BULLETIN Nº 152
ISSN 1019-2026

TIC

TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

PRESIDENT'S LETTER

Dear Colleagues,

First of all, let me wish you and your families a very Happy and Healthy 2013. For most, 2012 was a tough year. I am certain you are all hoping for a global economic turn-around during this coming year. With the global political leadership landscape more certain than this time last year, now that a number of key elections are behind us, perhaps we can look forward towards stabilization and growth that will result in more jobs, greater security and increased prosperity.

While the Fifty-third General Assembly in Cape Town, South Africa, is now a fond memory, and as we look forward to this year's General Assembly in York, England, from October 13th to 16th, I would like to make a few comments regarding some of the discussions that permeated the Cape Town meeting.

The issue of conflict minerals remains at the forefront of daily discussions both inside our member companies' walls as well as in the global press. As an organization, the T.I.C. continues to be at the forefront of this discussion. Your Executive Committee continues to be involved on committees that are engaged in crafting policy that ultimately impacts the membership. This involvement extends beyond the T.I.C. as an organizational voice as many member companies are individually engaged in the conflict minerals' discussion on a daily basis. While it may seem a natural thing to do, this involvement is costly for our member companies on both a time and expense basis. However, this involvement, which has been ongoing for some time now, has highlighted the T.I.C. and its membership as an important and educated voice in the discussion and will pay dividends to the organization as a whole moving forward.

Another topic of conversation was T.I.C. membership. Over the past few years we have seen some ebb and flow in the rolls as some long time members left while we welcomed new members. It remains gratifying to me that we continue to attract new member companies, and while the reasons for being a member may change over time, it is never satisfying to lose a member company. I am pleased to say that we are seeing a reversal in this trend as "old" friends are now interested in coming back to the fold while we continue to see interest from new companies. It was also very gratifying to see many younger delegates in attendance and engaged at the Cape Town General Assembly. These are all clear indications that our focus and efforts are of interest and value to our membership and the industry overall. That said, we must maintain this momentum and continue to find ways to bring in new members. It is always easiest to gain the attention of those companies closest to the processing of niobium and tantalum. However, we need to be more proactive and look a few more steps down the supply chain to companies that use tantalum and niobium in their products but have not historically been involved in the organization.

I know this membership discussion is not a new one; the larger the membership, the stronger the organization and the greater our "industry voice". As we move forward, we also need to consider how to use new tools such as social media to communicate with current members, support and enhance the T.I.C. brand and attract new members. This is your organization and your Executive Committee needs to hear fresh, new ideas from you on this topic.

On another subject, we are carefully reviewing the results of the recent member e-survey. The response to the survey was excellent with a 60% participation level. Thank you to all who responded. While the survey was intentionally short, the goal was to better understand how we can make certain the General Assembly meetings are user friendly and meaningful with regards to content, venue and activities. Given the volume of content in this current Bulletin, we have decided to do a follow-up e-mail, within a short period of time, where we can focus on the survey itself, therefore, giving the appropriate level of consideration to the many excellent ideas and suggestions put forward by you and your fellow T.I.C. member delegates. Two comments I will make are as follows: 1) while the response from those member companies who attend the General Assemblies on a regular basis was very high, the counter to this is that we were not able to gain a reasonable window as to the reasons for less frequent attendance by other member companies, and 2) many member companies did not identify themselves in their responses thus making it difficult to follow-up to gain additional insight as to the reasons for the comments and/or additional clarification. Moving forward, I will be interested in any additional feedback you might have.

As I take over in my role of President, I would like to thank my predecessor, José Isildo de Vargas, for all his hard work over the past year. I would also like to thank Karlheinz Reichert for his contributions to the Executive Committee since his election in 2007 and welcome Yasukazu Muto to our team.

Lastly, I want to thank Richard Burt for his exceptional contributions to the T.I.C., over the years. December 31st was Richard's last day as the T.I.C. Supply Chain Officer where he has been the recent voice of the T.I.C. on the conflict minerals issue. Beyond that, as a past President, Executive Committee member and delegate, Richard's contributions in time, effort and wisdom are greatly appreciated and will be sorely missed. I know I speak for the entire membership in wishing Richard and Roz only the best as they explore and enjoy the next phase of their lives. For those who would like to send Richard a private note, he can be reached at gravita@cogeco.ca.

With sincere regards,

Dr Daniel F. Persico (Dan)
President

CONTENTS

FIFTY-FOURTH GENERAL ASSEMBLY

The Fifty-fourth General Assembly is scheduled to take place in York, England, and will include a plant tour to Metalysis, located near Rotherham. The dates are Sunday October 13th to Wednesday October 16th 2013. The meeting will take place at the Royal York 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-THIRD GENERAL ASSEMBLY & SYMPOSIUM 2012 ON TANTALUM AND NIOBIUM

Ulric Schwela

The Westin Hotel, next to the Cape Town International Convention Centre

The Tantalum-Niobium International Study Center held its annual conference from October 7th to 10th 2012 at the Cape Town International Convention Centre (CTICC), with guests staying at the next-door Westin Hotel. This was the Fifty-third General Assembly in the T.I.C.'s history and a Symposium with approximately twice the usual number of technical papers and 191 people registered for the event.

