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TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

PRESIDENT'S LETTER

Dear friends and fellow T.I.C. members,

Happy New Year!

I hope your holidays were safe and relaxing and prepared you for a successful and prosperous new year. As we head into 2014, I want to quickly look back at what was a very successful General Assembly in York, and once again thank our host Metalysis, Emma Wickens for her tireless leadership and everyone who contributed to making the York General Assembly one of the most attended meetings ever.

As a result of the efforts to gain new members we now have 93 members in the T.I.C. We welcomed 9 new member companies in York and we look forward to getting to know better the individual company delegates. Please remember, this is your organization and therefore your support and input are requirements for the future success of the T.I.C. My personal goal is to achieve a total of 100 member companies before stepping down as President at the forthcoming General Assembly.

I also want to take this opportunity to express my heartfelt thanks to the Executive Committee members who stepped down in York: José Isildo de Vargas, Alexander Gagarin and Hiroya Nishimoto. The T.I.C. benefitted greatly from your selfless service, keen insight and business experience. I also wish to welcome the new members of the Executive Committee: David Gussack, Dale Gwinnutt and Alexey Tsorayev. We look forward to your contributions to come.

At the forthcoming spring Executive Committee meeting in Brussels a number of issues will be addressed. One will be the planning for this year's General Assembly in New York City. Please mark Sunday October 12th to Wednesday October 15th 2014 on your calendars. New York City is a fun and exciting venue and promises to be another successful meeting.

I wish you all success in 2014, both in business and in your personal lives.

Regards,

Dr Daniel F. Persico (Dan)
President

CONTENTS

FIFTY-FIFTH GENERAL ASSEMBLY

The Fifty-fifth General Assembly is scheduled to take place in New York, U.S.A., and will include a plant tour to Hi-Temp Specialty Metals, located in Yaphank, on Long Island. The dates are Sunday October 12th to Wednesday October 15th 2014. The meeting will take place at the Sheraton New York Times Square Hotel, where a block booking of bedrooms has also been secured.

Call for papers: please submit your proposals for papers for the technical sessions by **March 31st**.

FIFTY-FOURTH GENERAL ASSEMBLY

Ulric Schwela

The Royal York Hotel
on a typically sunny English day

The Tantalum-Niobium International Study Center held its annual conference from October 13th to 16th 2013 at the Royal York Hotel & Events Centre, in York, England. This was the Fifty-fourth General Assembly in the T.I.C.'s history and was very well attended with 246 people registered for the event.

A total of 18 technical presentations were given in four sessions, spread over two full days. The last four papers, on Tuesday afternoon, were all related to supply chain issues and were followed by a panel discussion.

Delegates and accompanying persons enjoyed a Welcome Reception on Sunday evening. On Monday evening, a Gala Dinner was held in the stunning setting of the National Railway Museum, with entertainment provided by the York Railway Institute Band.

Ulric Schwela

The Royal York Hotel's sumptuous interior

On the morning of Wednesday October 16th, delegates were given the opportunity to visit the facility of Metalysis, located a little over an hour away from York. Lunch was taken at the Monk Fryston Hall Hotel, a stately manor house dating back to the 12th century. The busses then continued to the small market town of Masham, where a guided tour of the Theakston Brewery had been arranged.

The accompanying persons enjoyed a separate sightseeing programme on Monday and Tuesday. The first day focused on the city of York, discovering the famous Minster, the city walls, the Jorvik Viking Centre and York's Sweet Story. The second day took them further afield, aboard a magnificent steam train, to the picturesque village of Goathland. The afternoon was spent visiting Castle Howard, a beautiful stately home set in spectacular grounds. On Wednesday, the accompanying persons joined the delegates who had visited Metalysis for lunch at Monk Fryston Hall, then continued to the Theakston Brewery.

GENERAL ASSEMBLY

The General Assembly was held on the morning of October 14th. Nine companies were elected as new members of the association and three companies had resigned. This brought the total membership of the association at the end of the General Assembly to 94. One company name change and one transfer of membership were also enacted by the Assembly. Full details are provided in the last section of this Bulletin, under 'Member company news'.

Mr José Isildo de Vargas, Mr Alexandr Gagarin and Mr Hiroya Nishimoto did not stand for re-election to the Executive Committee. The other nine members of the Executive Committee had confirmed their wish to stand for re-election. Mr David Gussack, Mr Dale Gwinnutt, and Mr Alexey Tsorayev had also added their candidacies.

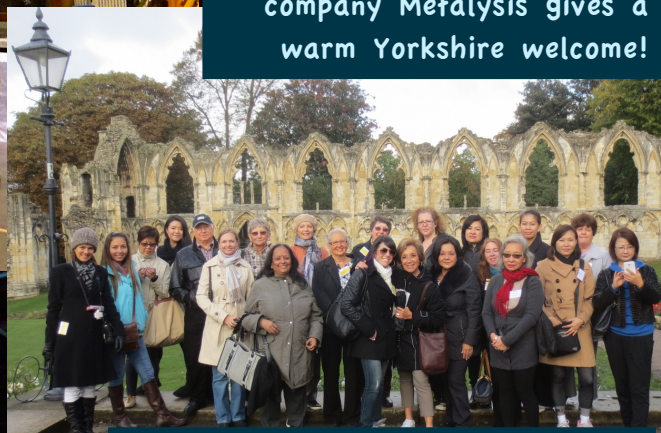
As the number of candidates for the Executive Committee equalled the twelve positions allowed for by the T.I.C.'s Charter, there was no need to hold a ballot. The member delegates approved the following twelve people to form their Executive Committee: Mr John Crawley, Mr Alan Ewart, Mr David Gussack, Mr Dale Gwinnutt, Mr David Henderson, Mr Jiang Bin, Mr Ian Margerison, Mr William Millman, Mr Yasukazu Muto, Dr Daniel Persico, Mr Itamar Resende and Mr Alexey Tsorayev. Of these twelve, Dr Daniel Persico was re-elected as President of the T.I.C. for a second consecutive year.

Fifty-fourth General Assembly, York, England

The President addresses the General Assembly on Monday morning

Ian Margerison from the host company Metalysis gives a warm Yorkshire welcome!

The National Railway Museum, the fascinating venue for the Gala Dinner on Monday evening



Ladies' Tour in the Yorkshire Museum Gardens with the old Abbey

There was also live music by the York Railway Institute brass band!

The Ladies assembled in front of the "Gladstone" from 1882

Tyler Gillard, OECD

Michael Rohwer, CFSI

Karen Hayes, Pact

The invited speakers in the Supply Chain session on Tuesday afternoon

Two of the tour groups at Metalysis on Wednesday morning

Ladies at Monk Fryston Hall

Monk Fryston Hall

The Theakston brewery tour on Wednesday afternoon

What are mushy peas??

With thanks to Ian Margerison, Richard Burt and Ulric Schwela for the images.

