Precious Metals Consortium

Precious Metals & Rhenium Consortium

PGM Tox Experts & Work Group Meeting

22 March 2017| MCC, Brussels

Precious Metals Consortium

1. Welcome and introduction

1.1 Confidentiality and Competition law

1.2 Tour-de-table and apologies

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.	

1.3 Approval of the agenda

1 Welcome and Introduction (11-11.10)

1. Reminder on Confidentiality and Competition Law
2. Tour de table and apologies
3. Approval of the agenda
4. Approval of the minutes of the last meeting (4 Oct 2016) and status of action points

2 Palladium and compounds (11.10-11.30)

1. Status (ongoing) registration dossiers
2. Learning lessons

3 Platinum and compounds (11.30-12.30)

1. Status (ongoing) registration dossiers
2. Karstedt Concentrate: dossier update
3. HHPA/2AE: status & remaining work
4. *Remaining challenges*
5. *IPA STF: in vivo mutagenicity testing with Pt (cmpds)*

Lunch break (12.30-13.30)

4 Rhodium and compounds (13.30-14.30)

1. Dossier status
2. Rh(III) genetox review
3. Diammonium sodium hexakis(nitrito-N)rhodate: status & remaining work
4. *Some bottlenecks*
5. *Remaining challenges*

5 Ruthenium and compounds (14.30 -15:30)

1. Dossier status
2. RuCl3: status & remaining work
3. TetradoRu: status & remaining work
4. *Remaining challenges*

6 Budget and workplan (15.30-15.45)

7 AOB, next meetings/calls and closing remarks (15.45-16.00)

1.4 Approval of minutes & status action points

- Final draft minutes circulated 12 October 2016 – approved?
- Action points

Actions	Who?	When?	Status
Review RAAF justification reports by chemistry expert	Dave Boyd	w/c 24 Oct	**DONE**
Include impurity profiles from substance ID card in RAAF justification reports and elucidate on similarity between source/target substance	BIBRA	w/c 10 Oct	**DONE**
Circulate result of preliminary water solubility test with Karstedt concentrate to Tox Expert group, and decide on way-forward for ecotox testing	PMC	Expected w/c 10 Oct	**DONE** - KC full ecotox testing waived
Check read-across strategy for ENV classification Pt nitrate with WCA & circulate to Tox Experts	PMC	w/c 3 Oct	**DONE** - RA strategy revised (Pt(0) vs Pt(II) vs Pt(IV))
Perform in vitro Mouse Lymphoma tk assay	PMC	Initiate ASAP	**DONE** - Assay showed mutagenic activity
Include testing proposals for in vivo genetox testing as agreed, and a waiver for in vivo genetox for Pt dinitrate	Bibra	< end 2016	**DONE**
Verify if PNECs are (not) required for 1-10 tpa substances	PMC	w/c 3 Oct	**DONE** - no need to include

1.4 Approval of minutes & status action points

Actions	Who?	When?	Status
Circulate the 5 revised occupational assessment reports	PMC	w/c 3 Oct	**DONE**
Review Pt ES within 2 weeks deadline	PMC Companies	<21 Oct	**DONE**
Inform PMC secretariat what uses are believed not relevant in the PGM industry	PMC Companies	<21 Oct	**DONE -** all uses & use descriptors revised and agreed
Inform Mgt Cttee about need for a dermal monitoring campaign	France Capon	Meeting 6 Oct	**DONE**
Discuss PGM reserves with Mgt Cttee	France Capon	Meeting 6 Oct	**DONE**
Review site visit reports urgently (if not yet done)	PMC Companies	<end Oct	**DONE -** SV report finalised
Inform PMC secretariat (& EBRC) on Rh/Ru monitoring intentions (and newly gathered data)	PMC Companies	<end Oct	**DONE -** Monitoring database available

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2. Palladium and Pd compounds

2.1 Status (ongoing) registration dossiers

Substance	CAS	EC	LR	Status	
Palladium	7440-05-3	231-115-6	Umicore NV/SA	REGISTERED	Jan 2017
Palladium dichloride	7647-10-1	231-596-2	BASF	REGISTERED	Jan 2017
Dihydrogen tetrachloropalladate(2-) (in solution)	16970-55-1	241-047-9	Heraeus	Rejected by ECHA MCC	See next slides
Diamminedichloropalladium	14323-43-4	238-269-3	Heraeus	REGISTERED	Jan 2017
Dichlorobis(triphenylphosphine)palladium	13965-03-2	237-744-2	Heraeus	REGISTERED	Jan 2017
Palladium (II) di(4-oxopent-2-en-2-oate)	14024-61-4	237-859-8	Heraeus	REGISTERED	Jan 2017
Palladium(II) acetate	3375-31-3	222-164-4	Heraeus	REGISTERED	Oct 2016
Palladium monoxide	1314-08-5	215-218-3	Heraeus	REGISTERED	Jan 2017
Tetraamminepalladium (II) nitrate	13601-08-6	237-078-2	Johnson Matthey	REGISTERED	Jan 2017
Tetraamminepalladium(2+) dichloride	13815-17-3	237-489-7	Umicore AG&Co.KG	REGISTERED	Mar 2017
Tetraamminepalladium(2+) dihydroxide	68413-68-3	270-241-6	Heraeus	Rejected by ECHA MCC	See next slides
Tetrakis(triphenylphosphine)palladium	14221-01-3	238-086-9	Umicore AG&Co.KG	REGISTERED	Mar 2017
Palladium sulphate	13566-03-5	236-957-8	Heraeus	Approved by Sub Assembly	See next slides
Tetraamminepalladium(2+) diacetate	61495-96-3	262-819-1	Umicore AG&Co.KG	Approved by Sub Assembly	See next slides
Disodium tetrachloropalladate	13820-53-6	237-502-6	BASF	REGISTERED	Jan 2017
Palladium dinitrate	10102-05-3	233-265-8	Heraeus	Approved by Sub Assembly	See next slides
Palladium dihydroxide	12135-22-7	235-219-2	Umicore AG&Co.KG	Approved by Sub Assembly	See next slides
Diammonium hexachloropalladate	19168-23-1	242-854-9	Johnson Matthey	REGISTERED	Feb 2017
Dipotassium hexachloropalladate	16919-73-6	240-974-6	C. Hafner	REGISTERED	Feb 2017

Phys-chem testing: Status

Substance	Test	Testing status
Palladium dinitrate	Melting point Boiling point Readily combustible solids Self-heating solids Oxidising solids Granulometry	Complete
Tetraammine palladium(2+) diacetate	Melting point Boiling point Density Water solubility Readily combustible solids Self-heating solids Granulometry	Complete
Palladium sulphate	Density	Complete
Dihydrogen tetrachloropalladate	Melting point Boiling point Flash point Auto-ignition	Shipment of test item in progress
Tetraamminepalladium(2+) dihydroxide	Melting point Boiling point Flash point Auto-ignition Water solubility	Shipment of test item in progress

Classification changes

- Palladium dinitrate CAS: 10102-05-3
  - » Oxidising solid, Packing Group I
  - » Classification confirmed based on final test report

2.2 Learning lessons

- ECHA manual completeness check:
  - Non standard waivers for phys-chem endpoints have been rejected for 3 PMC substances
  - As a result additional phys-chem testing was required
  - One substance has already been resubmitted and registered, two are still awaiting the testing (see next slide)

  - Description on composition for a UVCB (KC) in section 1.2 of IUCLID has been considered not to be complete by ECHA MCC
  - As a result additional information has been included for palladium and platinum dinitrate that are also registrered as a UVCB

2.2 Learning lessons

- Phys-chem testing takes time:
  - The need for additional phys-chem tests for 3 Pd substances was identified in April 2016
  - Contracts and samples ready over summer
  - Results and reports available end of November 2016
  - Review and approval started mid December.

  - Mid January H2PdCl4 and (NH3)4Pd(OH)2 registrations were rejected by ECHA Manual Completeness Check (MCC)
  - Deadline to re-submit is the 1st of June 2017
  - Request for quotes from 3 different labs, some couldn't meet the deadline
  - Mid February quote from Siemens signed
  - Turn-around-time is 10 weeks after arrival of the sample
  - This is close to the deadline of the 1st of June!

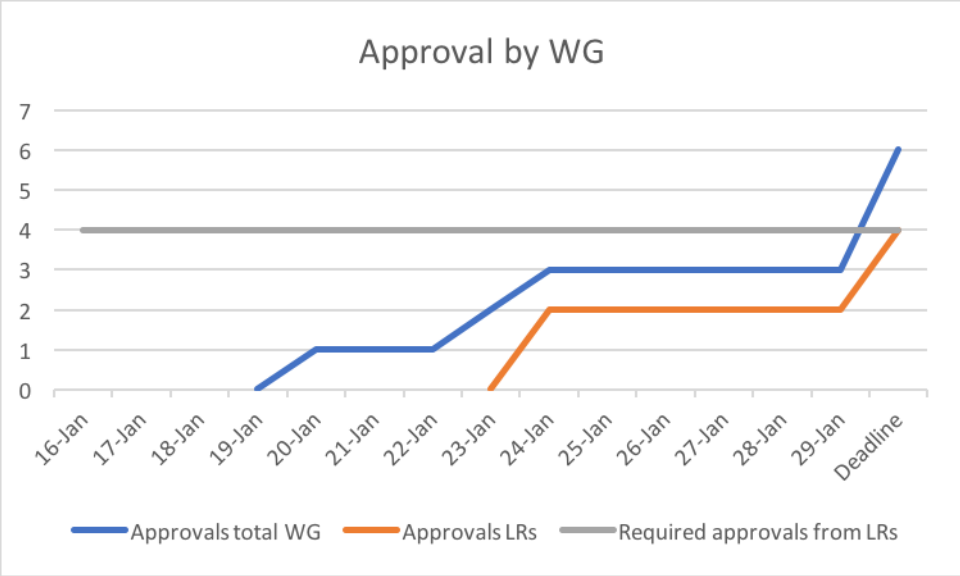
2.2 Learning lessons

- Creation of an Opportunity For Improvement (OFI) tracker:
  - During review and approval by the members some comments were made that couldn't be resolved on short notice because of lack of time and/or budget
  - The budget for 2018 is established keeping this tracker in mind although not all suggestions can be tackled at once. Some require expensive testing (OECD 422) or input from ECHA.
  - Some opportunities for improvement should first be discussed by the working group
  - Some examples:

Point of attention	Importance (tentative!)	Action?
Conservative TK assessments	Low	No direct action, all uses safe
Phys-chem waivers TAPd nitrate	Low	Replace the non standard phys-chem waivers
Pd PNEC	Medium	Derive Pd PNEC for different oxidation states (cfr. Pt)
Bio elution testing for PdO	Medium	Bio elution data would strengthen the dossier
Pd and Pt nitrate OCC risk assessments	Medium	Align approaches for Pd and Pt nitrate

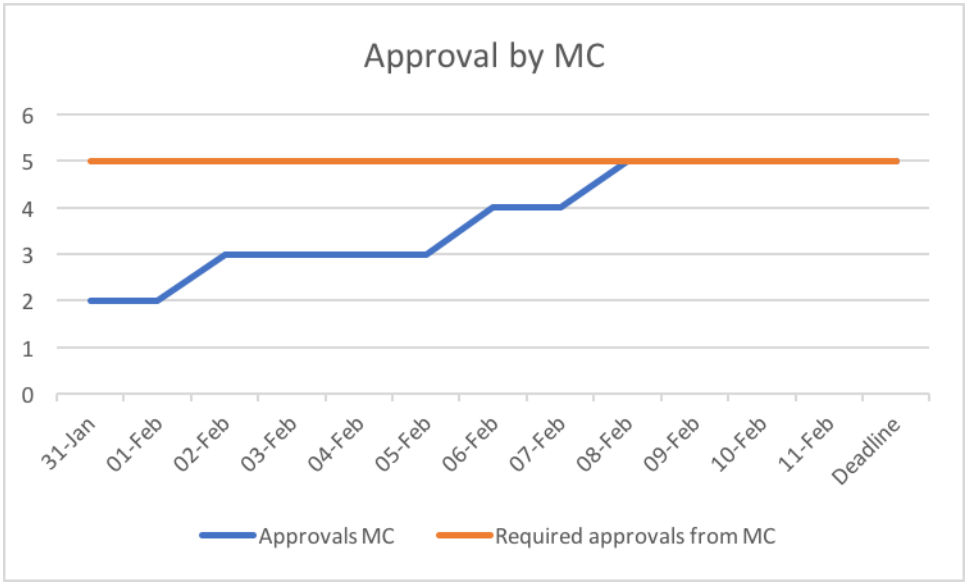
2.2 Learning lessons

- Review and approval process takes time, current procedure:
  - Review by the WG (2 weeks)
  - Time for consultants to incorporate comments from the WG (1 week)
  - Approval by the WG, all LRs approved by the deadline



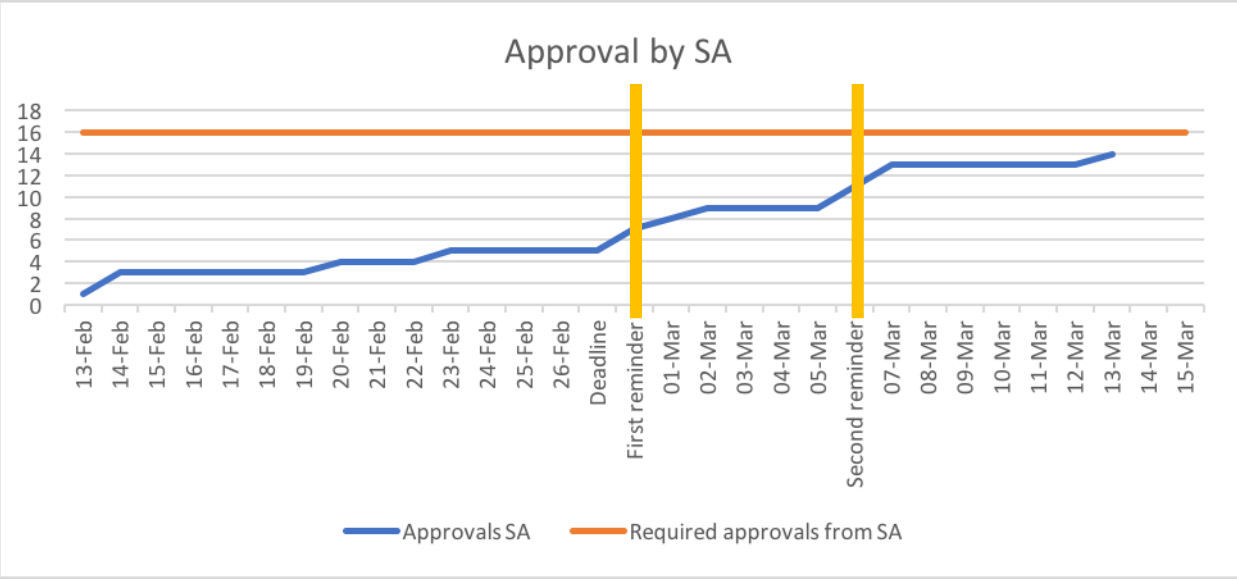
2.2 Learning lessons

- Review and approval takes time, current procedure:
  - Approval by the MC, 5 out of 8 required approvals were given before the deadline



2.2 Learning lessons

- Review and approval takes time, current procedure:
  - Approval by the SA:
    - 5 approvals by the deadline,
    - 9 approvals after the first reminder
    - 14 approvals after the second reminder.
  - A qualified majority of votes (16/23) is needed from the whole Pd SA even from companies not interested in the substances.