On October 8th, 9th and 10th, a total of 25 technical presentations were given in five sessions spread over two full days and one half day.

Delegates and accompanying persons enjoyed a Welcome Reception on Sunday evening, followed on Monday evening by a Sunset Cruise off the city's Atlantic coastline where guests had the good fortune to also see playful seals and dolphins.

A Gala Dinner was held on Tuesday night with entertainment provided by a South African children's choir, followed later by a Zulu warrior dance. In the welcoming speeches, the outgoing President Mr José Isildo de Vargas noted how difficult the year 2012 had been for the industry and that the coming year 2013 promised to be equally challenging. The incoming President Dr Daniel Persico noted the good work that the T.I.C. was doing and paid particular tribute to the sterling services rendered by Mr Richard Burt, the current Supply Chain Officer and also former President of the T.I.C. for two terms, as he would soon be retiring.

On Wednesday afternoon, delegates were taken on a tour of Groot Constantia, established 1685 and Africa's oldest winery, a very different kind of 'plant tour' from those delegates have become accustomed to! Following open air wine tasting amid the spectacular Cape hills, there were cellar tours and a luncheon, finishing off with a group photograph.

The accompanying persons enjoyed a separate two-day sightseeing programme. On Monday, participants discovered Cape Town 'seen from above' from the top of Signal Hill, together with the famous Kirstenbosch Botanical Garden. Tuesday took them further afield along the spectacular coastline of the Cape Peninsula, including the scenic route along Chapman's Peak Drive and Cape Peninsula National Park, to Cape Point and Cape of Good Hope, returning via Simonstown naval village and the Boulders Beach penguin colony.

GENERAL ASSEMBLY

The General Assembly was held on the morning of October 8th. Six companies were elected as new members of the association, one company had resigned and the membership of two companies had been terminated, bringing the total membership to 89. 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'.

Dr Karlheinz Reichert did not stand for re-election to the Executive Committee. All other members of the Executive Committee had confirmed their wish to stand for re-election, and Mr Yasukazu Muto had also added his candidacy. 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 José Isildo de Vargas, Mr Alan Ewart, Mr Alexandr Gagarin, Mr David Henderson, Mr Jiang Bin, Mr Ian Margerison, Mr William Millman, Mr Yasukazu Muto, Mr Hiroya Nishimoto, Dr Daniel Persico and Mr Itamar Resende. Of these twelve, Dr Daniel Persico was elected as President of the T.I.C. for the coming year.

Fifty-third General Assembly & Symposium 2012 on Tantalum and Niobium
Cape Town, South Africa

A calm and peaceful sunset cruise...

...in good company!

Cheers!!

Ladies' Tour: a colourful outing

Birds of Paradise at Kirstenbosch Botanical Garden

Lively entertainment at the Gala Dinner!

Finally, a little wine tasting and a fine lunch at the Groot Constantia Winery

With thanks to José Isildo de Vargas, Richard Burt and Ulric Schwela for the images

T.I.C. STATISTICS UPDATE

Paper presented by Ulric Schwela, Technical Promotion Officer of the T.I.C., on October 10th 2012, as part of the Fifty-third General Assembly & Symposium 2012 on Tantalum and Niobium, held in Cape Town, South Africa.

The T.I.C. organises the collection, collation and communication of niobium and tantalum industry statistics for its 86 member companies. To better understand the "what" that results, we need to understand the "how" of the statistics collection and the "why" it is done in the first place.

So why do we collect statistics? To observe the past trends in production and consumption of niobium and tantalum, with the intent of inferring what the immediate future might hold. While the T.I.C. does the obtaining and observing, it is not permitted to make any comments on the future and so it is left to the readers to use the statistics as they see fit.

How then are statistics collected? Of the 86 member companies, a number of companies solely provide services to the industry or are otherwise not in a position to provide data relevant to the industry statistics. Most member companies do however contribute to one or more categories of the niobium and/or tantalum statistics. To provide assurance of a confidential collection, companies submit their individual company data to an independent third party collector. This collector then collates the data and provides the T.I.C. with a summary report which is distributed to the members. It is important to note that non-member companies do not report statistics to the T.I.C.

What are then the results of the statistics collection? Data for the period 2003-2012 will be presented, showing various trends and explaining some of the peaks and troughs that have occurred over the years.

This paper covers how the T.I.C. statistics function, what reporting companies are required to do, diagrams showing where statistics are collected from and, finally, a review of the data for the years 2003 to 2012. Readers who are familiar with the statistics process can probably go 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 data on the niobium and tantalum industries to show the main trends in niobium and tantalum production and consumption. These data are considered to cover the majority of the industry, except for tantalum primary production from 2009 onwards due to the loss of statistics contributions from several key tantalum producers[1], who left the association around the time of the financial crisis.

Key features of the statistics collection include:

- data come from T.I.C. members only;
- for confidentiality, members report data directly to an independent collector (HLB Belgium);
- the independent collector provides the T.I.C. with an aggregate report;
- the T.I.C. issues the report to all the member companies;
- data accuracy relies on the good will and co-operation of the reporting companies.

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.

