metal		Type of substance:	UVCB
	EC/List no.:	Doré: 273-793-6		origin:	Inorganic
	CAS no.:	Doré: 69029-47-6			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**				**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Silver rich primary and secondary sources (anode slimes from copper electro-refining, precious metals enriched alloy from lead refining, leach residues and crude metal from zinc and lead production, returns and sweeps from silver production (such as dust from bag filters, slimes from wet dedusting systems, silver cement obtained from spent silver electrolyte, slags, crushed refractory) and silver scrap)				medium variability
Process	Enriched phase from smelting with coke, silica, lime, borax and sodium carbonate fluxes to maximise separation from other metals whilst controlling the formation of volatile metal compounds. Different combinations of batch wise processes can be used depending on the composition of the raw materials and the local conditions.				medium variability
Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Silver	63	99	90	low variability
	Gold	0	6,6	2,6	low variability
	Copper	0,3	9	2,8	low variability
	Tellurium	0	25	3,5	low variability
	Other constituents	0	2	1,1	low variability
	Sum=			100	
Mineralogical composition	Metallic silver (metallic silver encloses copper selenium silver tellurides, copper oxides and tellurium-bearing copper lead oxides which also fill the interstices of metallic silver. Therefore these intermetallic species shall be considered as inclusion and not as available compounds. The sample tested for speciation was prepared by drilling/sawing, which might have caused some oxidation.)	63	99	90	low variability
	Metallic gold	0,2	6,6	2,6	low variability
	Metallic copper	0,3	9	2,8	low variability
	Metallic tellurium	0	25	3,5	low variability
	Sum=			98,9	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Solid massive form with grey to dark grey colour			fixed
Conclusion	**Silver doré is a solid massive form with grey to dark grey colour and is the enriched phase from smelting processes applied on primary and secondary feeds with high silver content. Silver doré is rich in metallic silver (63-99%), with the difference made up mainly by gold, copper and tellurium.**				

Ref 2: PM matte

Substance Identity	EC/list name:	Matte, precious metal		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	308-506-6		origin:	Inorganic
	CAS no.:	98072-52-7			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**				**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Precious metal containing primary and secondary (sulphidic) sources and recycled plant intermediates				high variability
Process	Enriched sulfidic phase from smelting process (ca. 1200 °C), separated by tapping				low variability
Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Precious metals	0,5	25	11	low variability
	Copper	6	32	22	low variability
	Iron	0,5	18	7	low variability
	Lead	0,5	10	6	low variability
	Nickel	5	32	22	low variability
	Sulfur	5	30	18	low variability
	Other constituents				medium variability
	Sum=			**86**	
Mineralogical composition	Total of base metal sulphides	40	84	73	medium variability
	Precious metal sulphides	0,5	29	13	low variability
	Sum=			**86**	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Solid massive form with grey to black colour			fixed
Conclusion	**Matte, precious metal is a solid massive form with grey to black colour and is the enriched phase from smelting processes applied on primary and secondary precious metal containing sulfidic feeds. Matte, precious metal is composed primarily of base metal sulfides and precious metal sulfides.**				

Ref 3.1: Slags, doré furnace

Substance Identity	EC/list name:	Slags, doré furnace		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	266-975-1		origin:	Inorganic
	CAS no.:	67711-98-2			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability (fixed, low or high variation)**
Sources (input materials)	Gold and/or silver rich primary and secondary sources (anode slimes from copper electro-refining, precious metals enriched alloy from lead refining, leach residues and crude metal from zinc and lead production, returns and sweeps from silver and/or gold production (such as dust from bag filters, slimes from wet dedusting systems, silver cement obtained from spent silver and/or gold electrolyte, slags, crushed refractory) and silver and/or gold scrap)	medium variability
Process	Main residues from smelting of sources with coke, silica, lime, borax and sodium carbonate fluxes, separated by tapping. Different combinations of batch wise processes can be used depending on the composition of the raw materials and the local conditions.	low variability