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3. Platinum and Pt compounds

3.1 Status (ongoing) registration dossiers

Substance	CAS	EC	LR	Status	
Platinum	7440-06-4	231-116-1	Vale	Approval by Sub Assembly	
Hexachloroplatinic acid	16941-12-1	241-010-7	Johnson Matthey	Approval by Sub Assembly	
Tetraammineplatinum dinitrate (in solution)	20634-12-2	243-929-9	Umicore AG&Co.KG	Approval by Sub Assembly	
Diammineplatinum (II) nitrite	14286-02-3	238-203-3	Heraeus	Restarted after withdrawal from the scope	
Dipotassium tetrachloroplatinate	10025-99-7	233-050-9	Heraeus	Approval by Sub Assembly	
Dihydrogen hexahydroxyplatinate, compound with 2-aminoethanol (1:2) (in solution)	68133-90-4	268-717-3	BASF	HH testing running	See next slides
Dipotassium hexachloroplatinate	16921-30-5	240-979-3	Heraeus	Approval by Sub Assembly	
Platinum dinitrate	18496-40-7	242-383-9	Heraeus	Approval by Sub Assembly	
Platinum, 1,3-diethenyl-1,1,3,3-tetramethyldisiloxane complexes / Karstedt concentrate (in solution)	68478-92-2	270-844-4	Heraeus	REGISTERED	Feb 2017 See next slides
Diammonium hexachloroplatinate	16919-58-7	240-973-0	Johnson Matthey	Approval by Sub Assembly	
Dihydrogen hexahydroxyplatinate	51850-20-5	257-471-2	Johnson Matthey	Approval by Sub Assembly	
Tetraammineplatinum dichloride	13933-32-9	237-706-5	Johnson Matthey	REGISTERED	Feb 2017
Platinum dioxide	1314-15-4	215-223-0	Umicore AG&Co.KG	REGISTERED	Mar 2017

Phys-chem testing: Status

Substance	Tests	Testing status
Platinum dinitrate	Melting point Boiling point Density Readily combustible solids Self-heating solids Oxidising solids Granulometry	Complete
Tetraammine platinum dichloride	Oxidising solid	Complete

- Tetraammine platinum dichloride oxidising solids test confirmed no classification for this substance
  - » Result also included in oxidising properties waivers for other substances in this group (Halogens, metal^{2+} oxidation state)

Classification changes

- Platinum dinitrate CAS: 18496-40-7
  - » Oxidising solid, Packing Group I
  - » Classification confirmed based on final report
- Platinum, 1,3-diethenyl-1,1,3,3-tetramethyldisiloxane complexes / Karstedt concentrate CAS: 68478-92-2
  - » No environmental classification required based on rangefinder tests and solubility trials (previously Chronic Category 4 assigned)

3.2 Karstedt Concentrate: dossier update

- A meeting between PMC and Reconsile was held on the 15th of February
  - Reconsile had some suggestions for improvement of the dossier
  - Discussion on the LoA agreement is not yet finalised
  - Once the LoA is signed PMC will provide Reconsile with a dossier for full review
  - Evaluation of the Reconsile comments

- Discussion on classification of KC and the following steps was held on the 17th of March 2017

  cfr. next slides

Karstedt Concentrate (1)

Test	Status	Report date
Skin irritation in vitro Epiderm - OECD 439	Non-irritant	30-Jun-16
Eye irritation in vitro - OECD 437	Not a severe irritant	13-Jun-16
Local Lymph Node Assay - OECD 442B	Negative	24-Oct-16
In vitro mammalian cell micronucleus test (human lymphocytes) – OECD 487	Positive	11-Nov-16
In vitro gene mutation in mammalian cells (hrpt assay in mouse lymphoma cells) – OECD 476	Cancelled	
Acute oral toxicity Up-and-down procedure - OECD 425	> 5000 mg/kg	29-Sep-16
Acute dermal toxicity - OECD 402	Cancelled	
Preliminary repeat dose toxicity	Complete	17-Oct-16
Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test	Reporting	

Karstedt Concentrate (2)

14-day range finding study:

- 1000 mg/kg/day: terminated on day 12 due to 1 mortality, adverse clinical signs and effects on body weight. Males showed no body weight gain to day 7 and body weight loss to day 12. Lower food consumption in both sexes (more pronounced in week 1). Evidence of GI tract irritation at necropsy in both sexes (more severe in males).
- 750 mg/kg/day: adverse clinical signs in both sexes, lower body weight in males (-13% day 15), lower food consumption in both sexes (more pronounced in week 1)
- 500 mg/kg/day: minor adverse clinical signs (2M, 1F), lower body weight in males (-9.8% day 15, ns), lower food consumption in both sexes (more pronounced in week 1)

Karstedt Concentrate (3)

Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test (OECD 422 2015 version):

- Dose levels of 30, 125 and 500 mg/kg/day
- Included satellite animals dosed at 0 or 500 mg/kg/day for 28 days for blood sampling (TK and micronucleus testing). *In vivo* micronucleus assessment by Micro Flow method at Litron Laboratories, USA. Positive controls included (2 dose levels of mitomycin C or vincristine) for micronucleus.
- Included pre-treatment smears for animal selection, and thyroid hormone analysis
- Full draft report due 24 Mar 17

Karstedt - 422 study

500 mg/kg/day: males ↓ bw from D4 day (max -14.4%), ↓ food consumption both sexes week 1 only, salivation was noted in all males and 5/10 females. One female died on LD6.

Haematological differences: ↑ in white blood cell counts in both sexes (males: granulocytes, lymphocytes, monocytes, large unstained cells; females monocytes), ↓ reticulocytes in males.

Clinical chemistry, neurological screening – no effects

Organ weights: *males:* ↑ in relative organ weights for testes, kidneys, liver and epididymides; ↓ in absolute weight of spleen, thymus and prostate with seminal vesicles, all reflecting lower body weights; *females*: ↑ absolute and relative adrenal weight

Pathology: 5/10 males and 6/10 females showed macroscopic and/or microscopic abnormalities in the lung (both sexes) and adrenal (females only) and stomach.

Karstedt - 422 study (cont.)

500 mg/kg/day

Micropathology:

- Lungs: multiple granulomatous inflammation in combination with haemorrhages and pigment deposition. Occasional multi-nucleated giant cells indicating a foreign body response to the test item with associated granulomatous inflammation and haemorrhage with hemosiderin–laden macrophages (pigment deposition). *(Also in some intermediate and low dose animals)*
- Adrenals: hypertrophic adrenals in 3/6 females (N.B. group mean adrenal weight increased but no specific correlation on individual animal basis) – pathologist concluded “possibly due to the prolonged stress in relation to the pregnancy-delivery of pups of the dams.” (*No effects at lower doses)*

i.e. No evidence of specific target organ toxicity

Karstedt – 422 study (cont.)

Reproductive performance:

	Dose level (mg/kg bw/day)			
	0 control	30	125	500
Females paired	10	10	10	10
No of litters	9	10	8	9
Corpora lutea	14.9	16.1	15.1	16.0
Implantation sites	14.8	15.7	15.1	15.6
Pre-implantation loss (dam/group)	0.8 (0.9)	2.5 (2.1)	0.0 (0.0)	2.8 (2.3)
Post-implantation loss (dam/group)	3.8 (3.4)	9.6 (10.2*)	14.1 (13.8**)	15.1 (14.3**)
Mean pups/litter day 1 (total)	14.2	14.4	13.0	14.0
Mean pups/litter day 1 (alive)	14.2	14.2	13.0	13.2
Total dead pups day 1 (litters)	0	2 (1)	0	7 (3)
Mean pup body weight day 1	6.97	6.85	6.68	5.93**
Pups died LD1-4	2	3	1	32/17+
Viability index (to LD4); dam/group)	98.6 (98.4)	96.7 (96.5)	99.2 (99.0)	72.1 (73.1**)
Pups died LD1-13	3	3	2	32/17+
Mean pup body weight day 1	6.97	6.85	6.68	5.93**
Mean pup body weight day 4	10.22	10.03	9.92	8.42*
Mean pup body weight day 13	29.99	28.66	27.46	20.55**

+ excluding 15 pups from intercurrent female 77

Increased post-implantation loss at 30 and 125 considered spontaneous as generally within the range of historic control data

Karstedt – 422 study (cont)

Concerns for reproductive toxicity:

- Developmental: increased number of stillbirths, decreased viability index, increased no of post-implantation loss.
- Lactational effects: increased pup mortality, early onset of delayed pup growth

Both present with limited evidence of systemic toxicity

Karstedt – 422 study (cont.)

Micronucleus assay:

- No test item-related increase of micronucleated reticulocytes in males or females animals at 500 mg /kg bw/day as compared to the corresponding vehicle control group.
- The positive reference control groups which received Mitomycin C (0.75 mg/kg bw, i.p.) or Vincristin sulphate (0.04 mg/kg bw, i.p.) exhibited a statistically significant increase in the number of micronucleated reticulocytes demonstrating the validity of testing procedure.

Karstedt – 422 study (cont.)

Ano-genital distance, nipple retention in males

No effects at any dose level

Thyroid hormone analysis:

- Adult males: At 500 mg/kg bw/day T4 ↓ (53.67 v 65.05 nmol/L)
- Adult females (PND 14): No effects
- Pups:
  - PND 4 no effects
  - PND 13 ↓ in males (48.34 v 67.08 nmol/L) and females (56.36 v 68.81 nmol/L) at 500 mg/kg bw/day

Thyroid weight:

- Adult males: no effects
- Adult females: no effects
- Pups (PND 13): no effects

Thyroid histopathology:

No effects

Karstedt – 422 study (cont.)

Conclusion on Endocrine Effects

The lack of effect in pregnant females and in PND 4 pups indicates that reduction in thyroid hormones in fetuses and possible consequences on fetal brain development is unlikely. By PND 13, T4 was reduced in male and female pups at 500 mg/kg only, indicating that as the dosage of Karstedt Concentrate increased (via increased milk consumption) then this triggered a similar response to that seen in the F1 males. There was no accompanying increase in thyroid weight or histopathology in any of the affected groups, indicating only a modest effect on the thyroid hormonal system.

The thyroid hormone reduction maybe a secondary consequence of increases in liver weight (although increase not large, liver not weighed in pups).

Karstedt – 422 study (cont.)

TENTATIVE CONCLUSIONS !

Report conclusions:

125 mg/kg bw/day: No treatment-related effects

30 mg/kg bw/day: No treatment-related effects

NOAELs:

Systemic toxicity: 125 mg/kg bw/day (↓ bw in males)

Reproductive toxicity:

Fertility and reproduction: 500 mg/kg bw/day

Pre-natal development: 125 mg/kg bw/day (↑ stillbirths, ↓ live born index)

Post-natal development: 125 mg/kg bw/day (↓ viability, ↓ pup bw)

Karstedt 422 (cont.)

TENTATIVE CONCLUSIONS !

Conclusions re classification (cfr PGM TE meeting 17/3):

STOT-RE: no evidence of significant target organ toxicity at any dose level. Not classified

REPRO: Cat 1B H360 May cause damage to unborn child

(it is possible that a regulator may also conclude “H362 May cause harm to breast fed children” but evidence is not definitive and not proposed at this time)

3.2 Karstedt Concentrate: next steps

- **Potential consequences if** classification as CMR cat1:
  - Need for exposure scenarios
    - incl. consumer uses/service life

      → leaching data (available, testing, worst-case assumption?)
    - contribution organic ligand (not via PMC monitoring data)

  - REACH Art 68(2): simplified restriction procedure (COMM, use for CMR cat1 substances on their own, in mixtures or in articles that could be used by consumers) – process typically <2 yrs

  - DU communication required

    → long-term support consumer uses, or not?

3.3 HHPA/2AE: status & remaining work

- ENV testing and ES are finalised
- HH testing: OECD 422
  - In-life phase terminated
  - Summary of the results expected end of March
  - Draft report expected beginning of June

  cfr. next slides

- Remaining work:
  - OCC ES: Suggestion to start from the HHPA or Platinum dinitrate ES and exposure estimates would this make sense?