Statistics in an annualised form are also made available to non-members. Those of the latest year are only available to the T.I.C. members, those one year old may be purchased for a fee of EUR 500, while those at least two years old are available free of charge on request.

THE FUNCTIONS OF A REPORTING COMPANY

What does a reporting company do? It:

- reports by the deadline indicated on the form (January 20th, April 20th, July 20th or October 20th);
- checks the reporting rules and reporting company lists to determine which figures to report;
- completes the forms provided, even if all results are 'zero' (0);
- sends the forms directly to the independent collector.

Why are reports required if all the results are zero?
If the independent collector does not receive a report, all it knows is that the report is missing. It does not have a crystal ball; it cannot and should not guess that a missing report equals zero. Missing reports simply delay the whole collection process.

Why report by a deadline?
Delays in reporting are a disservice to the entire industry; companies are given up to three weeks to complete the forms. Those companies that report late hold up the final report for the rest of the membership. The T.I.C. is authorised to know which companies these are and informs the Executive Committee for further action.

For further information on how to report, companies are encouraged to contact the T.I.C. for any clarification and guidance.

[1] These were **Cabot** (resigned in October 2008), owner of the Tanco mine in Canada; **Talison** (left the T.I.C. in February 2009), owner of the Greenbushes and Wodgina mines in Australia (now Global Advanced Metals, also owner of Cabot's Supermetals tantalum processing business (*i.e.* not including the Tanco mine) since August 2011); and **Noventa** (left the association in January 2010), owner of the Marropino mine in Mozambique.

MATERIAL FLOW DIAGRAMS

Put simply, "Primary production and traders' receipts" shows the units of niobium and tantalum in raw materials that are first *entering* the industry. Figures from "Processors" (receipts and/or shipments) show the units *circulating* in the industry.

Capacitor figures are essentially a sub-section of tantalum processor shipments, showing the receipts of the tantalum capacitor industry.

For this reason, the "Raw materials: production and receipts by producers and traders" includes *all production* regardless of whether it goes straight to stock or flows to downstream industry. This is also why recycled scrap and synthetic concentrates are *excluded* from raw materials.

The "Processors' raw material receipts" and "Processors' product shipments" show the material that is entering and/or leaving the processing industry at that particular time. Rules are in place to prevent double counting between reporting companies, therefore material moving *within* the processing industry is excluded. Note also that it is processors' *shipments* which are reported, not production unlike the raw materials; therefore processed materials held in stock are not reported until they are actually shipped and made available to the downstream industry.

NIOBIUM MATERIAL FLOW

The following diagram illustrates the types of companies in the niobium supply chain as grouped by the statistics process. The primary production of raw materials that is reported in the T.I.C. statistics is highlighted in yellow, while the processor shipments are highlighted in green. This indicates which figures companies should be including or excluding when reporting their statistics.

This flow sheet illustrates the three types of companies that report niobium statistics:

- Primary producer - *Reports production on the form "Nb/Prd/Trd"*
- Trader - *Reports receipts on the form "Nb/Prd/Trd"*
- Processor - *Reports shipments on the form "Nb/Proc"*

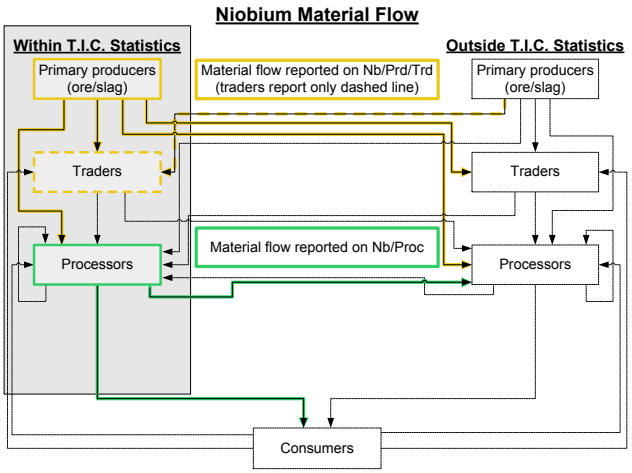

Figure 1 - Niobium Material Flow, Overview

where: Prd = primary producer; Trd = trader; Proc = processor shipments.

Distinction is made between those companies within the T.I.C. statistics reporting system and those without, which influences whether data are reported or not. The following three flow sheets clarify the situation for each of the above three types of companies.

FLOW SHEET FOR A NIOBIUM PRIMARY PRODUCER

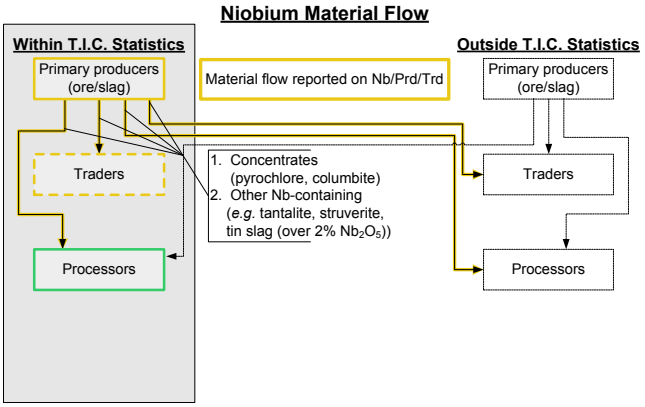

Figure 2 - Niobium Material Flow, Primary Producer

Note how a primary producer reports all material produced, regardless of its destination and even if it is going into stock. Items 1 and 2 are the two categories of material recorded for primary production.