	Core	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
Elemental composition	Silver	1	12	5	low variability
	Barium	0	16	4	low variability
	Copper	2	38	14	medium variability
	Iron	0	19	4	low variability
	Oxygen	11	25	17	low variability
	Lead	0	44	28	medium variability
	Silicon	0	11	5	low variability
	Other constituents				medium variability
	Sum=			77	
Mineralogical composition	Metallic silver	1	12	5	low variability
	Sum of oxides/silicates/sulphates of barium, copper, iron and lead	47	81	68	medium variability
	Sum=			73	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Green-black solid			fixed

Conclusion	**Slags, doré furnace are green-black solid residues from smelting processes applied on primary and secondary feeds with high silver and/or gold content. Slags, doré furnace are rich in metallic silver and oxides/silicates/sulphates of barium, copper, iron and lead.**

Ref 3.2: Slags, production of PM containing mat. other than doré

Substance Identity	EC/list name:	Slags, precious metal refining		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	308-515-5		origin:	Inorganic
	CAS no.:	98072-60-7			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability (fixed, low or high variation)**
Sources (input materials)	Precious metal containing primary and secondary sources and recycled plant intermediates	medium variability
Process	Main residues from smelting process (ca. 1350-1450°C) with several fluxes, separated by tapping.	low variability

	Core	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
Elemental composition	Precious metals	0,2	1	0,6	low variability
	Aluminum	3	19	9	low variability
	Calcium	1	37	12	low variability
	Iron	3	15	7	low variability
	Sodium	0	31	10	medium variability
	Oxygen	21	42	35	low variability
	Silicon	5	16	12	low variability
	Other constituents				high variability
	Sum=			85,6	
Mineralogical composition	Precious metals	0,2	1	0,6	low variability
	Sum of oxides/silicates of aluminum, calcium, iron and sodium	51	99	81	medium variability
	Sum=			81,6	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Black solid granulate			fixed

Conclusion	**Slags, production of precious metals containing materials other than doré are solid residues from smelting processes applied on precious metal containing primary and secondary feeds. Slags, production of precious metals containing materials other than doré are rich in oxides and silicates and contain at least 0.2% of precious metals.**

Ref 4.1: Slimes, silver electrolysis

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Primary or secondary sources high in silver content, solution of silver nitrate, copper dinitrate and nitric acid				low variability
Process	Anode slime from electrochemical refining (= simultaneous electrochemical dissolution of crude metal at one electrode and electrochemical deposition of higher purity metal on the other electrode, while the impurities are collected as a solid forming and precipitating in the medium ("anode slime"), or remain in the electrolyte; both are periodically or continuously removed from the system)				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Silver	30	84	46	medium variability
	Gold	0,4	46	33	medium variability
	Copper	0	17	6	medium variability
	Other constituents				
	Sum=			85	
Mineralogical composition	Metallic silver	30	84	46	low variability
	Metallic gold	0,4	46	33	medium variability
	Metallic copper	0	17	6	medium variability
	Sum=			85	
Physical characteristics	physical state (at 20°C, 1013 hPa)				fixed
Conclusion	Slimes, silver electrolysis are the anode slimes resulting from the electrochemical refining of sources high in silver content. They are rich in silver, gold and copper.				

Ref 4.2: Slimes, gold electrolysis

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Primary or secondary sources high in gold content, solution of gold trichloride and hydrochloric acid				low variability
Process	Anode slime from electrochemical refining (= simultaneous electrochemical dissolution of crude metal at one electrode and electrochemical deposition of higher purity metal on the other electrode, while the impurities are collected as a solid forming and precipitating in the medium ("anode slime"), or remain in the electrolyte; both are periodically or continuously removed from the system)				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Gold	75	83	79	low variability
	Silver	11	18	14	low variability
	Chloride	4	6	5	low variability
	Other constituents				
	Sum=			98	
Mineralogical composition	Metallic gold	75	83	79	low variability
	Silver chloride	15	24	19	low variability
	Sum=			98	
Physical characteristics	physical state (at 20°C, 1013 hPa)				fixed
Conclusion	Slimes, gold electrolysis are the anode slimes resulting from the electrochemical refining of sources high in gold content. They contain about 80% of gold, with the difference made up mainly by silver chloride.				