Dihydrogen hexahydroxyplatinate – 2AE

- Formulation analysis demonstrates that HHPA-2AE is stable in corn oil at nominal concentrations of 1, 30 and 100 mg/mL for 7 days.
- **Preliminary repeat dose toxicity study (complete):**
  - 14 day gavage at 500, 750 and 1000 mg/kg/day
  - Slightly lower (not significant) body weight both sexes:

Dose	Males	% difference	Females	% difference
Control	351.74		270.60	
500 mg/kg	364.70		259.72	-4.0%
750 mg/kg	361.54		256.12	-5.4%
1000 mg/kg	335.38	-4.7%	254.18	-6.1%

  - Significantly reduced food consumption in week 1 only

Dihydrogen hexahydroxyplatinate – 2AE

Combined repeated dose toxicity study with the reproduction/developmental screening test (OECD 422):

- In-life complete. End of study summary due end March. Draft report due 7-Jun-17
- Dose levels 0, 100, 300, 1000 mg/kg bw/day in corn oil
- **1000 mg/kg bw/day:** Male bw ↓ throughout the study with some animals showing bw loss/no overall gain. Max dif – 9.6%. Females no effect pre-mating. Gestation bw ↓ ~ 7% on GD20, lactation bw ↓ ~ 6%
- Adverse clinical signs (salivation) in males and females
- No clear effects on reproductive performance
- No treatment-related macroscopic findings

Dihydrogen hexahydroxyplatinate – 2AE

Combined repeated dose toxicity study with the reproduction/developmental screening test (OECD 422):

300 and 100 mg/kg bw/day

No significant signs of toxicity, no effects on bw, food consumption, no macroscopic findings

Summary of reproductive performance:

Group	Females paired	Pregnant animals	Fertility index	Females with viable litters	Females with total resorptions	Gestation index	Stillbirths
Control	10	10	100%	10	0	100%	1
Group 2	10	9	90%	9	0	100%	3
Group 3	10	9	90%	9	0	100%	1
Group 4	10	9	90%	8	1	89%	0

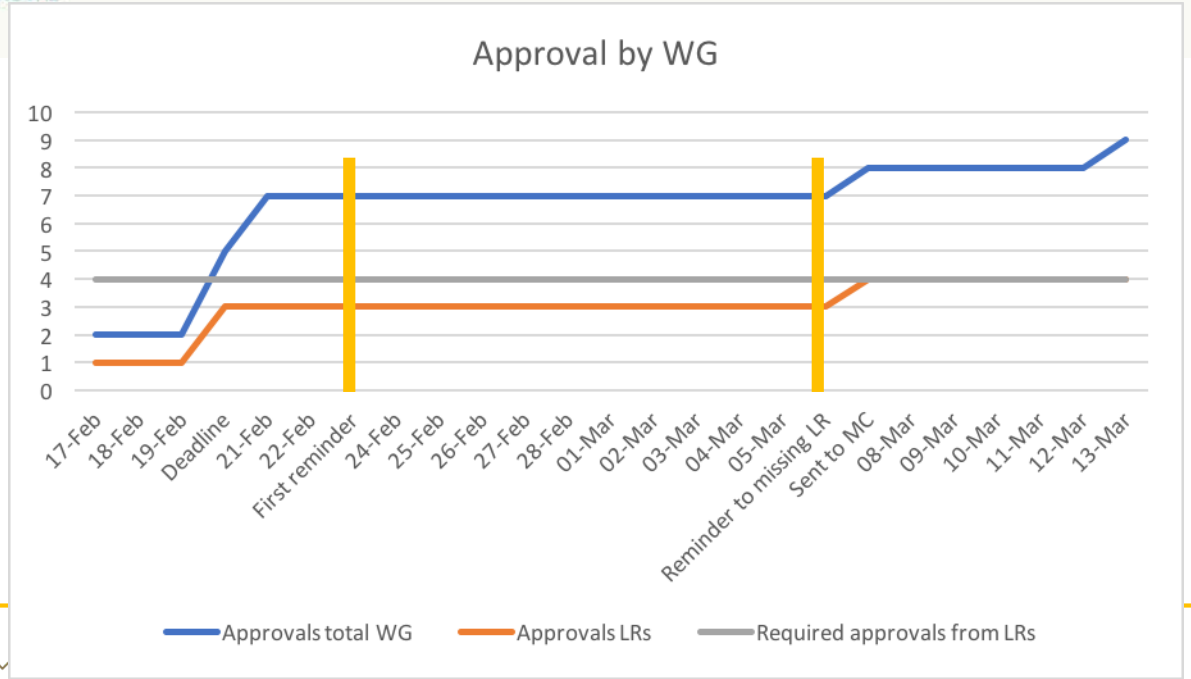
3.4 Remaining challenges

- Diammine platinum (II) nitrate re-included in the scope, dossier aimed for registration together with HHPA-2AE

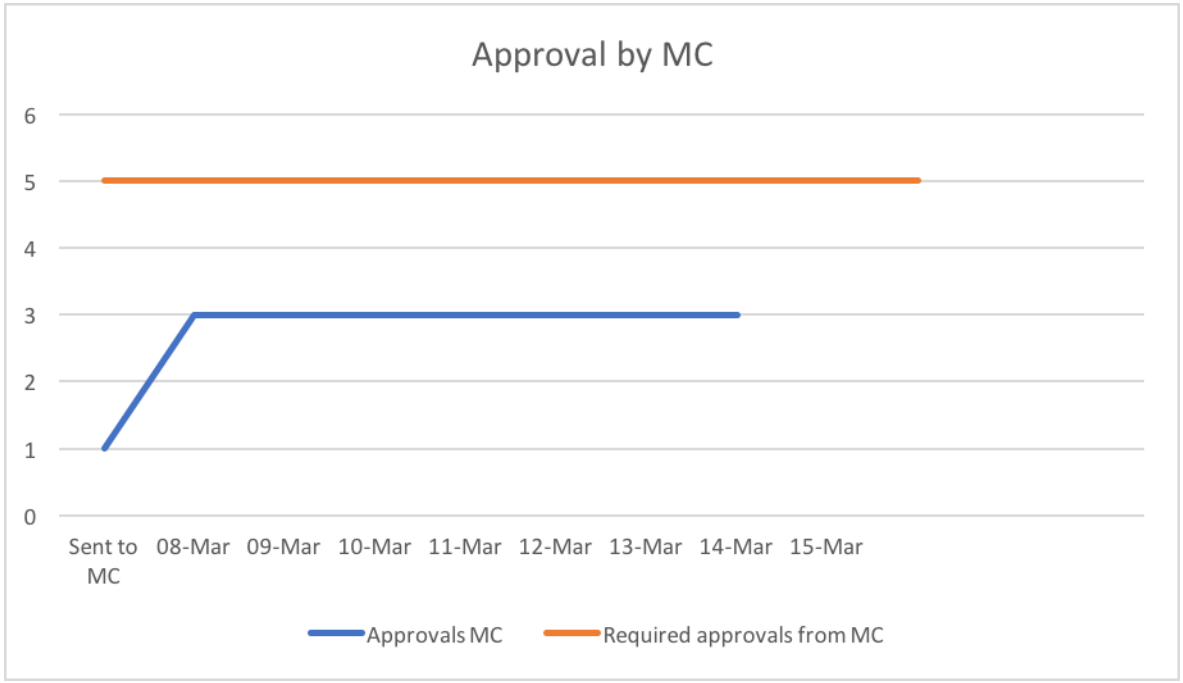
- examples OFI tracker for Pt:

Point of attention	Importance (tentative)	Action?
PNEC deriviation	Low	Consider new chronic ecotox testing
Sec. pois. ClPt's	Medium	Sec. pois. can't be waived based on previous arguments (STOT-RE1 classification), information on bio accumulation required
Dermal monitoring/toxicokinetics	Medium	Analogous data from Ni used, gather Pt data and assess dermal uptake
Annex III dossiers with WDU	High	Assess emissions from WDU (car catalysts) or go for Annex VII

3.4 Remaining challenges



3.4 Remaining challenges



Approval process: improvement

PMC approval process of dossiers with more than two registrants: new practice recommended by Mgt Cttee for approval by Assembly.

Work Group - only the co-registrants:

- **review period of 2-3 weeks (depending on the dossier)**
- **approval period before sending to the Management Committee of 2 weeks**

→

Management Committee: approval period of 2 weeks

→

(Sub)Assembly - only the co-registrants: approval period of 2-3 weeks (depending on the type of dossier).

N.B.: In the consortium agreement, no decision has to be taken at unanimity, but only at qualified majority (2/3). The reason was to avoid that one company could block the entire system.

Timeline Pt (excl. KC and HHPA-2AE)

Registration of Pt and compounds except HHPA-2A and Karstedt

TIMELINE

PROJECT DETAILS

DATE	MILESTONE	POSITION
23/01/2017	Dossiers sent for WG review / approval	5
20/02/2017	Deadline for WG approval	-5
17/03/2017	Send dossiers for Mngt Cttee approval	15
31/03/2017	Deadline for Mngt Cttee approval	-20
07/04/2017	Send dossiers for Assembly approval	5
21/04/2017	Deadline for Assembly approval	-10
30/04/2017	Registration by LR except Chloroplatinate	10
31/12/2017	Registration by LR of Chloroplatinates	5

Project Timeline Tips:

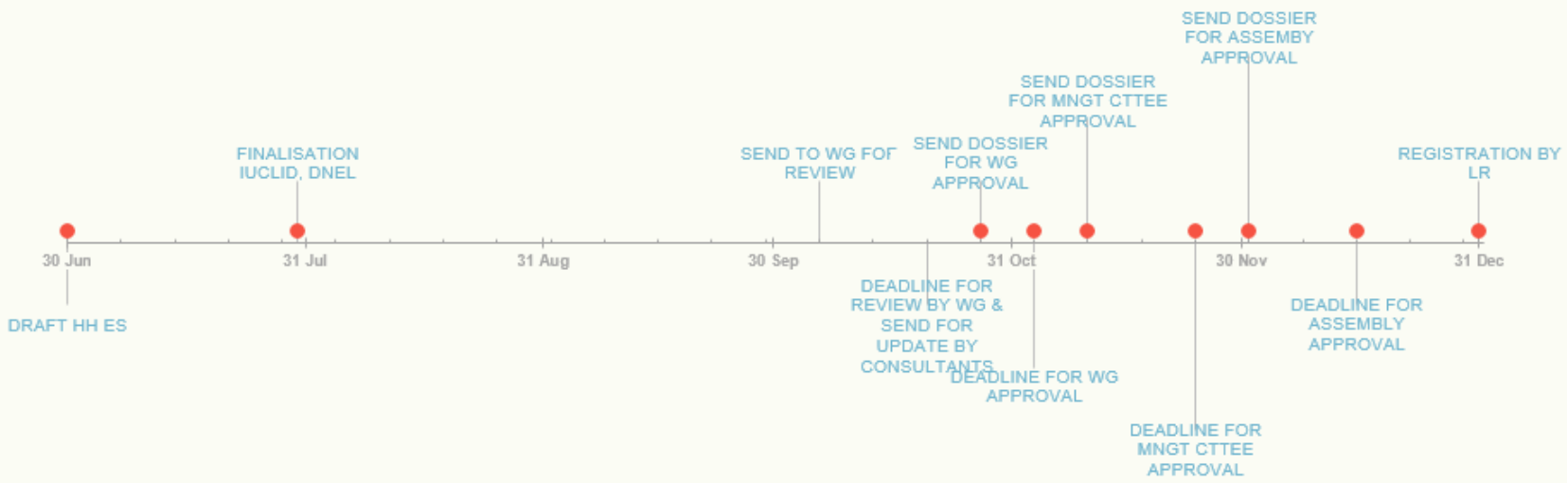
The role of the Position values in the Project Details table is to prevent the Milestone labels from overlapping each other on the timeline. Use positive numbers to position labels above the timeline and negative numbers to position them below.

To add additional Milestones, either insert new rows within the table or start typing below the last table entry and the table will automatically expand to accommodate your newly added data.

Timeline Pt (HHPA-2AE)

Registration of HHPA-2A

TIMELINE



PROJECT DETAILS

DATE	MILESTONE	POSITION
30/06/17	Draft HH ES	-5
30/07/17	Finalisation IUCLID, DNEL	5
6/10/2017	Send to WG for review	5
20/10/2017	Deadline for review by WG & send for update by consultants	-5
27/10/2017	Send dossier for WG approval	5
03/11/2017	Deadline for WG approval	-10
10/11/2017	Send dossier for Mngt Cttee approval	10
24/11/2017	Deadline for Mngt Cttee approval	-15
01/12/2017	Send dossier for Assemby approval	15
15/12/2017	Deadline for Assembly approval	-5
31/12/2017	Registration by LR	5

Project Timeline Tips:

The role of the Position values in the Project Details table is to prevent the Milestone labels from overlapping each other on the timeline. Use positive numbers to position labels above the timeline and negative numbers to position them below.

To add additional Milestones, either insert new rows within the table or start typing below the last table entry and the table will automatically expand to accommodate your newly added data.

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Positive in vitro testing data + Kirkland review
- PMC strategy (~EU REACH):
  - Inclusion proposals for in vivo testing in registration dossiers (Q1 2017 (Q4 2017 for ClPt))
  - Tiered testing approach:
    - start with chloroplatinates
    - revise strategy once data get available
    - defer TP Pt nitrate till other groups tested (cfr. corrosivity)
  - Testing after ECHA approval
- IPA STF:
  - plan to perform in vivo mutagenicity testing with Pt (cmpds)
  - test outside EU
  - delay REACH registrations till testing is finalised, submit updated files end 2017 - early 2018

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Questions:
  - How many and what substances being tested?
  - What assay will be used?
  - Who will do testing?

    cfr. data ownership – important for data sharing and potential compliance check
  - Consistency with PMC registration strategy (e.g. RAAF, tiered testing, defer Pt nitrateTP)?
  - Pt dioxide dossier:
    - no TP included
    - in endpoint summary: '*Based on the existing data set, platinum dioxide does not currently meet the criteria for classification as a germ cell mutagen (category 1A or 1B). However, this conclusion should be revisited when the results of the planned in vivo studies are available*.'