STIMULATING STATISTICS: THE GOAL OF RAPID REPORTING OF DEPENDABLE DATA

Paper presented by Ulric Schwela, Technical Officer of the T.I.C., on October 14th 2013, as part of the Fifty-fourth General Assembly, held in York, England.

ABSTRACT

The timely reporting of statistics for the members has long been a 'raison d'être' of the T.I.C. and this is no less the case today. Efforts continue to overcome difficulties as they arise, including finding new ways to stimulate a small number of members to report their data promptly.

Statistics are collected by the T.I.C. via an independent intermediary to preserve the confidentiality of reporting companies. These are then collated and published to the members every quarter, with four main categories for tantalum and two main categories for niobium:

- Tantalum primary production
- Tantalum processor receipts
- Tantalum processor shipments
- Tantalum capacitor producer receipts
- Niobium primary production
- Niobium processor shipments

Each of these is further sub-divided into anywhere from two to six sub-categories.

The presentation will look at the figures of the past decade to reveal trends, as well as make comparisons between different categories to highlight differences.

T.I.C. STATISTICS

This paper covers what reporting companies are required to do and a review of the data for the discrete calendar years 2002 to 2012. Readers who are familiar with the statistics process can probably skip straight to the data, while others are encouraged to read and understand the background information in order to put the statistics data into the right context.

UNDERLYING PRINCIPLES

The T.I.C. gathers statistics data on the niobium and tantalum industries to show the main trends in the quantities of niobium and tantalum produced and consumed. These data are considered to cover the vast majority of the industry, except for tantalum primary production from 2009 onwards due to the increased proportion of production outside the membership, in particular artisanal mining.

Key features of the statistics collection include:

- Data can and do only come from T.I.C. members;
- For confidentiality, members report data directly to an independent collector[1];
- An aggregate report is provided by the independent collector to the T.I.C. for review;
- A final report is issued by the T.I.C. to all the member companies.

From the above it can be seen that the data accuracy relies heavily on the good will and co-operation of the reporting companies. The T.I.C. provides advice to the member companies on how to complete the statistics, and members are free to engage with the T.I.C. for further clarification as desired, however the T.I.C. may not request information that identifies individual company data.

Collection requests are issued quarterly, every January 1st, April 1st, July 1st and October 1st to facilitate a routine and timely response; results are then circulated as soon as available.

DATA DATE RESTRICTIONS

Member companies receive statistics reports on a quarterly basis, whereas statistics aggregated by calendar year are also made available to non-members subject to a withholding period. Data up to a year old are only available to the T.I.C. members, therefore the figures for a full calendar year can only be released to non-members if at least one year old. The latest release may be purchased for a fee of EUR 500, while earlier calendar years become freely available.

[1] The T.I.C. uses the accountancy firm HLB Belgium as an independent intermediary.

STIMULATING THE STATISTICS

The goal of the T.I.C. is to provide timely and dependable data to its member companies. The T.I.C. merely acts as a facilitator, as the data are in essence provided by the members for the members. In order for this goal to be achieved, it is necessary to provide a certain amount of stimulus. This can be done by applying a certain amount of carrot and stick, preferably in equal measure. The 'carrot' is the condition that members only receive the final report if they respond to the request for statistics, while the 'stick' is that companies which persistently do not respond are brought to the attention of the Executive Committee for further action.

Essentially a company requested to submit statistics is required to:

- Report by the deadline indicated on the form (*e.g.* January 20th, April 20th, July 20th or October 20th);
- Check the reporting company lists to determine which figures to exclude[2], if any;
- Check the reporting rules to ensure figures are reported in the correct units;
- Complete the forms provided, even if all results are 'zero' (0);
- Send the forms directly to the independent collector (*i.e.* not to the T.I.C.).

What is the need for a deadline?
Those companies that are late in submitting their forms hold up the final report for the rest of the membership; this is a disservice to the entire industry. Once the final report is issued, it would be undesirable for it to be updated with late forms. The T.I.C. is authorised to know which companies are systematically late and informs the Executive Committee for further action as necessary.

Why bother reporting if all the results are zero?
If you don't submit your form, all the independent collector knows is that the form has not yet been received. It does not have a crystal ball and it should not make the assumption that a missing form equals zero. Or, to put it as a formula from the collector's point of view:

$$\text{No form} = \text{Missing form} \neq 0$$

What if I don't submit my statistics?
Submitting statistics forms is a duty of membership and missing forms adversely affect the overall statistics. Those companies that don't respond to the request for statistics are in turn not provided with the final report[3]; it is the corollary of *quid pro quo*. Or, to put it as another formula:

$$\text{No completed form} = \text{No final report}$$

While member companies are of course more than welcome to contact the T.I.C. at any time for matters related to niobium and tantalum, they are particularly encouraged to do so should they wish to have a stimulating discussion about reporting statistics!

THE STIMULATING STATISTICS

The statistics data collected from T.I.C. member companies on production, receipts and/or shipments of raw materials and metal products of niobium and tantalum are reviewed here for the years 2002-2012. As only annualised figures can be made available to the public, the graphs presented here are all in an annualised form. The original graphs presented at the Fifty-fourth General Assembly were in a six-monthly format and these original slides are still available for members to download from tanb.org/ga54files. [4]

All trends noted in this paper are based on the year-on-year difference between 2011 and 2012. [5]

[2] In most cases, volumes traded between member companies are excluded to avoid double counting.
[3] Those companies which are not given the report are informed of why this is done. No complaints about this procedure have been received.
[4] Members should contact the T.I.C. to obtain a password for access.
[5] Members should note that the year-on-year trends presented in the slides were based on the 12-month periods 2011 H2 – 2012 H1 *versus* 2012 H2 – 2013 H1, whereas the trends in this paper are necessarily based on complete calendar years, *i.e.* 2011 *versus* 2012; while generally similar, members may note some significant differences between the two comparisons.

PRIMARY PRODUCTION

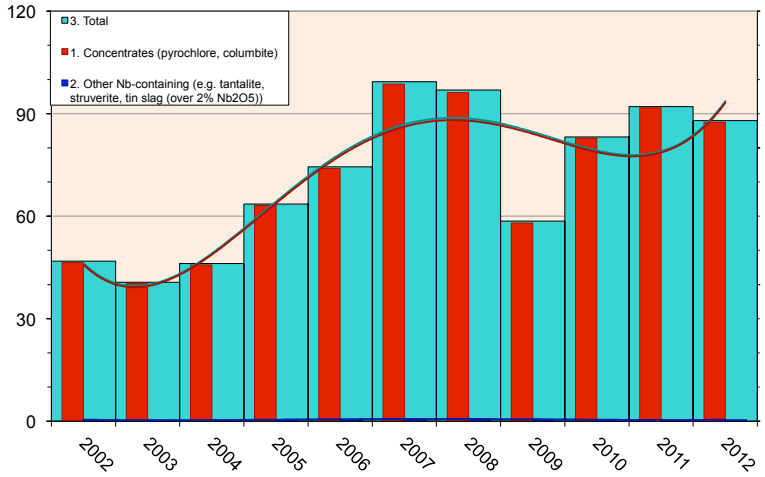


Figure 1 - Niobium primary production ('000 mt Nb_2O_5 contained)

The primary concentrates continue to form the bulk of niobium production, accounting for 99% of the total.