Ref 4.3: Residues from PM leaching and dissolution

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Primary and secondary sources and recycled plant intermediates, containing precious metals				medium variability
Process	Leaching (= intended dissolution and removal of at least one part or component from a material, leaving at least one other part of the material undissolved (this also includes "washing" with neutral, acidic or basic solutions; as well as reactive distillation)) and dissolution (= process intended to dissolve the whole material). Since both Leaching and Dissolution leave a solid residue as a Refinable or Intermediate, these processes cannot be distinguished strictly from				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Silver	0,01	84	23	high variability
	PGMs	0	69	16	high variability
	Chloride	0	20	4	low variability
	Copper	0	32	6	medium variability
	Iron	0	17	5	low variability
	Oxygen	0	32	10	medium variability
	Lead	0	12	4	low variability
	Sulphur	0	57	6	medium variability
	Tellurium	0	15	4	low variability
	Other constituents				
	Sum=			78	
Mineralogical composition	Silver: metallic, chloride, oxide				
	PGMs: metallic, chlorides, oxides, multi-metallic species, ammonium salts				
	Chloride: metal chlorides, NaCl				
	Copper: metallic, chlorides, oxides, multi-metallic species				
	Iron: chlorides, oxides, multi-metallic species				
	Oxygen: oxides				
	Lead: metallic, oxides, multi-metallic species				
	Sulphur: sulphides, sulphates				
	Tellurium: metallic, oxides, multi-metallic species				
	Sum=			0	
Physical characteristics	physical state (at 20°C, 1013 hPa)	solid			fixed
Conclusion	Residues from precious metal leaching and dissolution are solid residues left after leaching and dissolution.				

Ref 4.4: Precipitates from PM refining

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Primary and secondary sources and recycled plant intermediates, containing dissolved precious metals				medium variability
Process	Precipitation and crystallization: formation of an insoluble compound from a dissolved species by addition of a precipitation agent or changing the medium's characteristics (concentration, temperature, pH, polarity). The insoluble compound forms a solid precipitate.				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Precious metals	0,3	90	38	high variability
	Chloride	0	58	17	medium variability
	Copper	0	33	9	medium variability
	Iron	0	40	5	medium variability
	Oxygen	0	27	11	low variability
	Lead	0	14	2	low variability
	Selenium	0	18	4	low variability
	Sum=			86	
Mineralogical composition	Precious metals: metallic, chlorides, oxides, sulphides, multi-metallic species, ammonium salts				
	Chloride: metal chlorides, NaCl				
	Copper: metallic, chlorides, oxides, sulphides, multi-metallic species				
	Iron: chlorides, oxides, hydroxides, multi-metallic species				
	Oxygen: oxides, hydroxides				
	Lead: metallic, oxides, sulphates, multi-metallic species				
	Selenium: metallic, oxides, multi-metallic species				
	Sum=			0	
Physical characteristics	physical state (at 20°C, 1013 hPa)	solid			fixed
Conclusion	Precipitates from precious metal refining are solid precipitates left after precipitation and crystallization of primary and secondary sources containing dissolved precious metals.				

Ref 5.1: Matte leaching residues

Substance Identity	EC/list name:	Residues, copper-iron-lead-nickel matte, sulfuric acid-insol.		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names	Matte leaching residue		Type of substance:	UVCB
	EC/List no.:	310-050-8		origin:	Inorganic
	CAS no.:	102110-49-6			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary and secondary streams resulting from the refining of copper, nickel and other base metals-containing ores	medium variability
Process	Sulfuric acid-based leaching (leaching = intended dissolution and removal of at least one part or component from a material, leaving at least one other part of the material undissolved).	low variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Silver	0,1	15	8	low variability
	Gold and PGMs	0,2	41	21	medium variability
	Copper	5	41	23	
	Iron	3	12	8	
	Sulphur	0	25	13	
	Sum=			73	
Mineralogical composition	Oxides, sulphates, sulphides?				high variability
	Sum=			0	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	black powder			fixed