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Benefits:
  - Have more complete picture on Pt mutagenicity while registering
  - Ensure adequate HH protection
  - Potentially no need for TP in registration dossiers

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks:
  - Breaching EU Law:
    - TP for Annex IX-X vertebrate testing required under REACH

      -if recent data submitted: screen by NGOs and ECHA & letter sent to registrants

      → no issue if justification can be given that testing was requested for regulatory purposes outside the EU

      → otherwise:

      -ECHA contact the authorities to check context of testing (agreements with US & Japan to decrease animal testing)

      -if no justification can be given:

      -SONC letter is sent

      -study can be rejected, although unlikely

      -company reputational damage

    - enforcement = MS responsibility
    - precedents at Ombudsman (NGOs pressure and obliging ECHA to act)
    - substance & company under focus EU Authorities & NGOs

?regulatory driver?

?need to re-test?

?further regulatory actions?

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - In case of **negative testing**:
    - Update dossier, no major issues expected (if on time – cfr further)
  - In case of **positive testing**:
    - modifications to REACH dossiers required

    examples:

    *HHPA now quantitative RA – change to qualitative afterwards?

    *If mutagenicity = threshold effect: need for extra DNELs (e.g. ClPt dossiers)

    *K2PtCl4 now Annex III – need to update to Annex VII?

    *Need to update RAAF?
    - Triggering additional testing (proposals) for carcinogenicity?

!unpredictable!

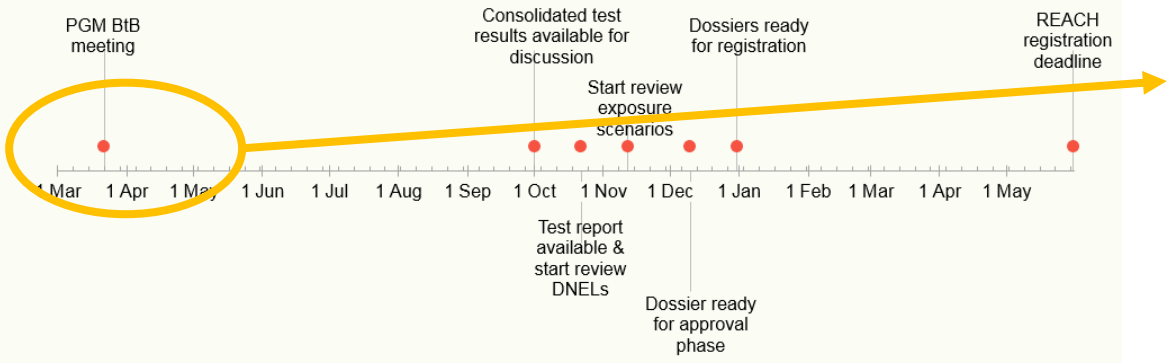
3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - Delay of testing = delay of registration?

?registration at risk?

Tentative timing Pt dossiers

TIMELINE



Quick setup required

PROJECT DETAILS

DATE	MILESTONE
22/03/2017	PGM BtB meeting
1/10/2017	Consolidated test results available for discussion
22/10/2017	Test report available & start review DNELs
12/11/2017	Start review exposure scenarios
10/12/2017	Dossier ready for approval phase
31/12/2017	Dossiers ready for registration
31/05/2018	REACH registration deadline

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - Delay of testing = delay of registration?

?registration at risk?

Tentative timing Pt dossiers

TIMELINE

5 months timeslot for testing & reporting

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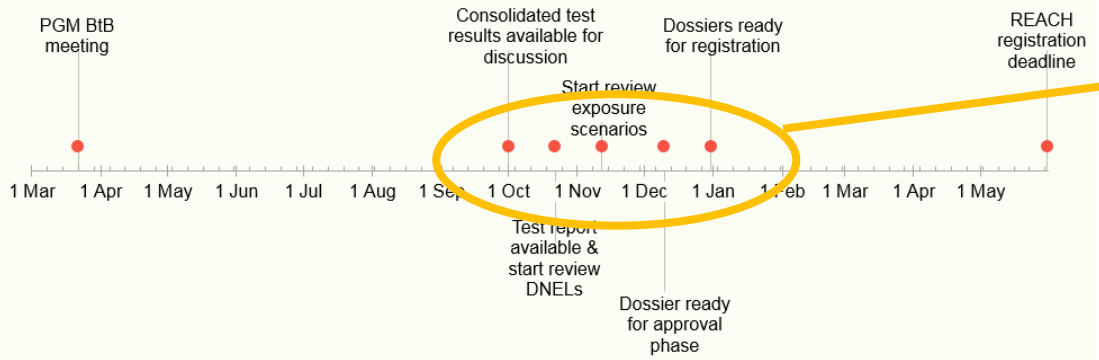
3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - Delay of testing = delay of registration?

?registration at risk?

Tentative timing Pt dossiers

TIMELINE



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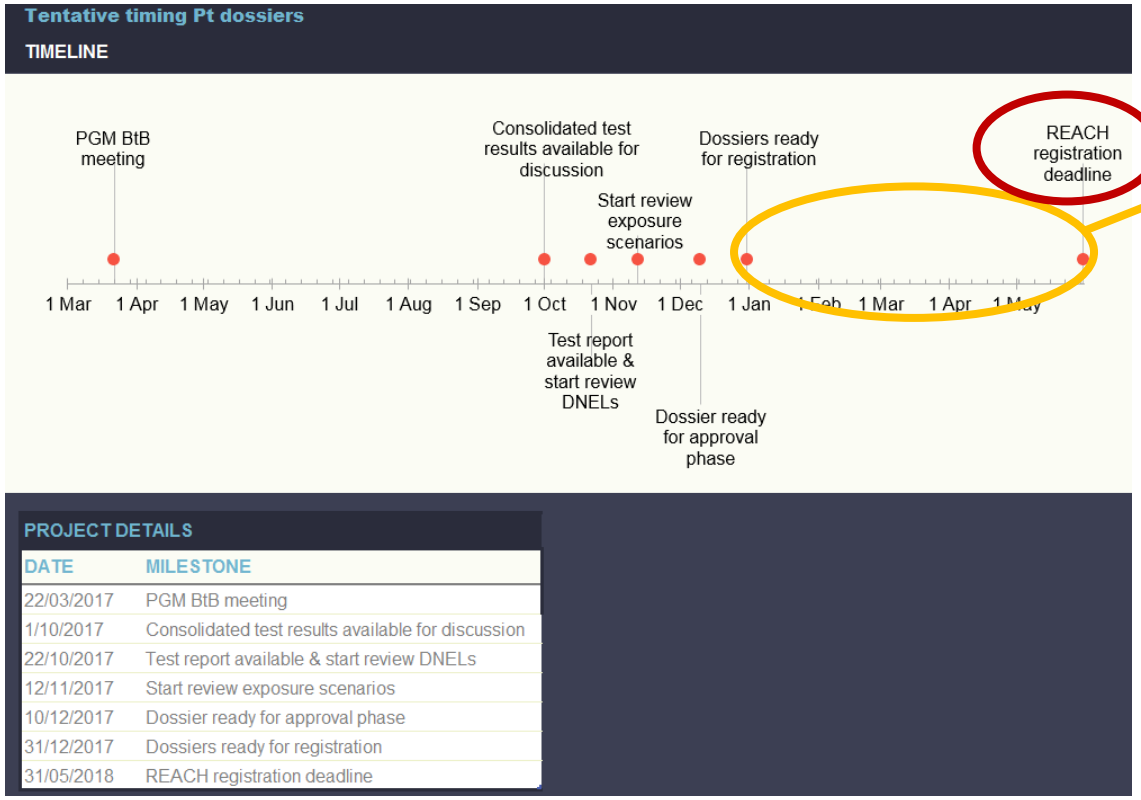
Availability consultants end 2017?
No flexibility when to engage

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - Delay of testing = delay of registration?

?registration at risk?



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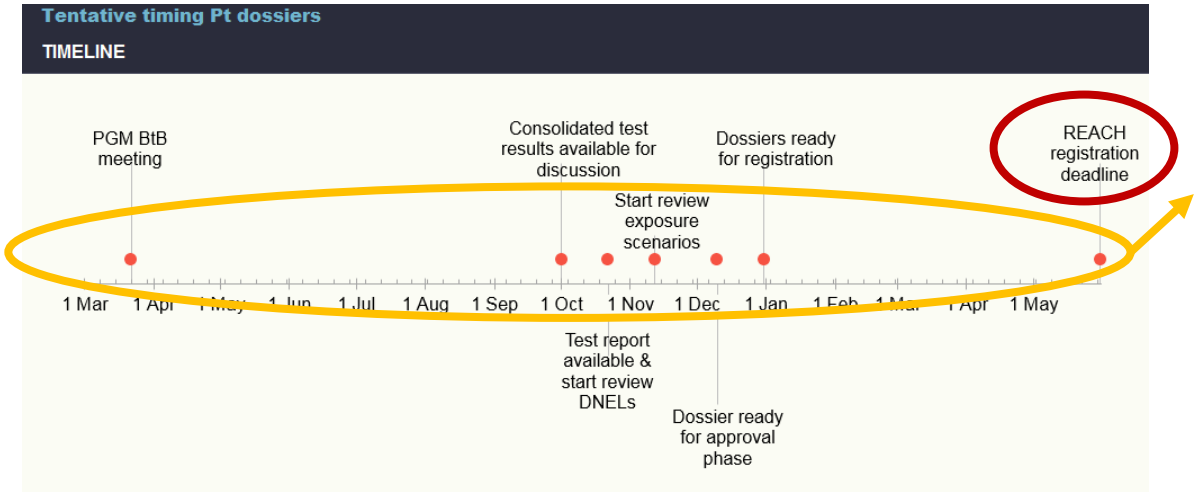
31/05/2018	REACH registration deadline

Quick registration required
Hope for no MCC issues

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

- Risks (continued):
  - Delay of testing = delay of registration?

?registration at risk?



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31/05/2018	REACH registration deadline

Worst-case
…
for all Pt dossiers?

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

IPA PROs	*PMC concerns*
Avoid partial picture on Pt HH	Unsure if picture will be solid afterwards (other hazards included in dossiers and potential weak risk assessment depending on the time update CSR/ES). TP not desseminated until taken up by regulators
Include IPA and PMC relevant substances	Important to ensure consistency with PMC strategy (e.g.: corrosivity and RAAF).
More economical study design than which could be imposed by EU authorities	cf. ILSI report on in vivo MN vs TGR assay: in vivo at least as predictive. Therefore, the risk to have to perform the TGR assay is small.
PMC can drop TP if outcome is relevant & fall back if not	TP can always be dropped, registrants informed if TP are picked-up & opportunity to update dossier. Time pressure to be taken into account.
Earlier opportunity for better HH RA	cf. time pressure – proposal for tiered testing. Other hazards driving RMM/OC (e.g. resp / skin sensit)
If equivocal outcome, then more time for follow-up	cf. other PGM topics that can be tackled without risk for breaching EU law (in vitro assays, emissions…)

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

IPA CONs	*PMC concerns*
Breaching REACH law, but testing outside EU jurisdiction for justifiable responsible care/regulatory concerns different from REACH	Responsible care not considered valid justification. Unsure about “other regulatory concerns” – animal testing must be justified by “regulatory requirements”.
Study judged as invalid (but unlikely)	Agree, but company image and reputation might be damaged depending on the owner of the animal study and the link made between IPA and PMC.
Funding at near-term rather than long-term	/

3.5 IPA STF: in vivo mutagenicity testing with Pt (cmpds)

Based on current understanding of the proposal and the assessment of the impact on Pt registration dossiers, the risks outweigh the benefits.

It is therefore suggested to:

- Keep PMC internal timing unchanged, and keep TP in dossiers
- Encourage IPA revise testing strategy (tiered approach?) and start testing as soon as ready (less time pressure)
- Update Pt REACH dossier as data get available – allows proper risk assessment if needed

Precious Metals Consortium

4. Rhodium and Rh compounds

4.1 Dossier status

Substance	CAS	EC	LR	Status	
Rhodium	7440-16-6	231-125-0	Johnson Matthey		10-100 tpa
Carbonyl(pentane-2,4-dionato-O,O')(triphenylphosphine)rhodium	**25470-96-6**	**247-015-0**	**Johnson Matthey**	**REGISTERED**	**AnnexIII**
Carbonylhydrotris(triphenylphosphine)rhodium	**17185-29-4**	**241-230-3**	**Umicore AG&Co.KG**	**REGISTERED**	**AnnexIII**
Dicarbonyl(pentane-2,4-dionato-O,O')rhodium	14874-82-9	238-947-9	Umicore AG&Co.KG		AnnexIII
Rhodium tris(2-ethylhexanoate)	*20845-92-5*	*244-079-1*	*Umicore AG&Co.KG*	*PC testing required Ames-pending*	*Solid being isolated*
Rhodium trichloride (hydrate)	10049-07-7	233-165-4	Heraeus		AnnexIII
Di-µ-chloro-bis(hapto-1,5-cyclooctadiene)dirhodium(I)	**12092-47-6**	**235-157-6**	**Heraeus**	**REGISTERED**	**AnnexIII**
Tris(triphenylphosphine) rhodium (I) chloride	**14694-95-2**	**238-744-5**	**Umicore AG&Co.KG**	**REGISTERED**	**AnnexIII**
Rhodium triiodide	15492-38-3	239-521-5	Umicore AG&Co.KG		AnnexIII
Dirhodium trisulphate	*10489-46-0*	*234-014-5*	*Umicore AG&Co.KG*	*PC testing required*	*AnnexIII*
Dirhodium trioxide	*12036-35-0*	*234-846-9*	*Umicore AG&Co.KG*	*Ames-decision required*	*AnnexIII*
Rhodium (III) acetate	42204-14-8	255-707-9	Umicore AG&Co.KG		AnnexIII
Rhodium trinitrate	10139-58-9	233-397-6	Johnson Matthey		1-10 tpa
Rhodium trihydroxide	*21656-02-0*	*244-508-2*	*Heraeus*	*Ames-draft report available*	*AnnexIII*
Triammonium hexachlororhodate	15336-18-2	239-364-2	Vale		AnnexIII
Diammonium sodium hexakis(nitrito-N)rhodate	64164-17-6	264-713-0	Vale		10-100 tpa

4.1 Dossier status

- Rhodium sulfate (1-10 tpa, AnnexIII):
  - Can not be isolated as solid - registration as solution
  - PC data missing

	Appearance/ Physical State/Colour	Melting / Freezing point	Boiling point	Vapour Pressure	Water solub	Flash Point	Autoflam mability
Dirhodium trisulphate	Statement required	Test required	Test required	Test required	Statement required	Include waiver	Include waiver

  - Checking with LR and initiate testing ASAP
  - Consequence for dossier: submission later than other Rh dossiers (Q2 2017), but <May 2018

! Testing proposed ~ECHA manual completeness checks !