FLOW SHEET FOR A NIOBIUM PRIMARY PRODUCTION TRADER

The role of the statistics provided by the traders is to capture material being produced outside the T.I.C. statistics. Material that traders receive from T.I.C. primary producers is *not* included in order to avoid double counting.

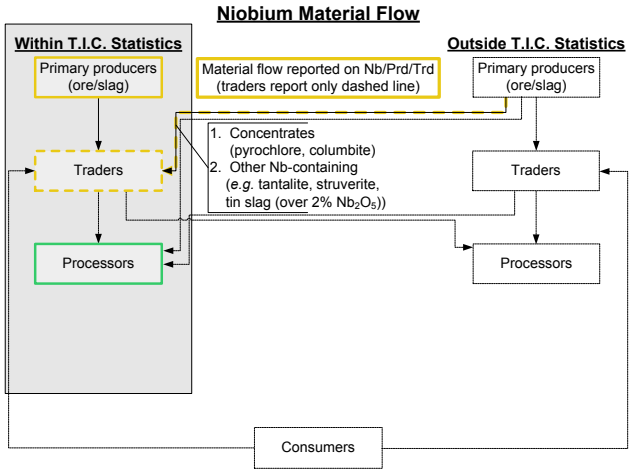

Figure 3 - Niobium Material Flow, Trader

FLOW SHEET FOR A NIOBIUM PROCESSOR

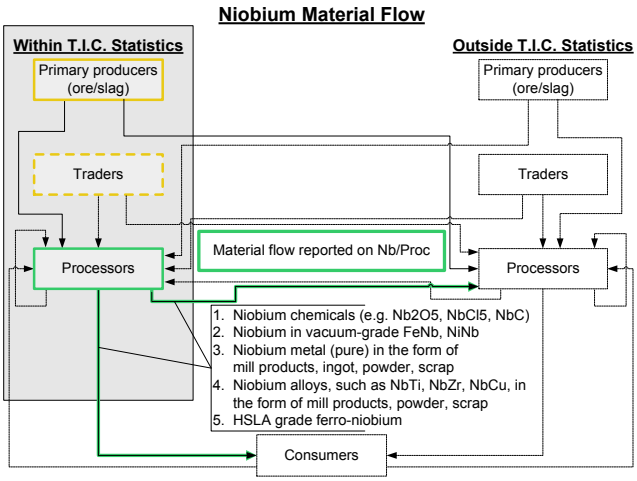

Figure 4 - Niobium Material Flow, Processor

Niobium processors simply report all their shipments, *except* for material going to other niobium processors within the T.I.C. statistics. Material held in stock is not reported until it is actually shipped. Items 1 to 5 are the categories of material recorded for niobium processor shipments.

TANTALUM MATERIAL FLOW

For tantalum the situation is essentially the same as for niobium, except with the addition of processors' receipts and capacitor producers' receipts. The following diagram illustrates the types of companies in the tantalum supply chain as grouped by the statistics process. The primary production of raw materials that is reported in the T.I.C. statistics is highlighted in yellow, while the processors' receipts are highlighted in blue and shipments in green. Capacitor producers' receipts are highlighted in orange. This shows which figures companies should be including or excluding when reporting their statistics.

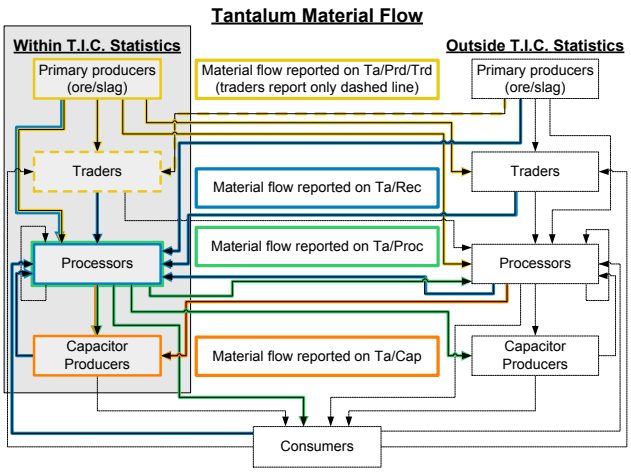

Figure 5 - Tantalum Material Flow, Overview

Tantalum presents a somewhat more complex schematic than niobium as there are four types of reporting company:

- Primary producer - *Reports production on the form "Ta/Prd/Trd"*
- Trader - *Reports receipts on the form "Ta/Prd/Trd"*
- Processor, uses two forms:
  - *Reports receipts on the form "Ta/Rec"; and*
  - *Reports shipments on the form "Ta/Proc"*
- Capacitor producer - *Reports receipts on the form "Ta/Cap"*

where: Prd = primary producer; Trd = trader; Rec = processor receipts; Proc = processor shipments; Cap = capacitor producer.