Conclusion	**Residues, copper-iron-lead-nickel matte, sulfuric acid-insol. are solid residues left afte sulfuric acid-based leaching of primary and secondary streams resulting from the refining of copper, nickel and other base metals-containing ores and concentrates.**

Ref 6.1: Silver electrolyte

Substance Identity	EC/list name:	Silver electrolyte		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	931-506-8		origin:	Inorganic
	CAS no.:				
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary or secondary sources high in silver content, solution of silver nitrate, copper dinitrate and nitric acid	low variability
Process	Electrolyte from electrochemical refining (= simultaneous electrochemical dissolution of crude metal at one electrode and electrochemical deposition of higher purity metal on the other electrode, while the impurities are collected as a solid forming and precipitating in the medium ("anode slime"), or remain in the electrolyte; both are periodically or continuously removed from the system)	low variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Silver	6	12	9	low variability
	Copper	2	5	3	low variability
	Nitrogen	1	2	2	low variability
	Hydrogen	8	9	8	low variability
	Oxygen	75	80	77	low variability
	Sum=			99	
Mineralogical composition	Silver nitrate	9	19	14	low variability
	Copper dinitrate	6	14	9	low variability
	Water	75	80	76	low variability
	Sum=			99	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	light blue liquid			fixed

Conclusion	**Silver electrolyte is fresh or spent aqueous silver nitrate, copper dinitrate and nitric acid solution used in and resulting from the electrochemical refining of sources high in silver content.**

Ref 6.2: Gold electrolyte

Substance Identity	EC/list name:	Gold electrolyte		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	933-944-5		origin:	Inorganic
	CAS no.:				
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary or secondary sources high in gold content, solution of gold trichloride and hydrochloric acid	low variability
Process	Electrolyte from electrochemical refining (= simultaneous electrochemical dissolution of crude metal at one electrode and electrochemical deposition of higher purity metal on the other electrode, while the impurities are collected as a solid forming and precipitating in the medium ("anode slime"), or remain in the electrolyte; both are periodically or continuously removed from the system)	low variability

	Core	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
Elemental composition	Gold	20	30	25	low variability
	Chloride				
	Other constituents				
	Sum=			25	
Mineralogical composition	Gold trichloride	30	46	38	
	Hydrochloric acid				
	Water				
	Sum=			38	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	orange to dark red-brown liquid			fixed

Conclusion	**Gold electrolyte is fresh or spent aqueous gold trichloride and hydrochloric acid solution used in and resulting from the electrochemical refining of sources high in gold content.**

Ref 7: PM Flue dust

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Precious metal containing primary and secondary (sulfidic) sources and recycled plant intermediates	medium variability
Process	Dust generated during several dry processes in production, processing, and refining of precious metal containing materials, and collected in appropriate facilities. These processes can include milling, thermal treatment, melting, smelting, grinding or polishing. Commonly, dusts from several processes are collected through a single exhaust gas filtering system at a site. This mixture of filter dusts is then sent to Refining to reclaim the precious metals.	medium variability

	Core	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
Elemental composition	Silver	0,3	10	5	low variability
	Gold and PGMs	0	2	1	low variability
	Calcium	0	15	4	medium variability
	Chloride	0	25	6	medium variability
	Sodium	0	15	3	medium variability
	Oxygen	0	31	9	medium variability
	Lead	9	47	23	medium variability
	Selenium	0,5	23	9	medium variability
	Zinc	0	27	6	medium variability
	Other constituents				high variability
	Sum=			66	
Mineralogical composition	Mixture of sulfides, oxides, chlorides				high variability
	Sum=			0	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	Greyish solid powder with D50 < 20 µm			fixed

Conclusion	**Flue dust, precious metal refining is a greyish solid powder with D50 < 20 µm resulting from various refining processes which use various precious metal containing sources but that is physically collected via the same centralised exhaust ventilation system and cannot be separated per process/source. This results in a UVCB with a variable composition.**