4.1 Dossier status

- Rhodium tris(2-ethylhexanoate) (1-10 tpa, AnnexIII):
  - Can be isolated as solid – isolation and characterisation ongoing
  - PC data missing (overview tentative!)

	Appearance/ Physical State/Colour	Melting / Freezing point	Boiling point	Density	Flammability	Self-igintion temp	Granulometry
Rhodium tris(2-ethylhexanoate)	Statement required	Test required	Test required	Test required	Test required	Test required	Test required

  - Initiate testing ASAP after isolation/characterisation
  - Consequence for dossier: submission later than other Rh dossiers (Q2 2017), but <May 2018

Rh Annex III substances: human health

Annex III Rh substances (x13)

Rh(I) compounds (x5):

- All 5 Annex III registration dossiers completed in 2016

  REMARK PMC: dicarbony(pentane-2,4-dionato-O,O') rhodium will be registered Q2 2017

Rh(III) compounds (4 'soluble' and 4 'insoluble')

- All 8 Annex III dossiers were on-hold due to genotoxicity uncertainty
- All 8 Rh(III) dossiers and Annex III reports now drafted, but the genotoxicity sections will require revisiting
- Dirhodium trioxide – currently Annex III, but wide dispersive uses and indications of possible HH classification (from C&L Inventory and other Rh(III) compounds) suggest Annex III exemptions do not apply – consider for registration at Annex VII (now or in the future?)

4.1 Dossier status

- Dirhodium trioxide (1-10 tpa):
  - Similar situation to PtO_2
  - WDU (~ENV and automotive catalysts), but …
  - …no classification based on available data

  - No substance specific testing data, uncertain HH profile (cfr. genetox)

  - Annex VII - data lacking (tentative): acute tox (oral), in vitro bacterial reverse mutation assay, skin sensitisation (in vitro!), in vitro skin and eye irritation

  → **Proposal to register as Annex III, and update to Annex VII dossier ASAP**

AGREE?

Rh Annex VII and VIII substances: human health

Annex VII Rh substance (x1)

Rhodium trinitrate:

- UVCB and classified for acute oral, corrosion, skin sens. and Muta2
- IUCLID drafted

Annex VIII Rh substances (x2)

Rh metal:

- No HH data (all data waivers) and no HH classification
- IUCLID drafted and 1st CSR generated

Diammonium sodium hexakis(nitrito-N)rhodate ("hexakis-Rh"):

- The only Rh substance for which DNELs/worker risk assessment are required.
- Dossier drafted and CSR required

4.2 Rh(III) genetox review

- Cfr. discussion 2016 BtB meetings
  - Ames with poorly water soluble Rh(III) compounds
  - Internal review of Rh(III) genetox data
  - Develop intelligent testing strategy

- Ames testing on PWS $Rh(OH)_3$ and Rh_2O_3 and tris(2-ethylhexanoate):
  - Initiated for $Rh(OH)_3$ and Rh_2O_3 (isolation Rh tris(2-ethyl…) ongoing)
  - No solubilization with various solvents
  - Stable suspension with Silverson mixing in 0.5% MC (cfr. genetox testing diammonium sodium hexakis (nitrito-N)rhodate)
  - Tiered approach:
    - Start full test with $Rh(OH)_3$
    - Decide afterwards on Rh_2O_3

Rhodium salts - Ames studies

Rhodium trihydroxide:

- Formulation: suspension in 0.5% MC with Silverson mixing
- Study complete: **Negative** (no evidence of toxicity and no notable increases in revertant numbers observed)

Rhodium(III) oxide:

- Formulation: suspension in 0.5% MC with Silverson mixing
- Preliminary experiment conducted indicates negative response

Rhodium tris(2-ethylhexanoate):

- Awaiting test substance delivery

4.2 Rh(III) genetox review

- Internal review Rh(III) genetox data:
  - Draft document prepared by PMC Secretariat
  - Discussed with Mark Raffray and Dave Boyd
  - Circulated to PMC TE on XX March
- Key messages:
  - Rh trichloride:
    - positive in vitro and in vivo data – classified as Muta2
    - In vivo assay: ip, not according today's standards
    - Prof Kirkland: mutagenicity ~ potential to release Rh(III)-ionic species in solution
  - Water soluble Rh(III) compounds:
    - Mainly in vitro bacterial reverse mutation assays, all positive and similar pattern (frameshift mutagenic action)
    - Rh nitrate: solid vs solution
    - Expectation: similar potential to release Rh(III)-ionic species + similar MoA to $RhCl_3$ $\Longrightarrow$ classified as Muta2

4.2 Rh(III) genetox review

- Key messages (continued):
  - Moderately water soluble Rh(III) compounds:
    - Diammonium sodium hexakis (nitrito-N) rhodate: solid negative in vitro database ↔ dipotassium pentachlorothodate (non PMC scope!): positive in vitro bacterial reverse mutation assay
    - Moderate water solubility vs similar dissolution/speciation expected in gastric environment
    - Precautionary classification as Muta2

  ! Untested hypothesis (re-speciation to mutagenic forms ?)

  → driver for further testing

4.2 Rh(III) genetox review

- Key messages (continued):
  - <u>PWS Rh(III) compounds</u>:
    - $Rh(OH)_3$: in vitro bacterial reverse mutation assay suggests negative outcome, Rh_2O_3 prelim test similar to $Rh(OH)_3$
    - RhI_3: positive in vitro bacterial reverse mutation assay

    HYPOTHESIS: suspension in DMSO – DMSO facilitates solubilisation and/or acts as ligand – '*artificial*' positive response, not expected in other media
    - Different genetox profile to WS/MWS substances – not classified

  - <u>Rh metal:</u>
    - No test data, but inert material (cfr. water solubility and bioelution data)
    - Not classified

4.2 Rh(III) genetox review

- Key messages (continued):
  - Predicted speciation (Dave Boyd):
    - Neutral to slightly acidic/alkaline pH (cfr. conditions in vitro assays):
      different dissolution and speciation – current basis for grouping

      → prediction corresponds to in vitro observations

    - Acidic pH / high Cl media (cfr. conditions in vivo assays,oral):
      significant dissolution of ALL Rh(III) substances as chloro-aqua Rh(III) species (except Rh metal)

      → untested hypothesis, far-reaching implications for PGM industry if reality

4.2 Rh(III) genetox review

- Proposed way-forward:
  - Do not classify poorly water soluble Rh(III) cmpds for mutagenicity
  - In vitro testing:
    - Test RhI_3 solubility in DMSO
    - Do in vitro bacterial reverse mutation assay with Rh_2O_3
    - Do in vitro bioelution assays (saline / gastric / lung fluids) with speciation analysis (check re-speciation hypothesis) + combine with isolated DNA reactivity

      → revise grouping afterwards
    - no additional in vitro MN assay (to clarify MoA)
  - In vivo testing:
    - include in vivo TP with WS Rh(III) compound in REACH dossiers of water soluble Rh compounds (in vivo MN assay (rat bone marrow, oral route) with TK and site of contact (Comet) components)

      - test compound: re-test $RhCl_3$ or Rh sulphate/acetate?

      - do not directly include poorly water soluble Rh(III) compound

AGREE?

4.3 Diammonium sodium hexakis(nitrito-N) rhodate: status & remaining work

- No data gaps identified

- PNECs
  - ENV testing finalised
  - Data for diammonium sodium hexakis (nitrito-N) rhodate, Rh nitrate and Rh trichloride (cfr. next slide)
  - PNECs derived for Rh(III) cmpds (cfr. PMC strategy Pt dossiers)

4.3 Diammonium sodium hexakis(nitrito-N) rhodate: status & remaining work

TEST	Diammonium sodium hexakis (nitrito-N) rhodate	Rhodium trinitrate hydrate	Rhodium trichloride hydrate
Short-term *Daphnia magna*	Fraunhofer (2014) OECD 202 48 h EC50: 81.3 mg/L (=11.8 mg Rh/L)	Enste-Diefenbach (2003) OECD 202 48 h EC50: 120 mg/L (=42.8 mg Rh/L)	Okamoto et al. (2014) 48 h EC50: **0.290 mg Rh/L** (reported as Rh)
Algal growth inhibition *Pseudokirchneriella subcapitata*	Fraunhofer (2015) OECD 201 72 h EC50: 4.5 mg/L (growth rate) 72 h EC10: 0.313 mg/L (growth rate)	Enste-Diefenbach (2003) OECD 201 72 h E_bC50: 0.88 mg/L 72 h E_rC50: >0.91 mg/L 72 h NOEC: 0.037 mg/L 72 h E_bC10: 0.12 mg/L 72 h E_rC10: 0.26 mg/L	
Short-term toxicity testing on fish		*Cyprinus carpio* Enste-Diefenbach (2003) OECD 203 96 h LC50: 116 mg/L (=41.4 mg Rh/L)	*Leuciscus idus melanotus* Institut Fresenius Chemische und Biologische Laboratorien GmbH (1995) OECD 203 96 h LC50: 220 mg/L (=108.24 mg Rh/L)
Activated sludge respiration inhibition testing	LAUS (2015) OECD 209 3 h NOEC: ≥1000 mg/L 3 h EC50: >1000 mg/L		

PNECs and exposure

- PNECs only required for Diammonium sodium hexakis (nitrito-N) rhodate
- Agreement to derive PNECs based on pooled data for Rh(III) substances
- Aquatic PNECs based on lowest acute value of 0.290 mg Rh L^{-1} for rhodium trichloride

PNEC	Units	PNEC	PNEC derivation method
Freshwater	µg Rh/L	0.29	Lowest EC50 of 0.290 mg Rh/L for Daphnia and an assessment factor of 1000
Intermittent releases	µg Rh/L	2.9	Lowest EC50 of 0.290 mg Rh/L for Daphnia and an assessment factor of 100
Freshwater sediment	mg/kg Rh wwt	0.95	Equilibrium partitioning
	mg/kg Rh dwt	4.37	Equilibrium partitioning
Marine water	µg Rh/L	0.029	Lowest EC50 of 0.290 mg Rh/L for Daphnia and an assessment factor of 10,000
Marine sediment	mg/kg Rh wwt	0.095	Equilibrium partitioning
	mg/kg Rh dwt	0.44	Equilibrium partitioning
Soil	mg/kg Rh wwt	0.001	Equilibrium partitioning
	mg/kg Rh dwt	0.0011	Equilibrium partitioning
Microorganisms	mg Rh/L	14.6	NOEC from an activated sludge respiration inhibition test and an assessment factor of 10
Secondary poisoning	Secondary poisoning assessment not required		

Environmental exposure

- Only one substance requires exposure assessment - Diammonium Sodium Hexakis(nitrito-n)rhodate
- Emissions information has been collated and GES scenarios developed for ‘Manufacture’ and ‘Use as Industrial Intermediate’ based on sector data
- As for other PGMs, exposure/emissions data from Rh sector is for total Rh across all sites
- Same dataset for both exposure scenarios (compounds are manufactured and used as intermediates at the same sites for Rh processing)

Environmental exposure

- Emissions factors (EFs) are 113 g/T for wastewater (50P from sector data) and 300 g/T for emissions to air (SpERC as only limited sector data available)
- EFs applied to 90P tonnage (4.5 tpa as Rh) to derive reasonable worst case exposure scenario
- ES for discharge via STP and direct discharge to freshwater
- Removal rate for Rh during sewage treatment taken from PMC monitoring study
- Safe use is demonstrated for ‘Manufacture’ and ‘Use as an Intermediate’

Environmental exposure

- RCRs:
  - Via STP: 0.015 for FW and 0.15 for FW sediment
  - Direct discharge: 0.0017 for FW and 0.017 for FW sediment
  - 0.04 for soil (w/o sludge to land)
- Environmental modelling undertaken in CHESAR, EUSES and bespoke spreadsheet with R16 algorithms (same answer in all!)
- Problems with CHESAR as it requires IUCLID entries for endpoints waived for metals (e.g. Kow, VP etc)

Hexakis-Rh:
Risk characterisation approaches

Qualitative:

- Based on the mutagenicity (Muta. 2) classification
- Hazard banding: Muta. 2 is high hazard
- Will be taken forward for use in the worker risk assessment

Quantitative (supporting only):

- Based on outcome of OECD 422 study
  - Systemic, repro and developmental NOAEL of 1000 mg/kg bw/day
- DNEL calculated, but documented only in discussion text
- Used for risk assessment only in support of qualitative

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Hexakis-Rh:
Qualitative risk characterisation

Population	Route	Endpoint	Type of risk characterisation	Hazard conclusion
Workers	Inhalation	**Systemic long-term**	**Qualitative**	**High hazard (no threshold derived)**
		Systemic acute	Not needed	No hazard identified
		Local long-term	Not needed	No hazard identified
		Local acute	Not needed	No hazard identified
	Dermal	**Systemic long-term**	**Qualitative**	**High hazard (no threshold derived)**
		Systemic acute	Not needed	No hazard identified
		Local long-term	Not needed	No hazard identified
		Local acute	Not needed	No hazard identified
	Oral	Systemic long-term	N/A	Not relevant
	Eyes	Local effects	Not needed	No hazard identified

Hexakis-Rh:
(supporting) quantitative DNELs

Worker, systemic ,long-term DNELs

Based on lack of adverse effects at 1000 mg/kg bw/day in OECD 422 study

Inhalation:

47 mg/m^3 (compound specific)

11 mg/m^3 (Rh equivalent)

Please note these values exceed the 10 mg/m^3 nuisance dust limit.