Primary production of niobium saw an increase in output up until 2007 when the global financial crisis began to make itself felt, with 2009 production being a trough on a par with the levels of five years earlier. Since then, production has mostly recovered and stabilised, with the latest figures showing a year-on-year dip of 5%.

Looking at the second category of raw materials in isolation, *i.e.* those materials from which niobium is obtained as a minor constituent, while they have a negligible impact on overall niobium production it is interesting that over the past five years they have tended to do the opposite of the primary raw materials, with the latest figures giving a rise of 31%.

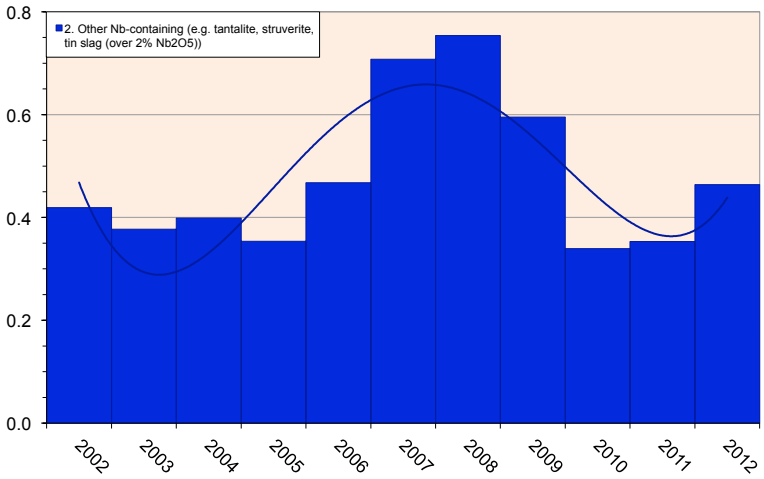


Figure 2 - Niobium primary production, showing "Other Nb-containing" concentrates only ('000 mt Nb_2O_5 contained)

PROCESSOR SHIPMENTS

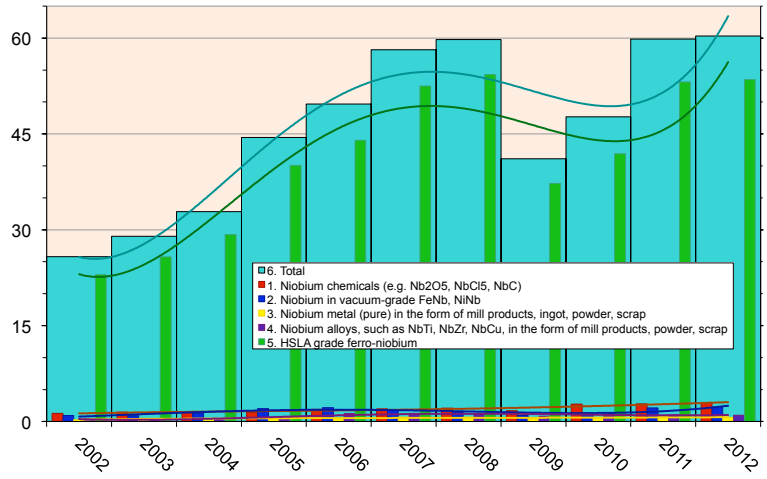


Figure 3 - Niobium processor shipments ('000 mt Nb contained)

The niobium processors report their shipments across five different categories. The distribution remains consistent, with 88% for HSLA ferro-niobium, 5% for niobium chemicals, 4% for vacuum-grade niobium master alloys, 2% for niobium alloys such as NbTi and finally 1% for pure niobium metal. As will be seen below, this is in marked contrast to the tantalum shipments whose proportions according to type of material continue to change from year to year.

Overall production has remained stable with an uptick of 1%, pushing the 2012 total to a new record, a fraction over the 60'000 mt Nb a year mark.

Examining the shipments without the preponderance of HSLA ferro-niobium, it can be seen that niobium chemicals increased 7% and vacuum-grade niobium 4%, while niobium alloys declined by 10% and pure niobium metal by 13%.

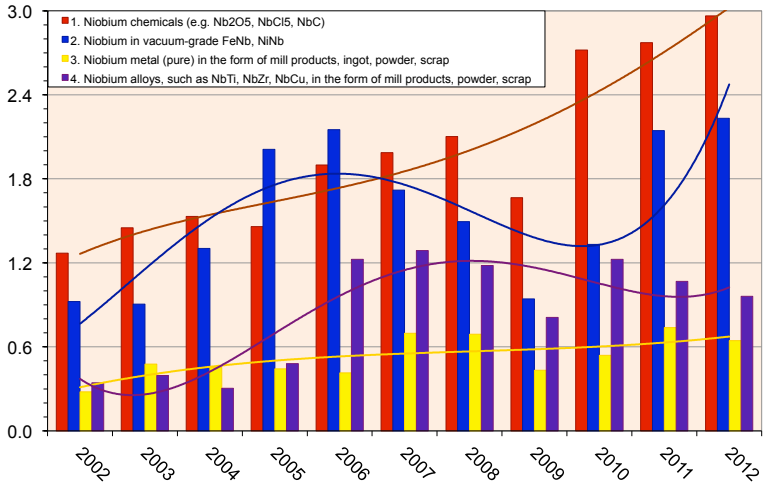


Figure 4 - Niobium processor shipments, without HSLA grade ferro-niobium ('000 mt Nb contained)

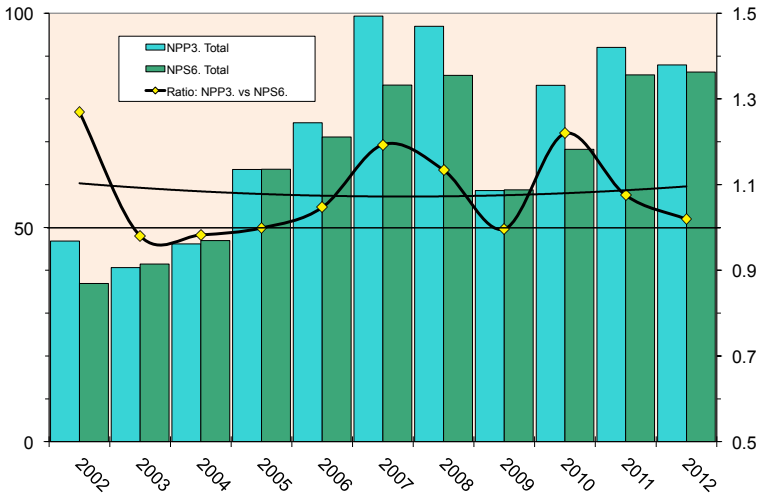


Figure 5 - Niobium primary production *versus* processor shipments ('000 mt Nb_2O_5 contained on the left; ratio on the right)

Comparing the niobium primary production versus the processor shipments, shows closely matching figures for most of the 2002-2012 period, with peaks in production compared to processor shipments in 2002, 2007 and 2010. Since 2011 there is again a good correlation between the two sets of figures.