Ref 8: Residues PM cementation and reduction

Substance Identity	EC/list name:	Residues, precious metal refining cementation		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names	Cements		Type of substance:	UVCB
	EC/List no.:	310-051-3		origin:	Inorganic
	CAS no.:	102110-50-9			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary and secondary sources and recycled plant intermediates, containing dissolved precious metals	medium variability
Process	Targeted creation of a metal in its elemental/metallic state from a dissolved species by the addition of a reduction agent (e.g. a more electropositive metal = cementation; reduction agents like hydrazine, formaldehyde etc. = reduction; enforced by an electric current = electrodeposition, electrowinning). Since metals are not (physically) soluble in aqueous media, they form a metallic precipitate that is collected as an intermediate .	medium variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Silver and gold	1,5	92	12	high variability
	Platinum and palladium	0	82	22	high variability
	Rhodium and ruthenium	0	52	13	high variability
	Copper	0	68	11	high variability
	Iron	0	27	5	medium variability
	Selenium	0	94	11	
	Other constituents				
	Sum=			74	
Mineralogical composition	Metallic, oxides, chlorides				high variability
	Sum=			0	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	grey-black or brown solid powder			fixed

Conclusion	**Residues, precious metal refining cementation and reduction are metallic precipitates recovered through cementation, reduction and electrowinning by adding a reduction agent to sources containing dissolved precious metals. The resulting residues include cements and polishing sludges which generally contain precious metals, metal oxides, and metal chlorides in varying concentrations.**

Ref 9.1: Materials for reclaim, PM with or without support

Substance Identity	EC/list name:	Waste solids, precious metal refining		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:	308-526-5		origin:	Inorganic
	CAS no.:	98072-70-9			
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary and secondary sources of precious metals in metallic, oxide, chloride and other forms in varying concentrations, resulting from the application of thermal or thermo-chemical processes or end-of-life criteria.	high variability
Process	Various precious metal refining pyro-metallurgical processes?	high variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Silver and gold	0	8	2	
	PGMs	4	61	23	
	Silicon	2	60	21	
	Aluminum	0	18	7	
	Copper	0	12	4	
	Oxygen	0	34	21	
	Sum=			78	
Mineralogical composition	???				
	Sum=			0	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	beige solid powder			fixed

Conclusion	**Materials for reclaim, precious metals with or without supports are end of life products, out-of-spec products and production wastes which are sent to precious metal refining to reclaim their precious metal content.**

Ref 9.2: Materials for reclaim, PM on bricks, crucibles, trays etc.

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Spent artifacts (silicate or refractory based) used in the processing of precious metal streams that have retained				medium variability
Process	Crushing to varying degrees after various precious metal pyro-metallurgical refining processes (it is common practice				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Silver and gold	0,1	1,2	0,7	low variability
	PGMs	0,01	9	2	low variability
	Aluminum	3,5	12	7	low variability
	Carbon	0	16	8	medium variability
	Iron	0,6	18	7	low variability
	Magnesium	0,2	20	10	low variability
	Oxygen	27	36	32	low variability
	Silicon	8	21	15	low variability
	Sum=			81,7	
Mineralogical composition	Metallic silver and gold	0,1	1,2	0,7	low variability
	Metallic PGMs	0,01	9	2	low variability
	Aluminium oxide	7	23	14	
	Iron oxide	1	25	10	
	Magnesium oxide	0,3	33	17	
	Silicon dioxide	17	45	31	low variability
	Sum=			74,7	
Physical characteristics	physical state (at 20°C, 1013 hPa)	Dark grey solid (powder) with light grey lumps			
Conclusion	Materials for reclaim, Precious Metals in Bricks, Pots, Crucibles and trays, etc. are spent artifacts used in the production and refining of precious				