Just as for niobium, distinction is made between those companies within the T.I.C. statistics reporting system and those outside of it.

FLOW SHEET FOR A TANTALUM PRIMARY PRODUCER

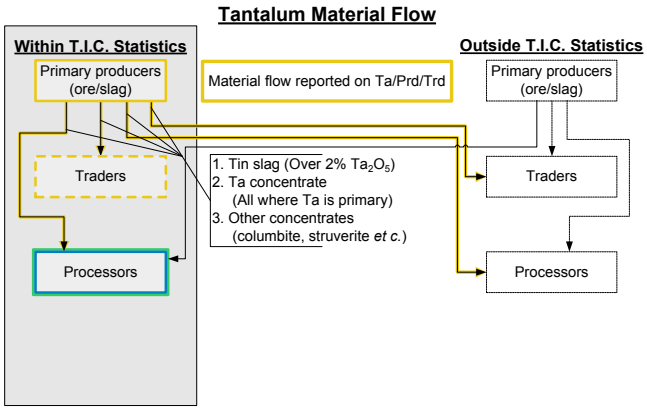

Figure 6 - Tantalum Material Flow, Primary Producer

As for niobium, a tantalum primary producer reports all material produced, regardless of its destination, even if it is going into stock. Items 1 to 3 are the three categories of material recorded for primary production.

FLOW SHEET FOR A TANTALUM PRIMARY PRODUCTION TRADER

The role of the statistics provided by the traders is to capture material being produced outside the T.I.C. statistics. Material that traders receive from T.I.C. primary producers is *not* included in order to avoid double counting.

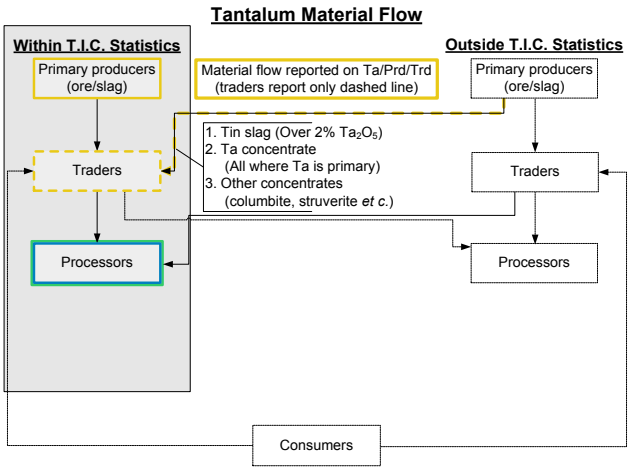

Figure 7 - Tantalum Material Flow, Trader

FLOW SHEET FOR A TANTALUM PROCESSOR'S RECEIPTS

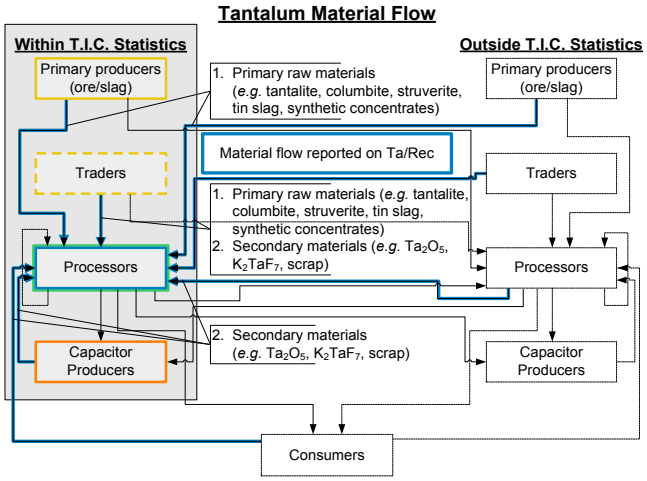

Figure 8 - Tantalum Material Flow, Processor Receipts

Tantalum processors report *both* their receipts *and* their shipments, *except* for material received from or going to other tantalum processors within the T.I.C. statistics. Items 1 and 2 are the two categories of material recorded for processors' receipts; note that category 2 is not expected from primary producers, just as category 1 is not expected from downstream users.

FLOW SHEET FOR A TANTALUM PROCESSOR'S SHIPMENTS

Tantalum processors report *both* their receipts *and* their shipments, *except* for material received from or going to other tantalum processors within the T.I.C. statistics. As for niobium, material held in stock is not reported until it is actually shipped. Items 1 to 6 are the six categories of material recorded for processors' shipments; note that category 3 is only expected to be delivered to capacitor producers, while categories 1, 2, 4 and 6 are not expected to be taken up by capacitor producers.