PRIMARY PRODUCTION

For tantalum, the primary production is different to that of niobium in several obvious respects:

- Niobium production is nearly two orders of magnitude greater than tantalum;
- Production is broken down into three categories, with the addition of tin slag as a secondary source arising out of the tin industry;
- The "Estimated" value for 2008, due to the figures from one of the major tantalum mines not being submitted for one reporting quarter;
- The vast predominance of primary tantalum concentrates up until 2008, and their modest contribution from 2009 onwards.

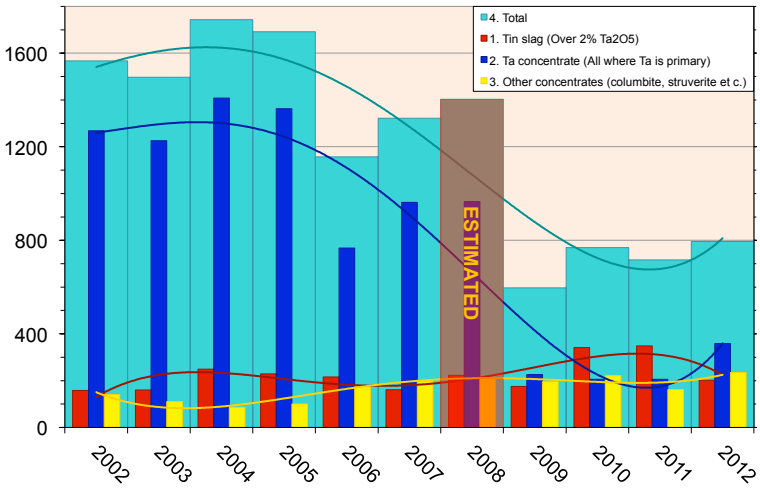


Figure 6 - Tantalum primary production (mt Ta_2O_5 contained)

The last point is the most significant one. Up until 2008 these data were considered to cover the vast majority of the industry. Then the global financial crisis took hold of the tantalum industry and promptly led to the closure in quick succession of several key industrial producers of primary tantalum concentrates. The closure of these industrial mines (excepting a later return to production by one mine at 50% capacity for seven months) led to a concomitant increase in the proportion of production contributed by artisanal mining sources[6]. Unfortunately, these artisanal mining sources have always been difficult to capture in the statistics and it is believed that only a fraction is included above, therefore the total tantalum primary production data for 2009 onwards may at times have covered as little as half of actual overall production from all sources.

Nevertheless, taking the figures as they are, the 2012 distribution of production is approximately 25% for tin slag, 45% for tantalite and 30% for other concentrates such as columbite or struverite. Overall production has increased by 11%, bringing the total to a modest peak for the post-2008 period. The increase is mainly due to primary tantalum concentrates surging 75% and secondary concentrates by 45%, while tin slag dropped by 42%.

PROCESSOR RECEIPTS

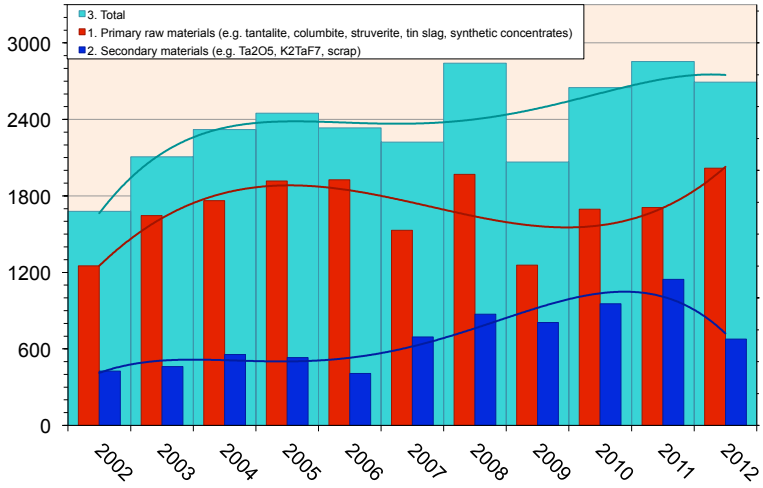


Figure 7 - Tantalum processor receipts (mt Ta_2O_5 contained)

Unlike for niobium, tantalum processors also report their receipts, split into two categories. The first category is primary raw materials which includes all three categories seen in the previous graph, plus the additional inclusion of synthetic concentrates; this means that an exact comparison can not be made although the two figures would be expected to be similar. The second category includes all secondary materials, including scrap resulting from external recycling[7].

It can also be seen that the figures for receipts are more stable than the figures for primary production, there is not the dichotomy of pre-2008 and post-2008 figures. In 2012 the proportion of primary versus secondary materials was 75% and 25% respectively. Total receipts have dipped by 6%, mainly due to secondary materials dropping 41% and only partially offset by an 18% increase in primary raw materials: enough though to push receipts of primary raw materials to a new record of over 2000 mt Ta_2O_5 a year.

[6] Artisanal mining is primarily in the form of primary tantalum concentrates, with some secondary concentrates such as columbite; by definition there is no artisanally produced tin slag.

[7] Tantalum scrap is primarily from industrial end users, with only a small portion coming from end-of-life recycling; internal company recycling and direct member to member scrap recycling is not included as this would be considered double counting.

Given the existence of data for tantalum processor receipts, it should be possible to make a better comparison than for niobium, between primary production and processor figures. However, as receipts of primary raw materials also include synthetic tantalum concentrates, such a comparison should be done with care. Furthermore, given the nature of the tantalum primary production figures, we are presented with two separate comparisons for the pre- and post-2008 periods. Nevertheless, with the exception of 2002 it can be generalised that there have been significantly more receipts by processors than can be accounted for by synthetic concentrate production.