Ref 9.3: Materials for reclaim, PM production by-products

SID parameters	Sameness criteria				Indication of variability (fixed, low or high variation)
Sources (input materials)	Precious metal containing primary and secondary sources and recycled plant intermediates.				medium variability
Process	Mechanical cleaning after various precious metal refining processes: it is common practice in precious metal processing and refining industry to clean floors and equipment regularly, to collect any residues of precious metal-containing material on them and reclaim the precious metal value. The resulting scraps, sweeps and cleaning tools (like swipes) are usually collected from several facilities and processes and combined before sent to refining as PM production by-products.				low variability
Elemental composition	Core	min (% w/w)	max (% w/w)	Typical (%w/w)	
	Silver and gold	1	4	3	low variability
	PGMs	5	10	8	low variability
	Aluminium	5	12	8	low variability
	Carbon	0	12	6	medium variability
	Copper	3	8	5	low variability
	Iron	4	10	7	low variability
	Sodium	2	12	7	low variability
	Oxygen	11	47	29	low variability
	Silicon	2	9	6	low variability
	Sum=			79	
Mineralogical composition	Silicon dioxide	5	19	12	low variability
	??				
	Sum=			12	
Physical characteristics	physical state (at 20°C, 1013 hPa)	brown solid powder			
Conclusion	Materials for reclaim, precious metal production by-products are unintentional by-products of the production and refining of precious metals which are recovered by mechanical cleaning and physically collected in a centralised manner from various sources and processes, and are used as a mixture input material in precious metal refining. They contain low concentrations of precious metals (but still worth recovering) as well as other metals and their compounds (oxides and others) in varying concentrations.				

Ref 10.1: Lead bullion, PGM rich

Substance Identity	EC/list name:	Lead bullion, Platinum Group Metals rich		SMILES:	not applicable
	IUPAC name:	Lead bullion, Platinum Group Metals rich		InChI:	not applicable
	Other names	Lead Precious Metal Ingot, Lead Precious Metal Grain, Lead Ingot/Grain		Type of substance:	UVCB
	EC/List no.:	931-607-7		origin:	Inorganic
	CAS no.:				
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary and secondary feed materials usually in the form of residues containing low concentrations of precious metals, and higher and variable concentrations of base metals and refractory materials.	medium variability
Process	Enriched lead phase from smelting with fluxes and with a lead collector.	medium variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Lead	50	80	60	low variability
	PGMs (Ir, Pd, Pt, Rh, Ru)	5	40	16	medium variability
	Copper	1	15	5	low variability
	Silver	2	15	6	low variability
	Sum=			87	
Mineralogical composition	Lead	50	80	60	
	PGMs (Ir, Pd, Pt, Rh, Ru)	5	40	16	
	Copper	1	15	5	
	Silver	2	15	6	
	Sum=			87	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	black/metallic solid (ingot and grain)			fixed

Conclusion	**Lead bullion, Platinum Group Metals rich is the enriched lead phase from smelting of precious metals containing primary and secondary feeds with fluxes and with a lead collector. It is rich in lead and PGMs.**

Ref 10.2: Iron bullion, PGM rich

Substance Identity	EC/list name:	Iron bullion, Platinum Group Metals rich		SMILES:	not applicable
	IUPAC name:			InChI:	not applicable
	Other names			Type of substance:	UVCB
	EC/List no.:			origin:	Inorganic
	CAS no.:				
	Molecular formula:	not applicable		Substance listed	

SID parameters	**Sameness criteria**	**Indication of variability** (fixed, low or high variation)
Sources (input materials)	Primary and secondary feed materials usually in the form of residues containing low concentrations of precious metals, and higher and variable concentrations of base metals and refractory materials.	medium variability
Process	Enriched iron phase from smelting.	medium variability

Elemental composition	**Core**	**min (% w/w)**	**max (% w/w)**	**Typical (%w/w)**	
	Iron	55	78	67	low variability
	PGMs (Ir, Pd, Pt, Rh, Ru)	12	15	13	low variability
	Copper	1,7	5	3	low variability
	Nickel	0	10	5	low variability
	Sum=			88	
Mineralogical composition	Iron	55	78	67	low variability
	PGMs (Ir, Pd, Pt, Rh, Ru)	12	15	13	low variability
	Copper	1,7	5	3	low variability
	Nickel	0	10	5	low variability
	Sum=			88	
Physical characteristics	**physical state (at 20°C, 1013 hPa)**	black/metallic solid (ingot and grain)			fixed

Conclusion	**Lead bullion, Platinum Group Metals rich is the enriched lead phase from smelting of precious metals containing primary and secondary feeds with fluxes and with a lead collector. It is rich in lead and PGMs.**