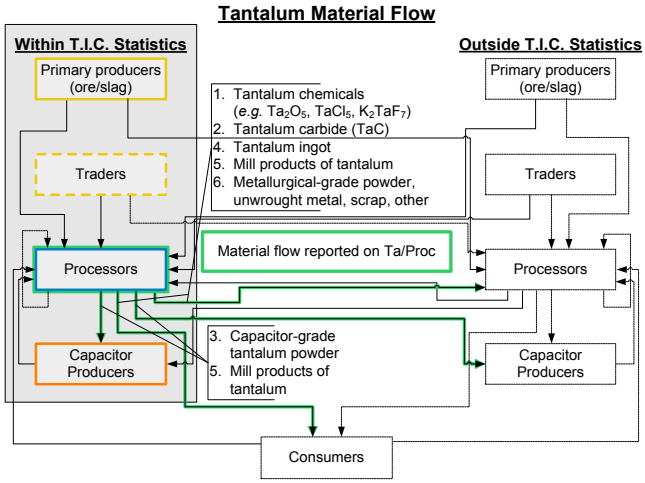

Figure 9 - Tantalum Material Flow, Processor Shipments

FLOW SHEET FOR A TANTALUM CAPACITOR PRODUCER'S RECEIPTS

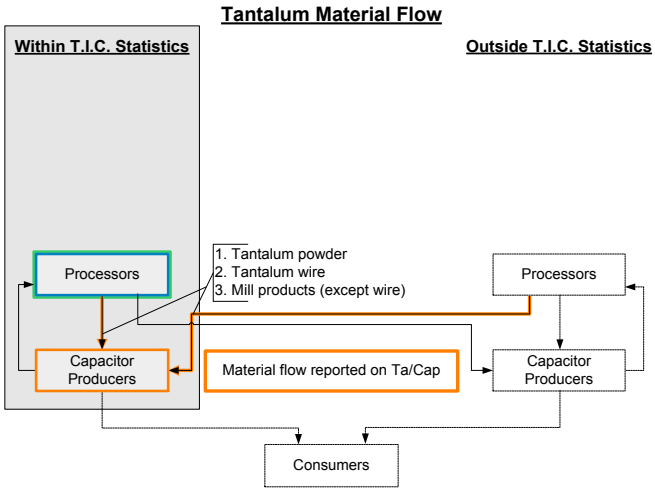

Figure 10 - Tantalum Material Flow, Capacitor Producer Receipts

Tantalum capacitor producers simply report *all* their receipts, regardless of origin. Items 1 to 3 are the three categories of material recorded for capacitor producers' receipts. Category 1 corresponds to category 3 of processor shipments except that it also includes production from non-members, while categories 2 and 3 form *part* of category 5 of processor shipments plus receipts from non-members.

STATISTICS OVERVIEW

The statistics collected from T.I.C. member companies on production and trading of raw materials and shipments by processors over the past year, are reviewed here in comparison with the statistics collected since 2003.

Up until the end of 2008 the T.I.C. reported results for the two six-month periods January-June and July-December, except for capacitor producers' receipts where figures have always been reported quarterly. Since 2009 the T.I.C. has been reporting all figures quarterly to its members. The graphs show points at half-yearly intervals for comparability with pre-2009 figures.

All data collected to the end of 2011 were in imperial units. As of 2012 data are collected in metric units and all old data have been converted for comparability.

TANTALUM

PRIMARY PRODUCTION

Figure 11 shows the primary production of tantalum for the past ten years[2], from the beginning of 2003. The current distribution of production is approximately ¼ for tin slag, ½ for tantalite and ¼ for other concentrates such as columbite or struverite. In the years leading up to 2008 there was clearly a much greater production of tantalite, this then dropped in the statistics for two reasons: the global financial crisis and consequent drop in demand, as well as the resignation of a major mining company from T.I.C. membership, although the latter factor was less important as that company stopped mining soon afterwards anyway. The figures for tin slag have been more consistent and showed an interesting upsurge in 2010-2011.

Overall production has decreased by 15% over the past year, while remaining in line with the post-2008 period. Tin slag has showed a greater drop of 45%, if only because the previous year showed a peak in production, whereas tantalite has surged by 51% and other concentrates declined slightly (by 14%).

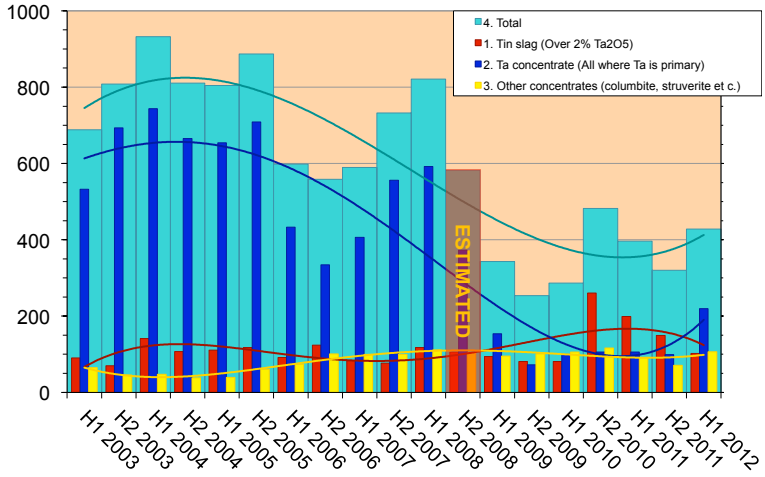

Figure 11 - Tantalum primary production (mt Ta_2O_5 contained)