Dermal:

133.3 mg/kg bw/day (compound specific)

31.3 mg/kg bw/day (Rh equivalent)

Hexakis-Rh: worker risk assessment

Exposure monitoring data available

- Exposures estimated based on methodology established for Pt compounds
- No Rh-specific data for cleaning/maintenance task (WP10)
  - Proposal to use data on raw material handling (WP01) as "analogous data"

Risk characterisation to be carried out manually and entered directly into CSR Sections 9 and 10

Stringent OCs/RMMs, associated with high hazard banding, expected due to Muta. 2 classification

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Hexakis-Rh: worker risk assessment

From ECHA Guidance R14 (and used in EBRC Pt methodology document)

		Number of data points						
		1	< 6	< 12	12	< 20	< 50	≥ 50
Geometric standard deviation	-	F	-	-	-	-	-	-
	> 3.5	-	E	D	C	B	B	B
	2 – 3.5	-	D	C	B	B	B	A
	< 2	-	C	B	B	B	A	A

Key:

F = Maximum value x 2

E = Maximum value x 1.5

D = Maximum value

C = 95th Percentile value

B = 90th Percentile value

A = 75th Percentile value

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Hexakis-Rh: worker risk assessment

								Exposure Estimate (µg/m³)		
Workplace	**n**	**Min.**	**P75**	**P90**	**P95**	**Max**	**GSD**	**Value**	**Basis**	
WP01	4	0.02	15.94	16.58	16.79	17.00	24.15	**25.50**	MAX x 1.5	n < 6; GSD > 3.5
WP02	10	0.11	15.22	18.03	19.52	21.00	8.52	**21.00**	MAX	n < 12; GSD > 3.5
WP03	2	2.90	3.20	3.26	3.28	3.30	1.10	**3.28**	P95	n < 6; GSD < 2
WP04	3	0.00	0.50	0.80	0.90	1.00	34.70	**1.50**	MAX x 1.5	n < 6; GSD > 3.5
WP05	1	-	-	-	-	1.70	-	**3.40**	MAX x 2	n = 1
WP06	3	0.03	0.97	1.14	1.19	1.25	7.03	**1.88**	MAX x 1.5	n < 6; GSD > 3.5
WP07	7	0.04	3.71	21.70	33.37	45.05	14.16	**45.05**	MAX	n < 12; GSD > 3.5
WP08	1	-	-	-	-	0.04	-	**0.08**	MAX x 2	n = 1
WP09	2	2.01	2.75	2.90	2.95	3.00	1.33	**2.95**	P95	n < 6; GSD < 2
WP10	-	-	-	-	-	-	-	***25.50***	*Based on WP01 - no Rh-specific monitoring data*	
JR	73	0.12	5.96	7.22	10.60	29.76	2.78	**5.96**	P75	n ≥ 50; GSD: 2-3.5

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Hexakis-Rh: worker risk assessment

								Exposure Estimate (µg/m³)		
Workplace	n	Min.	P75	P90	P95	Max	GSD	**Value**	Basis	
WP01	**Raw material handling**							**25.50**	MAX x 1.5	n < 6; GSD > 3.5
WP02	10	0.11	15.22	18.03	19.52	21.00	8.52	21.00	MAX	n < 12; GSD > 3.5
WP03	**Wet processing**							**3.28**	P95	n < 6; GSD < 2
WP04	**Separation/filtration**							**1.50**	MAX x 1.5	n < 6; GSD > 3.5
WP05	**Washing/drying**							**3.40**	MAX x 2	n = 1
WP06	3	0.03	0.97	1.14	1.19	1.25	7.03	1.88	MAX x 1.5	n < 6; GSD > 3.5
WP07	7	0.04	3.71	21.70	33.37	45.05	14.16	45.05	MAX	n < 12; GSD > 3.5
WP08	1	-	-	-	-	0.04	-	0.08	MAX x 2	n = 1
WP09	**Packaging/filling**							**2.95**	P95	n < 6; GSD < 2
WP10	**Cleaning/maintenance**							***25.50***	*Based on WP01 - no Rh-specific monitoring data*	
JR	73	0.12	5.96	7.22	10.60	29.76	2.78	5.96	P75	n ≥ 50; GSD: 2-3.5

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Hexakis-Rh: worker risk assessment

								Exposure Estimate (µg/m³)		
Workplace	n	Min.	P75	P90	P95	Max	GSD	**Value**	Basis	
WP01	**Raw material handling**							**25.50**	MAX x 1.5	n < 6; GSD > 3.5
WP02	**??WP02 Required (sampling/evaluation)??**							21.00	MAX	n < 12; GSD > 3.5
WP03	**Wet processing**							**3.28**	P95	n < 6; GSD < 2
WP04	**Separation/filtration**							**1.50**	MAX x 1.5	n < 6; GSD > 3.5
WP05	**Washing/drying**							**3.40**	MAX x 2	n = 1
WP06	3	0.03	0.97	1.14	1.19	1.25	7.03	1.88	MAX x 1.5	n < 6; GSD > 3.5
WP07	7	0.04	3.71	21.70	33.37	45.05	14.16	45.05	MAX	n < 12; GSD > 3.5
WP08	1	-	-	-	-	0.04	-	0.08	MAX x 2	n = 1
WP09	**Packaging/filling**							**2.95**	P95	n < 6; GSD < 2
WP10	**Cleaning/maintenance**							***25.50***	*Based on WP01 - no Rh-specific monitoring data*	
JR	73	0.12	5.96	7.22	10.60	29.76	2.78	5.96	P75	n ≥ 50; GSD: 2-3.5

4.3 Diammonium sodium hexakis(nitrito-N) rhodate: status & remaining work

- Remaining work:
  - ENV:

    Finalise ES (prelim conclusion: safe use for all uses)

    Develop waste ES

  - HH:

    Finalise ES (qualitative assessment!)

    Revise genetox sections where required (incl. Annex III reports)

  - PMC review & approval stages: please respect deadlines!

Classification changes

- Diammonium sodium hexakis(nitrito-N)rhodate CAS: 64164-17-6
  - » Aquatic chronic 2
  - » Classification confirmed based on final test report
- Rhodium trichloride
  - » Acute category 1, chronic category 1 classification (M factor 1)
  - » Based on *Daphnia* result from literature (Okamoto et al. 2014)

4.4 Some bottlenecks…

- SID cards:
  - In theory, Phase I exercise
  - For Rh, <1 mth from internal registration deadline and still not all drafted & agreed!
  - When circulated: no reaction = agreement?

- PC datagaps:
  - Some identified in 2015, but no sample sent to testing lab
  - Requested input not received

- Changing tonnages & scope:
  - cfr. SID above
  - Severe implications on data requirements (e.g. 1-10 to 10-100 tpa)

    → request to inform PMC ASAP

4.5 Remaining challenges

- Finalise dossier diammonium sodium hexakis (nitrito-N) rhodate (cfr. qualitative assessment)
- Rh(III) genetox: update dossiers and ‘clarify’ the issue
- Update Rh_2O_3 dossier (Annex III → Annex VII (if agreed))
- Agree on remaining SID cards
- Organise PC testing 2 Annex III substances and finalise dossier

...

Timeline Rh

Registration of Rh and Rh(III) compounds

TIMELINE

PROJECT DETAILS

DATE	MILESTONE	POSITION
22/03/2017	Discussion DNEL/ES at BtB meeting, clarification missing Phys-chem data (dirhodium trisulphate, ruthenium trihydroxide)	-5
11/04/2017	Send to WG for review	-20
25/04/2017	Deadline for review by WG & send for update by consultants	-5
05/05/2017	Send to WG for approval	15
12/05/2017	Approval of the WG	-20
19/05/2017	Send to the Management Cttee for ap	5
2/06/2017	Approval of Management Cttee	-5
9/06/2017	Send to GA for approval	15
23/06/2017	Approval of the GA	-10
30/06/2017	Registration by LR	25

Project Timeline Tips:

The role of the Position values in the Project Details table is to prevent the Milestone labels from overlapping each other on the timeline. Use positive numbers to position labels above the timeline and negative numbers to position them below.

To add additional Milestones, either insert new rows within the table or start typing below the last table entry and the table will automatically expand to accommodate your newly added data.

Precious Metals Consortium

5. Ruthenium and Ru compounds

5.1 Dossier status

Substance	CAS	EC	LR	Status	
Ruthenium	7440-18-8	231-127-1	Heraeus		10-100 tpa
Ruthenium trichloride (hydrate)	*10049-08-8*	*233-167-5*	*Heraeus*	*HH testing: in-life finalised, draft report available*	*10-100 tpa*
Ruthenium (IV) oxide	12036-10-1	234-840-6	Heraeus		AnnexIII
Tris(nitrato-O)nitrosylruthenium	**34513-98-9**	**252-068-8**	**Umicore AG&Co.KG**	**REGISTERED**	**Feb 2017**
Hexakis[mu-(acetato-O:O')]-μ3-oxo-triangulo-triruthenium acetate / Ruthenium acetate	55466-76-7	259-653-7	Johnson Matthey		AnnexIII
Tetraammonium decachloro-mu-oxodiruthenate(4-)	*85392-65-0*	*286-924-7*	*Heraeus*	*HH testing: in-life finalised, draft report expected*	*10-100 tpa*
Ruthenium trihydroxide	*12135-42-1*	*235-221-3*	*Umicore NV/SA*	*PC testing required*	*AnnexIII*

5.1 Dossier status

- Ruthenium trihydroxide (1-10 tpa, AnnexIII)
  - Needs registration as solid (suspension)
  - PC data missing

	Melting / Freezing point	Boiling point	Density	Vapour pressure	Flammability	Autoflammability
Ru trihydroxide	Test required	Test required	Test required	Test required	Test required	Test required

  - Initiate testing ASAP
  - Consequence for dossier: most likely later submission than other Ru dossiers (Q3 2017)

5.2 RuCl3: status and remaining work

- ENV testing finalised
- HH testing: in-life finalised, draft reports available

cfr. next slides

Ecotoxicity Testing Programme

Metal	Compound	Test	Progress	Result	Notes
Ruthenium (cont)	**Ruthenium trichloride**	Algae Inhibition of Growth (72 hours)	Complete	EC50 (growth rate) = 0.602 mg/L EC10 (growth rate) = 0.233 mg/L NOEC (growth rate) = 0.184 mg/L	**Lowest value (=0.244 mg Ru/L)** Measured (soluble) Ru concentrations 3-25% of nominal throughout test but stable so likely to be maximum achievable soluble concentrations.
		Fish Mortality (96 hours)	Complete	LC50 = > 0.94 mg/L	Limit test at nominal concentration of 10 mg/L. Measured (soluble) Ru concentrations 4-27% of nominal throughout test, decreasing over 48 hour renewal period.
		ASRIT (3 hours)	Complete	EC50 (without ATU) = 530 mg/L, EC50 (with ATU) = 330 mg/L	-

PNECs

- Two ruthenium substances require PNECs
  - Tetraammonium decachloro-mu-oxodiruthenate
  - Ruthenium trichloride
- Different oxidation states therefore read across not appropriate for ecotoxicity data
- Separate PNECs derived for each substance based on acute dataset

PNECs: Ruthenium trichloride

PNEC	Units	PNEC	PNEC derivation method
Freshwater	µg/L	0.244	Lowest EC50 of 0.244 mg Ru/L with an assessment factor of 1000
Intermittent releases	µg/L	2.44	Lowest EC50 of 0.244 mg Ru/L with an assessment factor of 100
Freshwater sediment	mg/kg dwt	7.62	Equilibrium partitioning based on a freshwater PNEC of 0.244 µg Ru/L
Marine water	µg/L	0.0244	Lowest EC50 of 0.244 mg Ru/L with an assessment factor of 10000
Marine sediment	mg/kg dwt	0.762	Equilibrium partitioning based on a freshwater PNEC of 0.244 µg Ru/L
Soil	mg/kg dwt	1.55	Equilibrium partitioning based on a freshwater PNEC of 0.244 µg Ru/L
Microorganisms	mg/L	8.92	NOEC from an ASRIT study of 89.2 mg Ru/L, with an assessment factor of 10
Secondary poisoning	To be assessed once test results received.		

Environmental exposure

- Two substances require exposure assessment – Ruthenium Trichloride and Tetraammonium decachloro-μ-oxodiruthenate (individual PNECs derived for each)
- Emissions information has been collated and GES scenarios developed for ‘Manufacture’ and ‘Use as Industrial Intermediate’ based on sector data
- As for other PGMs, exposure/emissions data from Ru sector is for total Ru across all sites (i.e. same dataset for both substances and both exposure scenarios)

Environmental exposure

- Emissions factors (EFs) taken from SpERC for manufacture of metal compounds
- EFs applied to max of tonnage band (100 tpa) to derive GES for each substance (using different PNECs)
- ES for discharge via STP and direct discharge to freshwater
- Removal rate for Ru during sewage treatment taken from PMC monitoring study
- Safe use is demonstrated for ‘Manufacture’ and ‘Use as an Intermediate’ (i.e. RCR<1)

5.2 RuCl3: status and remaining work

- Mammalian testing update – OECD407/421

  cfr next slides

Ruthenium Chloride (1)

14-day dose range finding toxicity/palatability study in rats:

- Dietary inclusions at 3750, 7500 and 15000 ppm (eq ~ 311, 639, 1194 mg/kg/day)
- No significant toxicity at any dose level
- 15000 ppm was associated with lower body weight (~ 6% on day 13), body weight gain (-31.4% days 0-13) and reduced food consumption in males. No effects in females
- Report issued 1-Mar-17

Ruthenium Chloride (2)

28-day dietary toxicity study with 14 day recovery period (OECD 407):

- Dietary inclusions at 500, 1500, 5000, 15000 ppm (eq. 38/47, 114/147, 365/449, 1149/1326 mg/kg/day in males/females)
- Recovery groups included at 0, 5000 and 15000 ppm
- Clinical signs, FOB data, body weight, food consumption, macroscopic and microscopic findings, organ weights, haematology and clinical chemistry indicate no notable signs of significant treatment-related toxicity.
- Body weight slightly lower at 15000 ppm (5.4%/3.1% on day 27 but no effect after 14 day recovery period)
- NOAEL = 5000 ppm (407 mg/kg bw/day).