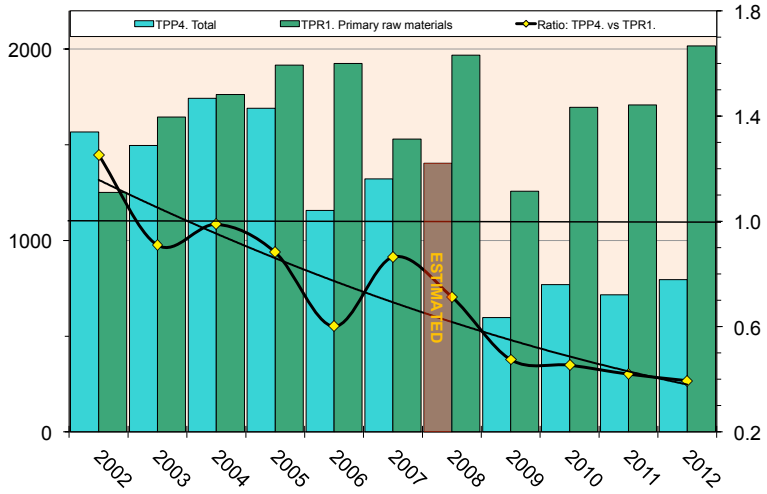


Figure 8 - Tantalum total primary production *versus* processor receipts of primary raw materials (mt Ta_2O_5 contained on the left; ratio on the right)

Breaking the time period down, the excess production of 2002 can be attributed to the tail end of the long-term take-or-pay contracts that existed between major producers and processors, with production continuing whether it was taken up by processors or not. In 2003 some of these contracts ended and major processors became freer to purchase from sources outside the membership, leading to an apparent deficit in production. This difference was exacerbated in 2006 when the major industrial mine of Greenbushes was closed. The post-2008 drop in primary production was only partly offset by the coincidental resignation of a major processor and associated drop in processor receipts figures and the rising processor receipts continue to outstrip the figures reported for primary production. Currently only 39% of processor receipts are accounted for by primary production, which as mentioned earlier can only partly be attributed to receipts of synthetic concentrates.

PROCESSOR SHIPMENTS

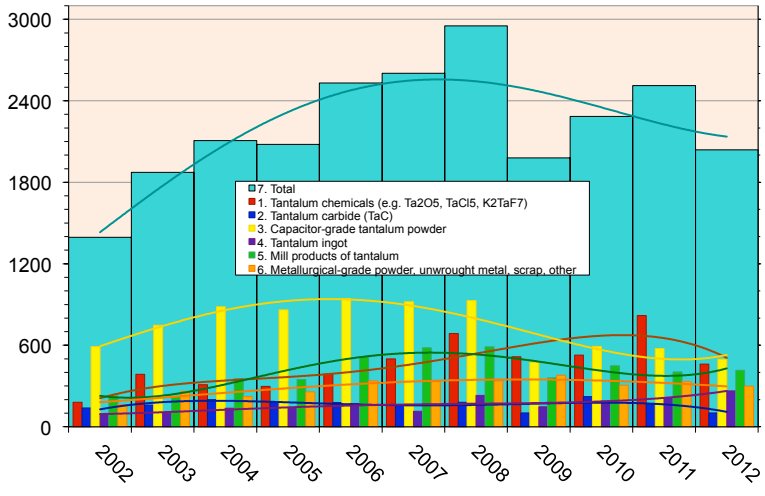


Figure 9 - Tantalum processor shipments (mt Ta contained)

Tantalum processor shipments are sub-divided into six categories, the most important one traditionally being capacitor grade powder with an average 39% of total shipments up until 2008. After 2008 capacitor powder only averaged 24%, which may be attributed to the absence of a processor considered to be a major producer of said powder.

The distribution of shipment categories for tantalum processors in 2012 was otherwise broadly in line with the previous decade, the main changes from 2011 being the drop in tantalum chemicals from 33% to 23% of total shipments. The main constituent was once again capacitor powder with 24%. Of the remainder, mill products contributed 20%, metallurgical powder 15%, tantalum ingot 13% and carbides 5%.

Overall, shipments are down by 19%, with a breakdown by category provided below.

By removing the total we can see the individual categories more clearly. The prominence of capacitor grade powder up until 2008 is even more evident, as well as the peak in tantalum chemicals seen in 2011.

Coming down from the 2011 peak, tantalum chemicals have dropped by 44%, closely matched by tantalum carbides with -40%. Capacitor powder has also declined, by 14%, and metallurgical powder by 10%, whereas mill products have nudged up 3% and tantalum ingot jumped by 24%.

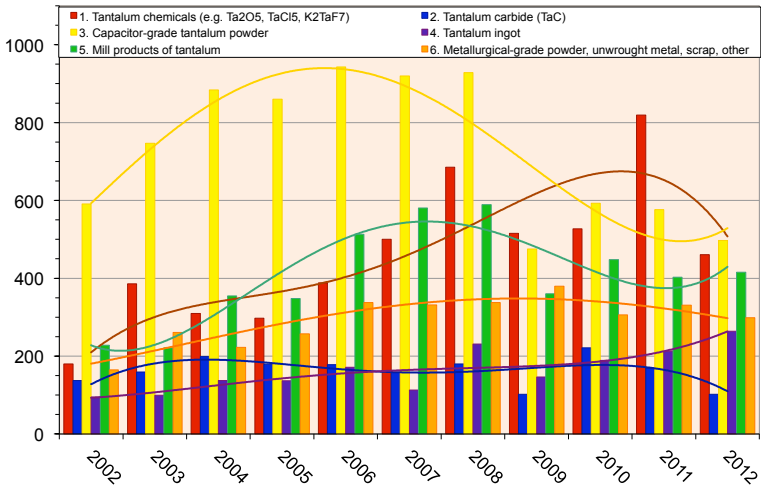


Figure 10 - Tantalum processor shipments (without total)
(mt Ta contained)

Being able to compare tantalum processor receipts with shipments, we can see the balance of material entering and leaving the processing stage. Overall, for the 2002-2012 period, some 26'000 mt of Ta_2O_5 were received, compared with 30'000 mt Ta_2O_5 in shipments (24'000 mt Ta, corrected to Ta_2O_5).

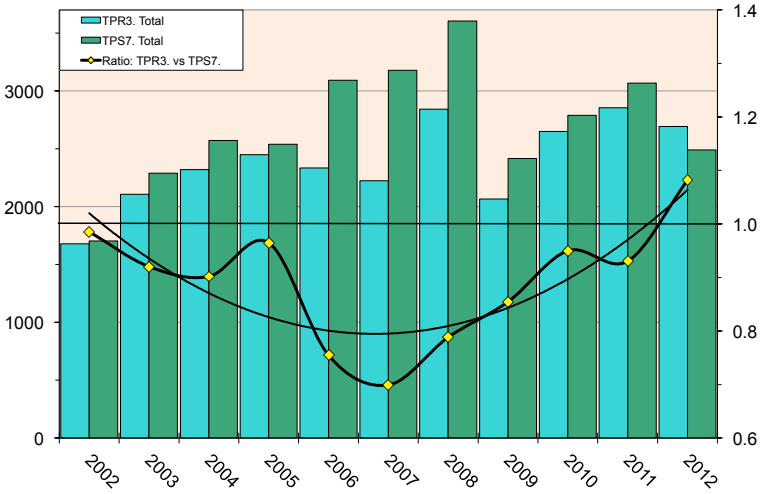


Figure 11 - Tantalum processor receipts *versus* processor shipments
(mt Ta_2O_5 contained on the left; ratio on the right)

The difference of 4'000 mt Ta_2O_5 must have come from somewhere and, if we assume that the absence of a major processor's data from the 2009-2012 period would not alter the receipts:shipments ratio significantly, we can make a like for like comparison of the four years before and after the 2008/2009 watershed to help explain the difference. This shows that there were 3'000 mt more in shipments for 2005-2008 compared with 1'000 mt more in shipments for 2009-2012. This can be attributed to the aforementioned take-or-pay contracts having led to large stocks of material at processors, which were increasingly 'worked off' from 2006 onwards. Now a more balanced picture is emerging, with receipts exceeding shipments in 2012 for the first time in the past 11 years.