PROCESSORS' RECEIPTS

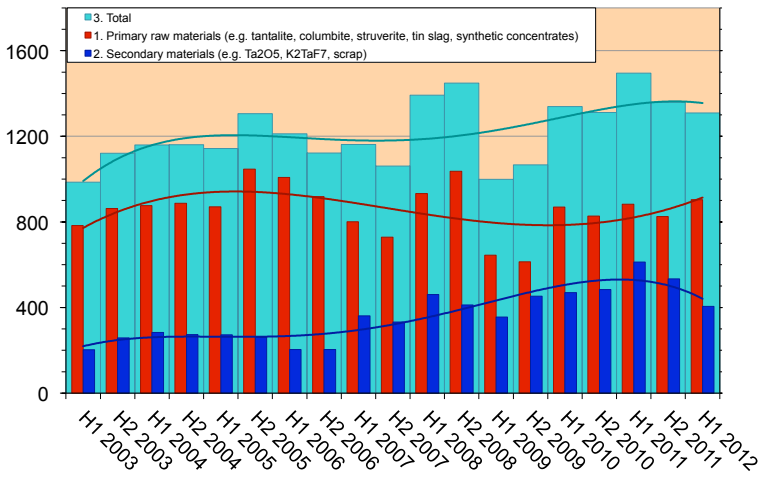

Figure 12 - Tantalum processor receipts (mt Ta_2O_5 contained)

The receipts by tantalum processors have been more stable than primary production. The distribution of primary versus secondary materials is currently 69% to 31%, with the secondary materials notably including recycled scrap. Total receipts have shown a small year-on-year drop of 5%, with primary materials essentially stable at +1% and secondary materials declining 14% from a historical high.

[2] It was not possible to release the results for the period 2008 H2 due to the independent collector SFC Group (former name of the company now called HLB Belgium) not receiving the data for 2008 Q4 from the company Talison. The release conditions for the statistics report prevented the release without this company's data.

Comparing the primary production with processors' receipts of primary raw materials should be done with care as the latter also includes receipts of synthetic tantalum concentrates. Nevertheless while there was a good correlation between the two figures up until 2005, the picture has been much more unstable since then. The Greenbushes mine closure of 2006 put a dent in production, creating a gap which was only closed at the end of 2007. While the resignation of the processor Cabot at the end of 2008 created a drop in processor receipts figures from 2009 onwards, this was more than offset by the even greater drop in primary production figures over the same period. Currently only 43% of processors' receipts are accounted for by primary production, and only part of the gap can be attributed to receipts of synthetic concentrates.

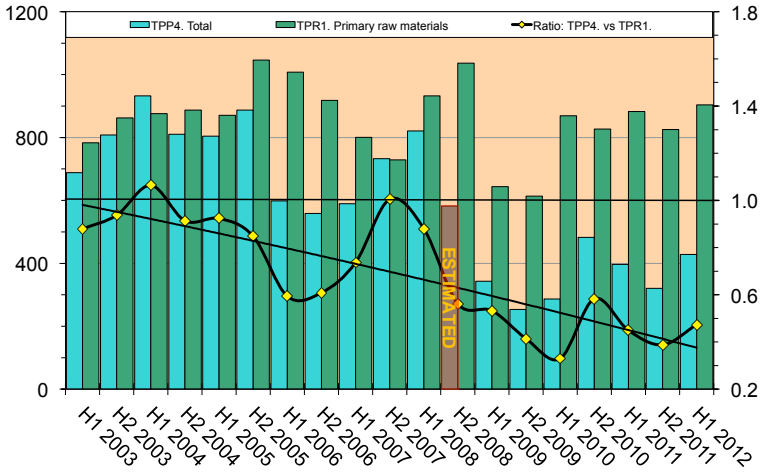

Figure 13 - Tantalum total primary production *versus* processors' receipts of primary raw materials (mt Ta_2O_5 contained)

PROCESSORS' SHIPMENTS

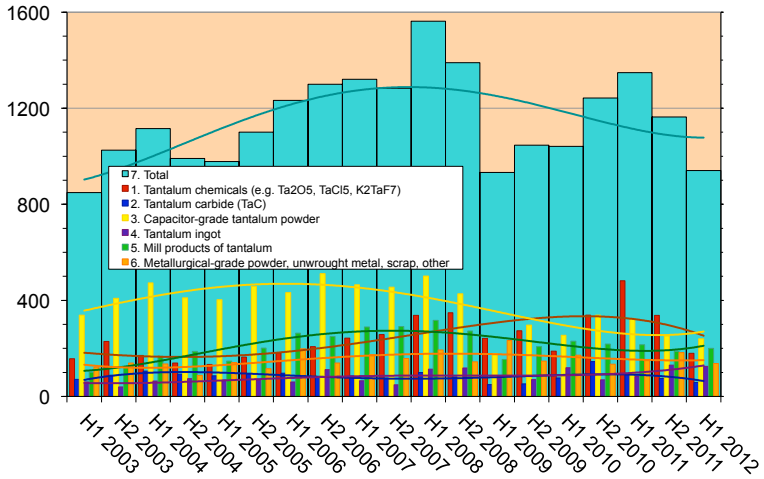

Figure 14 - Tantalum processors' shipments (mt Ta contained)

The picture for tantalum processors' shipments is similar to 2011, the most notable differences being the overall decline of 19%, which has eliminated the gain of 24% seen the previous year. This is mainly due to the largest contributor to shipments, tantalum chemicals, declining from 36% in 2011 to the current 19% of overall shipments. The biggest increase has been in tantalum ingot, up from 6% to 13% of shipments.