3. Workplan and budget

2017 draft budget

	PMC 2017 Budget *to be spent*	PMC 2017 Budget *to be invoiced*	PMC 2017 HR
2.7 Refinables-specific costs	***772.700 €***	***75.200 €***	***0,3***
2.7.1 Refinables REACH registration	**0 €**	**0 €**	
2.7.2 Refinables REACH dossier maintenance	**701.500 €**	**4.000 €**	
2.7.2.1 Phase 1: Scoping	5.000 €	0 €	
2.7.2.2 Phase 2: Substance identification	87.500 €	0 €	
2.7.2.3 Phase 3: Effects assessment and classification	348.000 €	3.000 €	
2.7.2.4 Phase 4: Exposure and risk assessment	140.000 €	0 €	
2.7.2.5a Phase 5a: Compilation of IUCLID 5 file & Registration Dossiers	120.000 €	0 €	
2.7.2.5b Phase 5b: IUCLID 5 Hosting System	1.000 €	1.000 €	
2.7.2.6 Ref Rolling maintenance (as from 2018)			
2.7.2.7 Ref Further improvement (as from 2018)			
2.7.2.8 Ref Testing proposal (as from 2018)			
2.7.3 Refinables REACH evaluation	**0 €**	**0 €**	
2.7.3.1 Dossier evaluation	0 €	0 €	
2.7.3.2 Substance evaluation	0 €	0 €	
2.7.4 Refinables REACH classification & labelling	**0 €**	**0 €**	
2.7.5 Refinables REACH authorisation	**0 €**	**0 €**	
2.7.6 Refinables internal and external fixed Scientific Manager	**49.200 €**	**49.200 €**	
2.7.7 Refinables Building reserves	**22.000 €**	**22.000 €**	

2018-2019 draft budget

	PMC 2018 Budget *to be spent*	PMC 2018 Budget *to be invoiced*	PMC 2018 HR	PMC 2019 Budget *to be spent*	PMC 2019 Budget *to be invoiced*	PMC 2019 HR
2.7 Refinables-specific costs	***405.548 €***	***405.548 €***	***0,2***	***405.559 €***	***405.559 €***	***0,2***
2.7.1 Refinables REACH registration	**0 €**	**0 €**		**0 €**	**0 €**	
2.7.2 Refinables REACH dossier maintenance	**376.500 €**	**376.500 €**		**376.500 €**	**376.500 €**	
2.7.2.1 Phase 1: Scoping						
2.7.2.2 Phase 2: Substance identification						
2.7.2.3 Phase 3: Effects assessment and classification						
2.7.2.4 Phase 4: Exposure and risk assessment						
2.7.2.5a Phase 5a: Compilation of IUCLID 5 file & Registration Dossiers						
2.7.2.5b Phase 5b: IUCLID 5 Hosting System	1.000 €	1.000 €		1.000 €	1.000 €	
2.7.2.6 Ref Rolling maintenance (as from 2018)	375.500 €	375.500 €		375.500 €	375.500 €	
2.7.2.7 Ref Further improvement (as from 2018)						
2.7.2.8 Ref Testing proposal (as from 2018)						
2.7.3 Refinables REACH evaluation	**0 €**	**0 €**		**0 €**	**0 €**	
2.7.3.1 Dossier evaluation	0 €	0 €		0 €	0 €	
2.7.3.2 Substance evaluation	0 €	0 €		0 €	0 €	
2.7.4 Refinables REACH classification & labelling	**0 €**	**0 €**		**0 €**	**0 €**	
2.7.5 Refinables REACH authorisation	**0 €**	**0 €**		**0 €**	**0 €**	
2.7.6 Refinables internal and external fixed Scientific Manager	**29.048 €**	**29.048 €**		**29.059 €**	**29.059 €**	
2.7.7 Refinables Building reserves						

Precious Metals Consortium

5. AOB, next meetings/calls and closing remarks

Next meetings:

- **Tue 21 March 1pm-5pm**
- **17, 18 or 19 Oct**

THANK YOU

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