CAPACITOR PRODUCER RECEIPTS

An additional segment for tantalum are the capacitor producers, which report their receipts of powder and wire for capacitors, as well as other mill products than wire *e.g.* furnace parts and sinter trays.

The distribution of capacitor producer receipts tends to be fairly consistent at around 80:20 with a small fraction for the third category. In 2012 it was 83% powder, 16% wire and 1% for the mill products other than wire. This consistent distribution has been mirrored in a further decline in receipts, where the total quantity has fallen by 18%, with powder and wire showing -16% and -29% respectively. Instead mill products other than wire have leapt 128%, however as this is an infinitesimally small contributor to the overall figures it is of no material consequence.

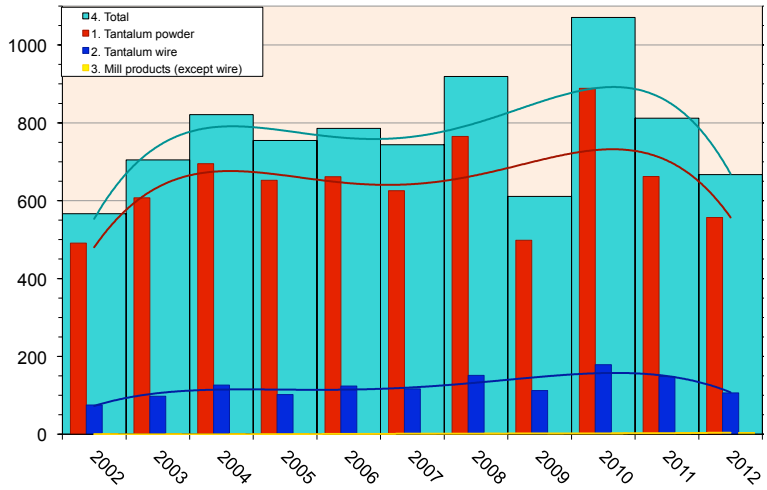


Figure 12 - Tantalum capacitor producer receipts (mt Ta contained)

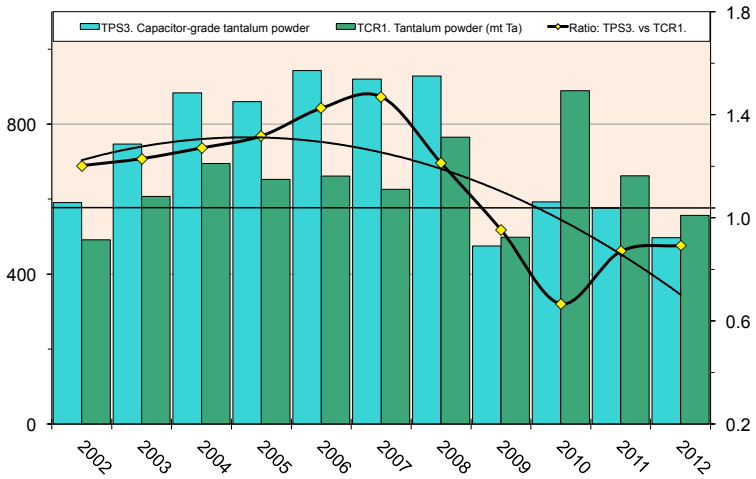


Figure 13 - Tantalum processor shipments of capacitor-grade powder *versus* capacitor producer receipts of tantalum powder (mt Ta contained on the left; ratio on the right)

With the capacitor producer receipts, we can compare their powder receipts against the capacitor powder shipments made by processors.

The 2002-2008 period shows a consistent surplus (averaging 30%) of capacitor powder shipments by processors compared to the powder receipts by capacitor producers, a pattern attributed to receipts by non member capacitor producers. This picture changed significantly at the end of 2008 with the resignation of a major capacitor powder producer, when the surplus then disappeared. Although the figures since 2009 represent the majority of the capacitor powder volume both in terms of shipments and receipts, the picture has been less clear, with recent figures suggesting a balancing of supply and demand. In 2012 processor shipments of capacitor powder accounted for 89% of the receipts by capacitor producers.

Comparing the receipts of capacitor powder with the receipts of wire enables a check of the accepted wisdom that the increasingly miniaturised tantalum capacitors lead to less powder compared to wire. Inside a capacitor we can consider the powder to occupy a three-dimensional space and the wire a one-dimensional length as it merely provides the terminal at both ends; hence as the volume of a capacitor is reduced it is the three-dimensional volume of the powder which is reduced the most, as opposed to the one-dimensional length of wire.

Despite both the receipts of capacitor powder and wire increasing over the past ten years (blue and green trend lines), the overall trend (black lines) has been for wire to form a greater proportion, and this pattern has remained consistent over the years, with minor fluctuation.

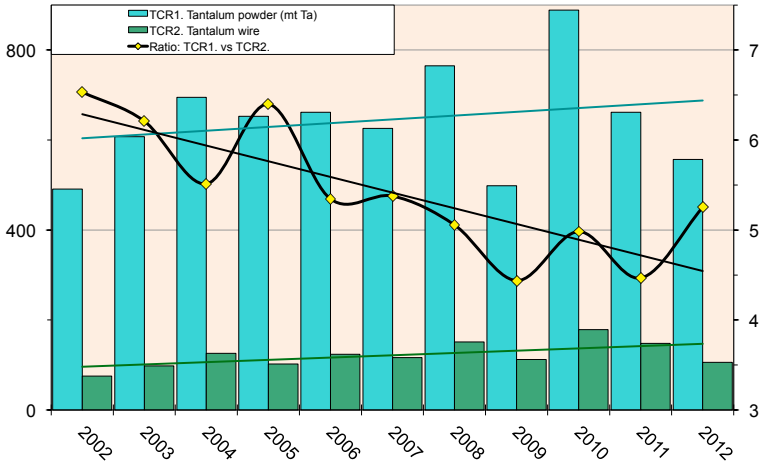


Figure 14 - Tantalum capacitor producer receipts: powder *versus* wire (mt Ta contained on the left; ratio on the right)

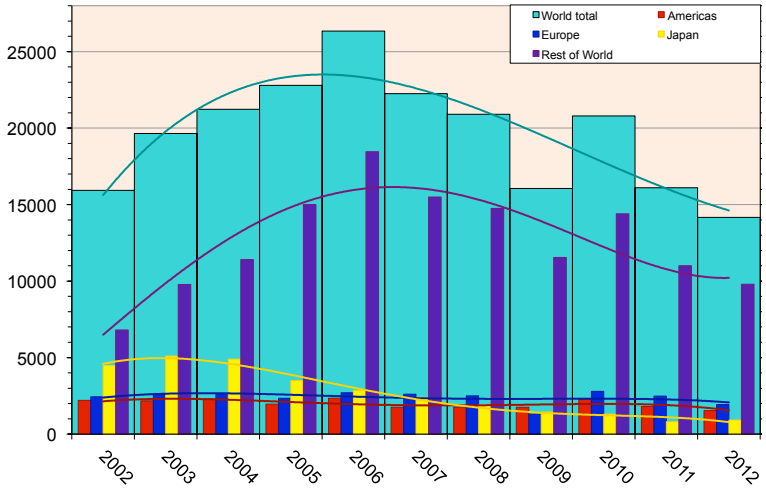


Figure 15 - Tantalum capacitor consumption estimate ('000'000 units)

Capacitor consumption, or the production of capacitors, echoes processor shipments and capacitor producer receipts, with an overall drop of 18%. This is mainly due to Europe falling 23%, followed by the Americas with -14% and the 'rest of the world' with -11%. Japan bucked the trend and jumped up 13%.