Ruthenium Chloride (3)

Reproduction/developmental toxicity screening test (dietary route) (OECD 421 2016 version):

- Dietary inclusions at 1500, 5000, 15000 ppm (93.6/152.9, 313/524,957.9/1593.7 mg/kg/day in males/females)
- No adverse treatment-related clinical signs at any dose level.
- Males at 15000 ppm ↓ bw (7.1%), ↓ food consumption (9%)
- No effects on reproductive performance, gestation, parturition
- No effects on pup survival, bw, growth
- No effects on ano-genital distance, nipple retention in males
- No toxicologically significant effects on organ weights
- No treatment-related macroscopic or microscopic findings

Ruthenium Chloride (4)

Summary table of the thyroid hormone analysis

Parameters	Groups/Concentration (mg/kg bw/day)			
	0	Low dose	Mid dose	High dose
Thyroxine (T4) level (nmol/L)				
Parental males	64.300	60.932	51.305	52.667
Parental females	43.456	43.450	41.183	36.067
PND 4 pups	28.118	29.498	26.115	25.773
PND 13 pups	84.591	80.845	70.550	63.575
Thyroid-Stimulating Hormone (TSH) level (nmol/L)				
Parental males	2.866	2.955	3.288	2.840
Parental females	2.744	2.779	3.601	3.141
PND 13 pups	below LOQ	below LOQ	below LOQ	below LOQ

Ruthenium Chloride (5)

Conclusions re classification (cfr PGM TE meeting 17/3):

STOT-RE: no evidence of significant target organ toxicity at any dose level. Not classified

REPRO: no evidence for effects on reproductive ability, fertility or lactation and development. Not classified

5.2 RuCl3: status and remaining work

- Remaining work:
  - ENV:

    Develop ES (initial assessment: no risk predicted)

    Develop Waste ES

    Secondary poisoning assessment? (~discussion TE 17 March)

  - HH:

    Finalise testing reports

    Derive DNELs

    Develop ES

  - PMC review and approval

5.3 TetradoRu: status and remaining work

- ENV testing finalised
- HH testing: in-life finalised, draft reports pending

cfr. next slides

Ecotoxicity Testing Programme

Metal	Compound	Test	Progress	Result	Notes
Ruthenium	**Tetraammonium decachloro-mu-oxodiruthenate (TERTADO Ru)**	Algae Inhibition of Growth (72 hours)	Complete	EC50 (Growth rate) = 0.38 mg/L EC10 (Growth rate) = 0.019 mg/L NOEC (Growth rate) = 0.023 mg/L	**Lowest value (=0.115 mg Ru/L)** Recovery 80-90% at test start, dropping to 40-80% at test end.
		Daphnia Immobility (48 hours)	Complete	EC50 = >55.7 mg/L	No effects in definitive test. Measured Ru concentrations 49-57% of nominal.
		Fish Mortality (96 hours)	Complete	No effects up to maximum exposure concentration (nominally 100 mg/L). EC50/ NOEC = > 73.6 mg/L	50-60% losses over 48 hour renewal period (semi-static test). Toxicity values based on time weighted measured concentrations.
		ASRIT (3 hours)	Complete	EC50 = 740 mg/L (with ATU) & 500 mg/L (without ATU)	-

PNECs: Tetraammonium decachloro-mu-oxodiruthenate

PNEC	Units	PNEC	PNEC derivation method
Freshwater	µg/L	0.115	Lowest EC50 of 0.115 mg Ru/L with an assessment factor of 1000
Intermittent releases	µg/L	1.15	Lowest EC50 of 0.115 mg Ru/L with an assessment factor of 100
Freshwater sediment	mg/kg dwt	3.59	Equilibrium partitioning based on a freshwater PNEC of 0.115 mg Ru/L
Marine water	µg/L	0.0115	Lowest EC50 of 0.115 mg Ru/L with an assessment factor of 10000
Marine sediment	mg/kg dwt	0.359	Equilibrium partitioning based on a freshwater PNEC of 0.115 mg Ru/L
Soil	mg/kg dwt	0.729	Equilibrium partitioning based on a freshwater PNEC of 0.115 mg Ru/L
Microorganisms	mg/L	3.03	NOEC from an ASRIT study of 30.3 mg Ru/L, with an assessment factor of 10
Secondary poisoning	To be assessed once test results received.		

5.3 TetradoRu: status and remaining work

- Mammalian testing update – OECD422

cfr. next slides

Tetraammonium decachloro-mu-oxodiruthenate (1)

14 day preliminary repeat dose oral in rats:

- No treatment-related clinical signs or effects on organ weight or macropathology.
- Dose related effects on body weight

	Male		Female	
Dose (mg/kg)	**Body weight (g)**	**Difference**	**Body weight (g)**	**Difference**
0	311.90		223.66	
500	290.76	-7.6%	219.08	-2.0%
750	280.50*	-10.1%	214.36	-4.2%
1000	266.76**	-14.5%	209 6	-6.3%

- Report issued 20-Jun-16

Tetraammonium decachloro-mu-oxodiruthenate (2)

Repeated dose oral toxicity with reproduction/developmental toxicity screen (OECD 422):

- Oral dosing in corn oil 0, 100, 300, 1000 mg/kg/day at 5 mL/kg
- **1000 mg/kg bw/day:** Mortality (1 male, 2 females), body weight loss (-15% males; -13% females), ↓ food consumption and adverse clinical signs (salivation, reduced activity, breathing sounds) requiring termination of the group after 14 days dosing. PM findings: partly grey, dark-red or black discoloured and/or indurated gastric mucosa.
- Study continued with 2 dose groups. Full histopathology on 300 mg/kg bw/day as high dose group

TetrodoRu 422 study

- **300 mg/kg bw/day:** Adverse clinical signs (salivation, breathing sounds in 8/10 males, 6/8 females). Macroscopic findings (haemorrhagic foci in the stomach) in 3/10 males, 3/10 females. Microscopic findings (erosions and haemorrhages in the glandular stomach) in 1/5 males, 1/5 females.

  No treatment-related effects on body weight, food consumption, neurological measures, clinical pathology, organ weights, thyroid hormone levels (parental males).
- **100 mg/kg bw/day:** Low incidence of clinical signs (salivation in 2/10 males; breathing sounds in 2/10 males,1/10 females) considered not to be adverse. No other treatment-related effects.
- **Reproduction toxicity**: No effects on fertility, gestation, parturition, pup survival, bw, growth, ano-genital distance, nipple retention in males

TetrodoRu – 422 study (cont.)

Report conclusions:

NOAELs:

Systemic toxicity: 100 mg/kg bw/day (clinical signs, histopathology)

Reproductive toxicity:

Fertility and reproduction: 300 mg/kg bw/day

Pre-natal development: 300 mg/kg bw/day

Post-natal development: 300 mg/kg bw/day

No classification and labelling expected

5.3 TetradoRu: status and remaining work

- Remaining work:
  - ENV:

    Develop ES (initial assessment: no risk predicted)

    Develop Waste ES

    Secondary poisoning assessment?

  - HH:

    Finalise testing reports

    Derive DNELs

    Develop ES

  - PMC review and approval

Classification changes

- Tetraammonium decachloro-mu-oxodiruthenate(4-) CAS: 85392-65-0:
  - » Aquatic acute 1, Aquatic chronic 1
  - » M factor 1 (acute), M factor 1 (chronic)
  - » Classification confirmed based on final test reports
- Ruthenium trichloride hydrate CAS: 14898-67-0
  - » Aquatic acute 1, Aquatic chronic 1
  - » M factor 1 (acute), M factor 1 (chronic)
  - » Classification confirmed based on final test reports

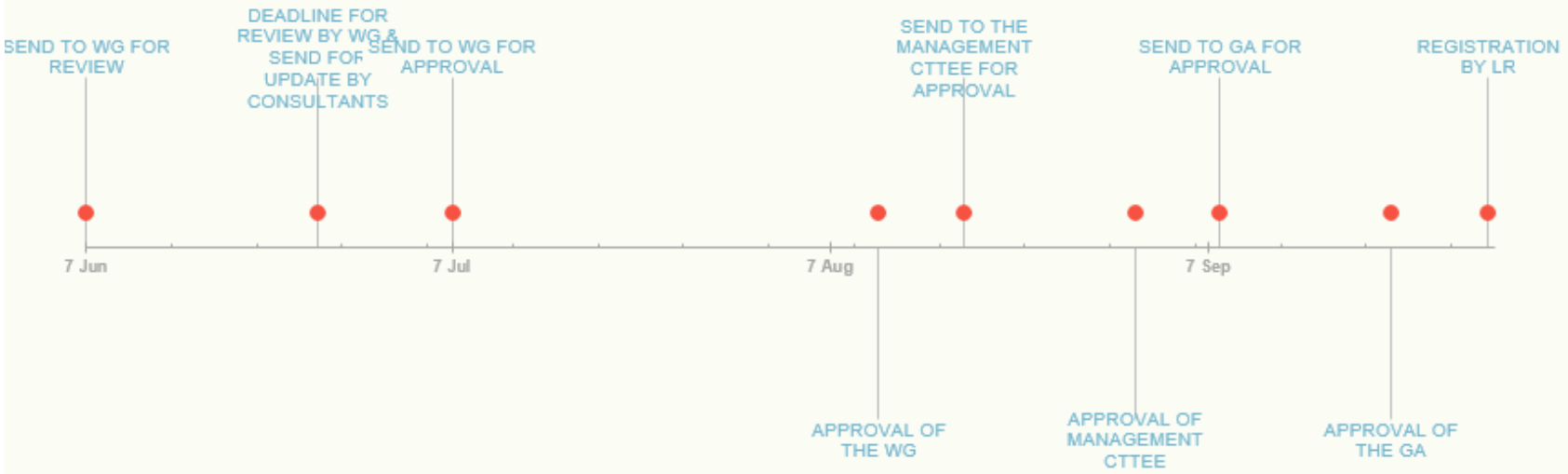
5.4 Remaining Challenges

- Finalise HH testing $RuCl_3$ and TetradoRu
- Create ES for both substances
- Organise PC testing $Ru(OH)_3$ and finalise dossier

Timeline Ru

Registration of Ru and compounds

TIMELINE



PROJECT DETAILS

DATE	MILESTONE	POSITION
7/06/2017	Send to WG for review	5
26/06/2017	Deadline for review by WG & send for update by consultants	5
07/07/2017	Send to WG for approval	5
11/08/2017	Approval of the WG	-5
18/08/2017	Send to the Management Cttee for approval	5
1/09/2017	Approval of Management Cttee	-5
8/09/2017	Send to GA for approval	5
22/09/2017	Approval of the GA	-5
30/09/2017	Registration by LR	5

Project Timeline Tips:

The role of the Position values in the Project Details table is to prevent the Milestone labels from overlapping each other on the timeline. Use positive numbers to position labels above the timeline and negative numbers to position them below.

To add additional Milestones, either insert new rows within the table or start typing below the last table entry and the table will automatically expand to accommodate your newly added data.

Precious Metals Consortium

6. Budget and workplan

2016 Expenses - Ir

	Budget *to be spent*	Budget *to be invoiced*	Real expenses
2.5.E Iridium-specific costs	***1.000 €***	***1.000 €***	***13.813 €***
2.5.E.1 Ir REACH registration	**0 €**	**0 €**	**0 €**
2.5.E.2 Ir REACH dossier maintenance	**1.000 €**	**1.000 €**	**10.583 €**
2.5.E.2.1 Phase 1: Literature search, data gap analysis and recommendations	0 €	0 €	
2.5.E.2.2 Phase 2: In-depth data gap analysis and integrated testing strategy	0 €	0 €	230 €
2.5.E.2.3 Phase 3: Experimental studies (testing programme including cost of samples)	0 €	0 €	249 €
2.5.E.2.4 Phase 4: Generation of Chemical Safety Report	0 €	0 €	6.778 €
2.5.E.2.5a Phase 5a: Generation of IUCLID 5 Files and Registration Dossiers	0 €	0 €	745 €
2.5.E.2.5b Phase 5b: IUCLID 5 Hosting System	1.000 €	1.000 €	2.582 €
2.5.E.3 Ir REACH evaluation	**0 €**	**0 €**	**0 €**
2.5.E.4 Ir REACH classification & labelling	**0 €**	**0 €**	
2.5.E.5 Ir REACH authorisation	**0 €**	**0 €**	
2.5.E.6 Ir internal and external fixed Scientific Manager	**0 €**	**0 €**	**3.230 €**
2.5.E.7 Ir Building reserves		**0 €**	

2018 Draft budget - Ir

	Budget *to be invoiced*	HR
2.5.E Iridium-specific costs	***44.800 €***	***0,1***
2.5.E.1 Ir REACH dossier maintenance	**33.000 €**	
2.5.E.1.1 Ir Rolling maintenance	10.000 €	
2.5.E.1.2 Ir Further improvement	23.000 €	
2.5.E.2 Ir REACH evaluation	**0 €**	
2.5.E.4 Ir REACH classification & labelling	**0 €**	
2.5.E.5 Ir REACH authorisation	**0 €**	
2.5.E.6 Ir internal and external fixed Scientific Managers	**11.800 €**	
2.5.E.7 Ir Building reserves		