Nevertheless Japan's share of the total in 2012 remained at 7%, as did the Americas at 11%, while Europe and the rest of the world were almost unchanged at 14% and 68% respectively.

In this final graph we can seek to confirm the anticipated trend of diminishing quantity of capacitor grade powder per capacitor, as appeared to be confirmed in Figure 14. The receipts of powder by capacitor producers, compared with the total quantity of capacitors produced, should show a steadily declining ratio. Instead, we have a stimulating statistic!

The declining ratio was indeed the case up until 2006/2007, dropping from about 30 mg Ta per capacitor to about 25 mg Ta per capacitor, after which the trend instead headed upwards of 40 mg Ta per capacitor. If we assume Figure 14 to be 'correct' and this Figure 16 to be 'wrong' post-2007, we can consider two possible explanations for this trend being skewed:

- Capacitor producers began stocking up more material than they needed for production;
- Capacitor consumption figures were consistently underestimated.

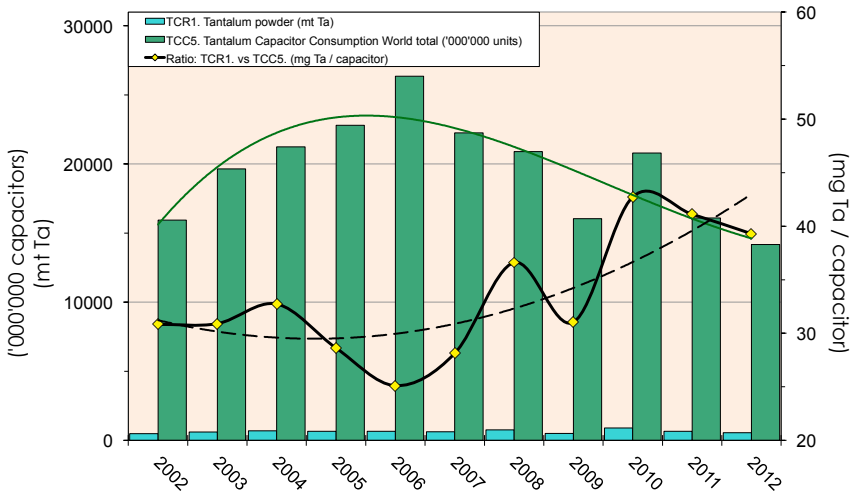


Figure 16 - Tantalum capacitor producer receipts of tantalum powder versus world total capacitor consumption estimate

Further, if we consider that the 2002-2008 data from Figure 13 suggest there is a not insignificant volume of capacitor powder being received by non-member producers, then the skewed trend in Figure 16 would be even worse. Whatever the true amount of powder being received, it is unlikely the capacitor consumption figures are to blame. The simpler explanation is more likely, that capacitor producers may have been building up stocks.

STATISTICS CONCLUSION

The niobium primary production for 2012 was on a par with 2011 figures, and still trending flat into the first two quarters of 2013. The same is true for niobium processor shipments. This shows there is no clear upward or downward trend, with output showing a stable, gentle fluctuation from one reporting period to the next.

Unlike tantalum, the distribution of niobium demand appears consistent with very little change between categories, while HSLA ferro-niobium continues to provide the vast majority of demand. There is also a good balance between production and processing activities, with the latest primary production giving a modest 6% surplus on processing output.

For tantalum, primary production and processor receipts figures are comparable to those of 2010, which if nothing else shows some stability as these segments have been fairly flat over the 2010-2012 period. The latest trend from the first half of 2013 indicates a modest increase in primary production, while processor receipts show little movement.

Primary production in 2012 still only accounted for 40% of processor receipts, a level maintained since 2009. Most of the 'missing' 60% is probably from artisanal mining, due to processors receiving material directly from traders and mining cooperatives which are not T.I.C. members.

Tantalum processor shipments are nearly back down to the levels of 2009, a very low point for tantalum right after the global financial crisis. Processor shipments continue to show great fluctuation in distribution of demand among categories as presumably one market is in upswing while others are down; on a positive side this is balancing out overall tantalum demand.

Tantalum capacitor producer receipts are almost down at 2009 levels, with the most recent trend showing further reduction.

Tantalum capacitor consumption estimates are at the lowest level for the past eleven years, and at least here the latest quarterly figures show a halt in the decline.

Reviewing the latest figures brings to attention some unwelcome trends but also some upward signs. It is definitely a case of 'ups and downs', but there are still positive signs to be found, particularly for tantalum and its primary production. Here's to a positive 2014!

COMMENT ON 'GAPS'

At various points in the text, direct or indirect reference is made to 'gaps' in the T.I.C. statistics, *i.e.* that the figures are incomplete even if they are considered to cover, in most cases, the majority of the volume of tantalum. There are not believed to be any gaps in the niobium statistics, or if there are they can be considered to be insignificant.

Where is this 'missing' tantalum then? It's out there, only it can not be included in the T.I.C. figures as these are based entirely and solely on the figures reported by the T.I.C. members. The T.I.C. can not make any official adjustment to the members' figures, they are what they are.

Nevertheless the author may be afforded a personal opinion. The areas where there are believed to be gaps in the T.I.C. statistics are, with the author's personal percentage estimate:

- tantalum primary production, over 55% of the actual volume
- tantalum processor receipts and shipments, less than 25% of the actual volume
- tantalum capacitor producer receipts, less than 20% of the actual volume

Clearly the biggest gap is in primary production. As mentioned earlier, there are only two developed mining companies which are currently not T.I.C. members and their production during the period from 2009 is understood to have been literally on and off. However much (not all) of this production is also understood to have been received by a processor which it too happens not to be a T.I.C. member, therefore the extent of this extra-T.I.C. activity can only be loosely inferred from other data. Only a small part of this tantalum volume finally finds its way into the T.I.C. capacitor producer receipts, as capacitor powder, as wire and as other mill products.

The next biggest gaps are for processor receipts and shipments, for the receipts this is likely to be the same distribution across primary and secondary materials, while for the shipments it is thought to be mainly (*i.e.* not entirely) for capacitor grade powder, mill products and carbides.

Finally there is also believed to be a small gap in capacitor producer receipts, due to smaller producers focused on domestic markets which consequently do not see an advantage in joining an international association.

MEMBER COMPANY NEWS

We would like to remind you that articles concerning T.I.C. members or the industry in general are posted regularly on the T.I.C. website in the section entitled 'News'.

NEW MEMBERS

Nine companies were elected to membership by the Fifty-fourth General Assembly:

Avon Specialty Metals Ltd
Address: Ashville Road, Gloucester, GL2 5DA, England
Nominated delegate: Mr Steven Munnoch
Tel.: +44 14 52 52 96 96, Fax: +44 14 52 30 06 24
e-mail: stevenmunnoch@avonmetals.com
Web site: www.avonspecialtymetals.com

Chee Ng Minerals Sdn. Bhd.
Address: 22½ Mile Stone, Ipoh-Kampar Road, 31900 Kampar, Perak, Malaysia
Nominated delegate: Mr Chee Yoke Hin
Tel.: +605 4665161, +605 4664333, Fax: +605 4665986
e-mail: thookeokying@hotmail.com
Web site: -

Chemaf sprl
Address: 144 Avenue Usoke, C/Kampemba, Lubumbashi, Democratic Republic of Congo
Nominated delegate: Mr Shiraz Virji
Tel.: +243 995333111, Fax: +971 4 430 9112
e-mail: shiraz@shalina.com
Web site: www.chemaf.com

Global Advanced Metals Pty Ltd
Address: Ground Floor, 76 Kings Park Road, West Perth, WA 6005, Australia
Nominated delegate: Mr Andrew O'Donovan (U.S. tel: +1 781 996 7320)
Tel.: +61 (8) 6217 2500, Fax: +61 (8) 6217 2501
e-mail: aodonovan@globaladvancedmetals.com
Web site: www.globaladvancedmetals.com

Jiujiang Zhongao Tantalum & Niobium Co. Ltd.
Address: No. 801 East Binjiang Road, Jiujiang City, Jiangxi Province, P.R. China
Nominated delegate: Mr Che Jiahe
Tel.: +86 792 7144668, +86 792 7144988, Fax: +86 792 7144699
e-mail: chejiahe2011@vip.163.com
Web site: www.jjzhongao.com

Mineral Resources International, AG
Address: Boesch 80 a, 6331 Huenenberg, Switzerland
Nominated delegate: Mr Girish Malik
Tel.: +41 41 5607755, Fax: +41 41 5607756
e-mail: info@mrinternational.ch
Web site: -

Scandmetal International S.A.
Address: Rue Louis Hymans 45, 1050 Brussels, Belgium
Nominated delegate: Mr Thomas Berman
Tel.: +32 2 343 06 96, Fax: +32 2 346 42 90
e-mail: metals@scandmetal.com
Web site: www.scandmetal.com

Shalina Resources Limited
Address: 30th Floor, Almas Tower, Jumeirah Lake Towers, P.O. Box 340575, Dubai, United Arab Emirates
Nominated delegate: Mr Abbas Virji
Tel.: +971 4 430 9111, Fax: +971 4 430 9112
e-mail: abbas@shalina.com
Web site: www.shalinaresources.com

Tranzact, Inc.
Address: 350 N. Marshall Street, Lancaster, PA 17602, U.S.A.
Nominated delegate: Mr Joel Nields
Tel.: +1 717 290 2891, Fax: +1 717 290 2895
e-mail: jnields@tranzactinc.com
Web site: www.tranzactinc.com

RESIGNATIONS

The company Nichicon-Tantalum Corp has resigned from the T.I.C. following the take-over by AVX and the consolidation of the two memberships.

The companies Crevier Minerals Inc and S.A. Minerals Ltd Partnership have also resigned from the association.

CHANGE IN COMPANY NAME

The following change was announced at the General Assembly:
Mineração Catalão de Goiás Ltda has changed name to Anglo American Nióbio Brasil Ltda. The delegate remains Mr Fabio Prieto (fabio.prieto@angloamerican.com).

TRANSFER OF MEMBERSHIP

The Fifty-fourth General Assembly approved the transfer of membership from Camet Metallurgy Inc. to Niobec Inc.

Niobec Inc.
Address: 1111 St-Charles Street West, East Tower, Suite 750, Longueuil, Quebec, Canada J4K 5G4
Nominated delegate: Ms Chantal Valiquette
Tel.: +1 450 677 0040 ext. 5025
e-mail: chantal_valiquette@niobec.com

CHANGES IN MEMBER CONTACT DETAILS

Advanced Metallurgical Group N.V. (AMG)
Advanced Metallurgical Group N.V. (AMG) has nominated Mr Hoy Frakes to represent the company within the T.I.C., in the place of Mr Itamar Resende who has left AMG. He can be contacted on hfrakes@amg-nv.com .

EXECUTIVE COMMITTEE

Ulric Schwela

The Executive Committee of the T.I.C.
meeting in York on Sunday October 13th 2013

According to the Charter of the T.I.C., the Executive Committee may consist of between two and eleven people, plus the President. The Executive Committee is drawn from the membership, and committee members may be, but need not also be, the delegates of member companies.

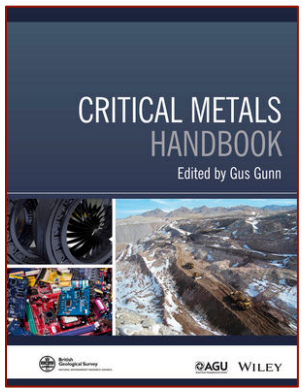
The Executive Committee composition was approved by the T.I.C. members at the General Assembly on Monday October 14th 2013, and it now consists of (in alphabetical order):

- John Crawley	jcrawley@rmmc.com.hk
- Alan Ewart	adewart@alance.co.uk
- David Gussack	david@exotech.com
- Dale Gwinnutt	dalegwinnutt@elitematerial.com
- David Henderson	dhenderson@rittenhouseir.com
- Jiang Bin	jiangb_nniec@otic.com.cn
- Ian Margerison	ian.margerison@metalysis.com
- William Millman	bill.millman@avx.com
- Yasukazu Muto	yasukazu.muto@hcstarck.com
- Daniel Persico (President)	danielpersico@rc.jp.nec.com
- Itamar Resende	iresende@btinternet.com
- Alexey Tsorayev	tsorayevaa@ulba.kz

CRITICAL METALS HANDBOOK

A new book due for publication in February 2014 will include an extensive article on tantalum and niobium. Richard Burt, former President of the T.I.C., has co-authored the article together with two Canadian geologists. Nearly half the article is dedicated to the types and locations of niobium and tantalum mineral deposits around the world, with the remainder covering the topics of extraction and processing techniques, material applications, recycling, substitution, environmental and geopolitical considerations.

For further details and a table of contents, please see
http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470671718.html



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e-mail to
info@tanb.org