2016 Expenses - Pd

		Budget *to be spent*	Budget *to be invoiced*	Real expenses
2.5.B	***Palladium-specific costs***	***572.405 €***	***622.173 €***	***365.891 €***
2.5.B.1	**Pd REACH registration**	**498.625 €**	**498.625 €**	**312.257 €**
2.5.B.1.1	*Phase 1: Literature search, data gap analysis and recommendations*	5.500 €	5.500 €	
2.5.B.1.2	*Phase 2: In-depth data gap analysis and integrated testing strategy*	5.500 €	5.500 €	2.373 €
2.5.B.1.3	*Phase 3: Experimental studies (testing programme including cost of samples)*	148.000 €	148.000 €	61.297 €
2.5.B.1.4	*Phase 4: Generation of Chemical Safety Reports*	286.125 €	286.125 €	213.711 €
2.5.B.1.5a	*Phase 5a: Generation of IUCLID 5 Files and Registration Dossiers*	52.500 €	52.500 €	34.566 €
2.5.B.1.5b	*Phase 5b: IUCLID 5 Hosting System*	1.000 €	1.000 €	310 €
2.5.B.2	**Pd REACH dossier maintenance**	**0 €**	**0 €**	
2.5.B.3	**Pd REACH evaluation**	**0 €**	**0 €**	
2.5.B.4	**Pd REACH classification & labelling**	**0 €**	**0 €**	
2.5.B.5	**Pd REACH authorisation**	**0 €**	**0 €**	
2.5.B.6	**Pd internal and external fixed Scientific Manager**	**73.780 €**	**50.275 €**	**53.634 €**
2.5.B.7	**Pd Building reserves**		**73.273 €**	

2018 Draft budget - Pd

	PMC 2018 Budget *to be invoiced*	PMC 2018 HR
2.5.B Palladium-specific costs	***451.098 €***	***0,4***
2.5.B.1 Pd REACH dossier maintenance	**386.000 €**	
2.5.B.1.1 Pd Rolling maintenance	36.000 €	
2.5.B.1.2 Pd Further improvement	350.000 €	
2.5.B.2 Pd REACH evaluation	**0 €**	
2.5.B.3 Pd REACH classification & labelling	**0 €**	
2.5.B.4 Pd REACH authorisation	**0 €**	
2.5.B.5 Pd internal and external fixed Scientific Managers	**65.098 €**	
2.5.B.6 Pd Building reserves		

2016 Expenses - Pt

	Budget *to be spent*	Budget *to be invoiced*	Real expenses
2.5.A Platinum-specific costs	***1.183.955 €***	***645.102 €***	***735.869 €***
2.5.A.1 Pt REACH registration	**1.060.175 €**	**466.775 €**	**640.823 €**
2.5.A.1.1 Phase 1: Literature search, data gap analysis and recommendations	5.500 €	5.500 €	
2.5.A.1.2 Phase 2: In-depth data gap analysis and integrated testing strategy	5.500 €	5.500 €	1.510 €
2.5.A.1.3 Phase 3: Experimental studies (testing programme including cost of samples)	842.600 €	249.200 €	440.585 €
2.5.A.1.4 Phase 4: Generation of Chemical Safety Reports	173.025 €	173.025 €	169.125 €
2.5.A.1.5a Phase 5a: Generation of IUCLID 5 Files and Registration Dossiers	32.550 €	32.550 €	28.001 €
2.5.A.1.5b Phase 5b: IUCLID 5 Hosting System	1.000 €	1.000 €	1.602 €
2.5.A.2 Pt REACH dossier maintenance	**0 €**	**0 €**	**0 €**
2.5.A.3 Pt REACH evaluation	**0 €**	**0 €**	**0 €**
2.5.A.4 Pt REACH classification & labelling	**0 €**	**0 €**	
2.5.A.5 Pt REACH authorisation	**50.000 €**	**50.000 €**	**31.427 €**
2.5.A.5.1. Chloroplatinates	50.000 €	50.000 €	31.427 €
2.5.A.6 Pt internal and external fixed Scientific Manager	**73.780 €**	**50.275 €**	**63.619 €**
2.5.A.7 Pt Building reserves		**78.052 €**	

2018 Draft budget - Pt

	PMC 2018 Budget *to be invoiced*	PMC 2018 HR
2.5.A Platinum-specific costs	***460.132 €***	***0,4***
2.5.A.1 Pt REACH registration	**15.000 €**	
2.5.A.1.1 Phase 1: Literature search, data gap analysis and recommendations		
2.5.A.1.2 Phase 2: In-depth data gap analysis and integrated testing strategy		
2.5.A.1.3 Phase 3: Experimental studies (testing programme including cost of samples)	15.000 €	
2.5.A.1.4 Phase 4: Generation of Chemical Safety Reports		
2.5.A.1.5a Phase 5a: Generation of IUCLID Files and Registration Dossiers		
2.5.A.1.5b Phase 5b: IUCLID Hosting System		
2.5.A.2 Pt REACH dossier maintenance	**376.000 €**	
2.5.A.2.1 Pt Rolling maintenance	31.000 €	
2.5.A.2.2 Pt Further improvement	345.000 €	
2.5.A.3 Pt REACH evaluation	**0 €**	
2.5.A.4 Pt REACH classification & labelling	**0 €**	
2.5.A.5 Pt REACH authorisation	**10.000 €**	
2.5.A.5.1 Chloroplatinates	10.000 €	
2.5.A.6 Pt internal and external fixed Scientific Managers	**59.132 €**	
2.5.A.7 Pt Building reserves		

2016 Expenses - Rh

		Budget *to be spent*	Budget *to be invoiced*	Real expenses
2.5.C	***Rhodium-specific costs***	***162.470 €***	***171.217 €***	***139.308 €***
2.5.C.1	**Rh REACH registration**	**113.500 €**	**113.500 €**	**108.233 €**
2.5.C.1.1	*Phase 1: Literature search, data gap analysis and recommendations*	5.500 €	5.500 €	
2.5.C.1.2	*Phase 2: In-depth data gap analysis and integrated testing strategy*	5.500 €	5.500 €	1.822 €
2.5.C.1.3	*Phase 3: Experimental studies (testing programme including cost of samples)*	70.000 €	70.000 €	56.029 €
2.5.C.1.4	*Phase 4: Generation of Chemical Safety Reports*	31.500 €	31.500 €	41.231 €
2.5.C.1.5a	*Phase 5a: Generation of IUCLID 5 Files and Registration Dossiers*	0 €	0 €	7.306 €
2.5.C.1.5b	*Phase 5b: IUCLID 5 Hosting System*	1.000 €	1.000 €	1.844 €
2.5.C.2	**Rh REACH dossier maintenance**	**0 €**	**0 €**	
2.5.C.3	**Rh REACH evaluation**	**0 €**	**0 €**	
2.5.C.4	**Rh REACH classification & labelling**	**0 €**	**0 €**	
2.5.C.5	**Rh REACH authorisation**	**0 €**	**0 €**	
2.5.C.6	**Rh internal and external fixed Scientific Manager**	**48.970 €**	**50.275 €**	**31.076 €**
2.5.C.7	**Rh Building reserves**		**7.442 €**	

2018 Draft budget - Rh

		PMC 2018 Budget *to be invoiced*	PMC 2018 HR
2.5.C	***Rhodium-specific costs***	***296.400 €***	***0,3***
2.5.C.1	**Rh REACH registration**	**30.000 €**	
2.5.C.1.1	*Phase 1: Literature search, data gap analysis and recommendations*		
2.5.C.1.2	*Phase 2: In-depth data gap analysis and integrated testing strategy*		
2.5.C.1.3	*Phase 3: Experimental studies (testing programme including cost of samples)*	30.000 €	
2.5.C.1.4	*Phase 4: Generation of Chemical Safety Reports*		
2.5.C.1.5a	*Phase 5a: Generation of IUCLID Files and Registration Dossiers*		
2.5.C.1.5b	*Phase 5b: IUCLID Hosting System*		
2.5.C.2	**Rh REACH dossier maintenance**	**131.000 €**	
2.5.C.2.1	*Rh Rolling maintenance*	21.000 €	
2.5.C.2.2	*Rh Further improvement*	110.000 €	
2.5.C.3	**Rh REACH evaluation**	**100.000 €**	
2.5.C.3.1	*Dossier evaluation*	100.000 €	
2.5.C.3.2	*Substance evaluation*	0 €	
2.5.C.4	**Rh REACH classification & labelling**	**0 €**	
2.5.C.5	**Rh REACH authorisation**	**0 €**	
2.5.C.6	**Rh internal and external fixed Scientific Managers**	**35.400 €**	
2.5.C.7	**Rh Building reserves**		

2016 Expenses - Ru

		Budget *to be spent*	Budget *to be invoiced*	Real expenses
2.5.D	***Ruthenium-specific costs***	***558.420 €***	***345.956 €***	***391.582 €***
2.5.D.1	**Ru REACH registration**	**509.450 €**	**246.850 €**	**361.805 €**
2.5.D.1.1	*Phase 1: Literature search, data gap analysis and recommendations*	5.500 €	5.500 €	
2.5.D.1.2	*Phase 2: In-depth data gap analysis and integrated testing strategy*	5.500 €	5.500 €	1.511 €
2.5.D.1.3	*Phase 3: Experimental studies (testing programme including cost of samples)*	462.800 €	200.200 €	302.713 €
2.5.D.1.4	*Phase 4: Generation of Chemical Safety Reports*	33.600 €	33.600 €	48.412 €
2.5.D.1.5a	*Phase 5a: Generation of IUCLID 5 Files and Registration Dossiers*	1.050 €	1.050 €	7.870 €
2.5.D.1.5b	*Phase 5b: IUCLID 5 Hosting System*	1.000 €	1.000 €	1.298 €
2.5.D.2	**Ru REACH dossier maintenance**	**0 €**	**0 €**	
2.5.D.3	**Ru REACH evaluation**	**0 €**	**0 €**	
2.5.D.4	**Ru REACH classification & labelling**	**0 €**	**0 €**	
2.5.D.5	**Ru REACH authorisation**	**0 €**	**0 €**	
2.5.D.6	**Ru internal and external fixed Scientific Manager**	**48.970 €**	**50.275 €**	**29.777 €**
2.5.D.7	**Ru Building reserves**		**48.831 €**	

2018 Draft budget - Ru

	PMC 2018 Budget *to be invoiced*	PMC 2018 HR
2.5.D Ruthenium-specific costs	***136.400 €***	***0,3***
2.5.D.1 Ru REACH dossier maintenance	**101.000 €**	
2.5.D.1.1 Ru Rolling maintenance	21.000 €	
2.5.D.1.2 Ru Further improvement	80.000 €	
2.5.D.2 Ru REACH evaluation	**0 €**	
2.5.D.2.1 Dossier evaluation	0 €	
2.5.D.2.2 Substance evaluation	0 €	
2.5.D.3 Ru REACH classification & labelling	**0 €**	
2.5.D.4 Ru REACH authorisation	**0 €**	
2.5.D.5 Ru internal and external fixed Scientific Managers	**35.400 €**	
2.5.D.6 Ru Building reserves		

Precious Metals Consortium

7. AOB, Next meeting(s) and closing remarks

AOB

- AoA:
  - Project delayed due to some late company responses
  - Draft report expected end March 2017

- Occupational monitoring project (final report 13 Feb 2017):
  - 3 SV reports finalised (last one mid October 2016)
  - Existing and new occup. monitoring data received from 5 companies
  - Organised for 11 defined workplaces (+'Job Rotation')
  - 208 personal monitoring data, 20 static monitoring data (3 filtered, giving 225 in total)

	Personal monitoring data						Static monitoring data			
	Pd		Rh		Ru		Rh		Ru	
	Sol	*Tot*	*Sol*	*Tot*	*Sol*	*Tot*	*Sol*	*Tot*	*Sol*	*Tot*
Total	12	76	11	88	9	9	1	6	4	9

- Date next PMC BtB: 17-19 October 2017 (PGM TE/WG meeting 18 October)

AOB

- PMC Reserves

		Reallocation of reserves by 31/12/2016	Minimum reserves to be kept in house*	2017 Budget to be invoiced		Delta
				Project	Reserves building	
	PGM- horizontal costs	-360.252				
2.5a	**Pt-specific costs**	579.734	173.196	360.400	378.000	**-784.538**
2.5b	**Pd-specific costs**	285.248	145.734	25.200	0	**-139.514**
2.5c	**Rh-specific costs**	354.359	127.052	153.550	0	**-227.307**
2.5d	**Ru-specific costs**	348.025	144.793	195.200	240.000	**-443.232**
2.5e	**Ir-specific costs**	90.035	30.154	13.850	0	**-59.881**
	TOTAL	1.297.149	620.928	748.200	618.000	

* = total dossier costs x7,5 % for all projects but Re. For Re it is total dossier costs x5%

AOB

	Delta		JUSTIFICATION					
			Additional PC testing	*Update risk assessment / ES*	*Update Annex III to VII*	*Registration nanos*	*Additional mammalian testing*	*Regulatory actions*
Pt-specific costs	**-784.538**	**<2018**	MCC	ES Karstedt Conc				
		>2018	MCC	Qualitative RA ClPt	4 dossiers as Annex III	?	-Update Annex III -weaknesses identified in RAAF	-Karstedt conc -ClPt
Pd-specific costs	**-139.514**	**<2018**	MCC					
		>2018		-update HH exposure (monitoring data) -update PNECs	6 dossiers as Annex III	?	-Update Annex III -weaknesses identified in RAAF	
Rh-specific costs	**-227.307**	**<2018**	-MCC -registration solids					
		>2018	MCC	Qualitative RA Rh nitrito-compound	13 dossiers as Annex III	?	Update Annex III	
Ru-specific costs	**-443.232**	**<2018**	-MCC -registration solids					
		>2018	-MCC		4 dossiers as Annex III	?	Update Annex III	
Ir-specific costs	**-59.881**	**<2018**						
		>2018			3 dossiers as Annex III		Update Annex III	

MCC=Manual Completeness Check; PC=Phys-Chem; ES=Exposure Scenarios; RA=Risk Assessment; RAAF=Read Acrpss Assessment Framework

Precious Metals Consortium

THANK YOU

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