Looking at the shipments without the total, it can be seen how year-on-year tantalum carbides dropped by 45%, tantalum chemicals by 37%, capacitor powder by 26% and mill products by 11%, whereas metallurgical powder increased by 13% and tantalum ingot by 68%.

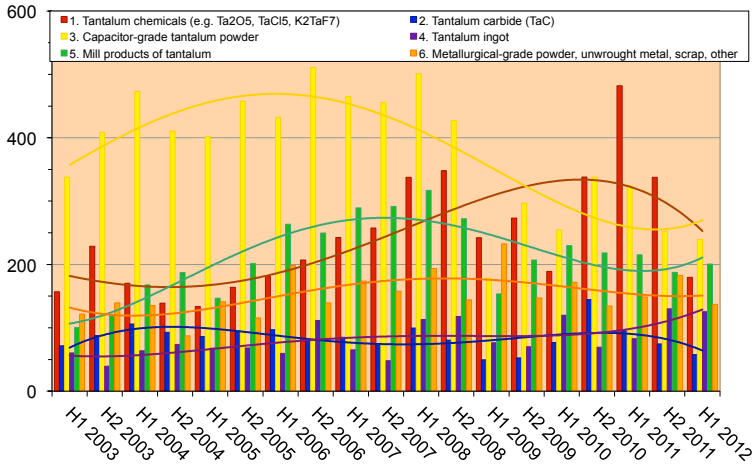

Figure 15 - Tantalum processors' shipments (without total) (mt Ta contained)

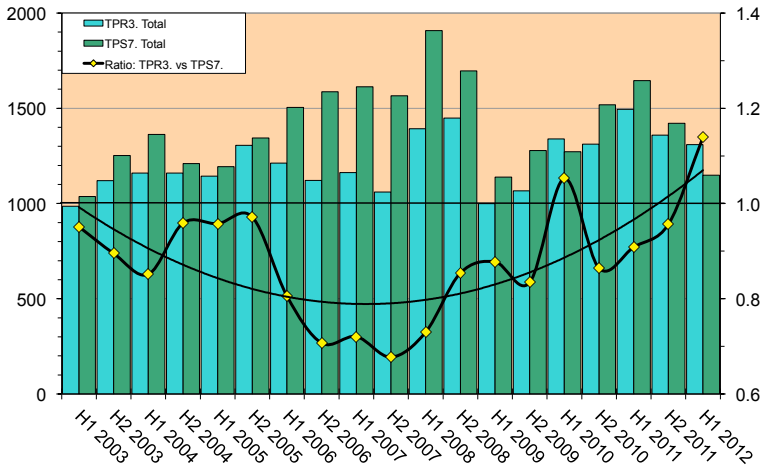

Figure 16 - Tantalum processors' receipts *versus* processors' shipments (mt Ta_2O_5 contained)

Over the past ten years there has tended to be a greater quantity of shipments than receipts, due to the need to work off the excess stocks that arose from the long term contracts established at the time of the dot com bubble. This picture has lately changed with receipts currently exceeding shipments by 5%, which may simply be due to the recent decline in processor shipments occurring faster than receipts could be adjusted.

CAPACITOR PRODUCERS' RECEIPTS

The distribution of capacitor producers' receipts remains as before, with 84% of receipts attributable to powder and 16% to wire, while the mill products other than wire are <1%. This consistent distribution has been mirrored in the recent decline in receipts, where the total quantity has fallen by 40%, with powder, wire and mill products other than wire showing 39%, 42% and 36% respectively.

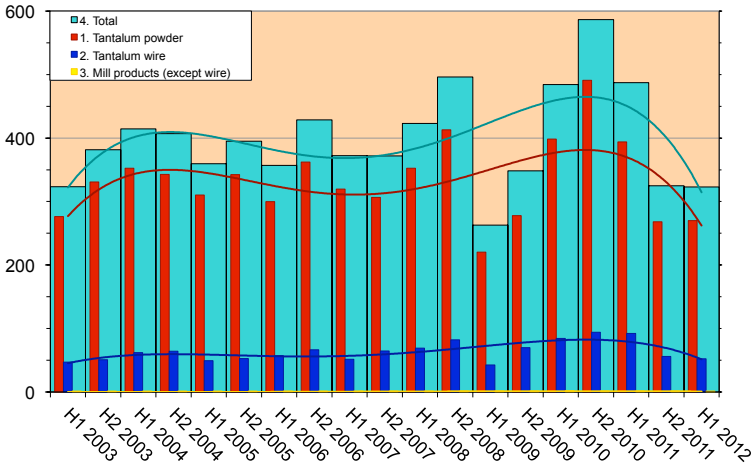

Figure 17 - Tantalum capacitor producers' receipts (mt Ta contained)

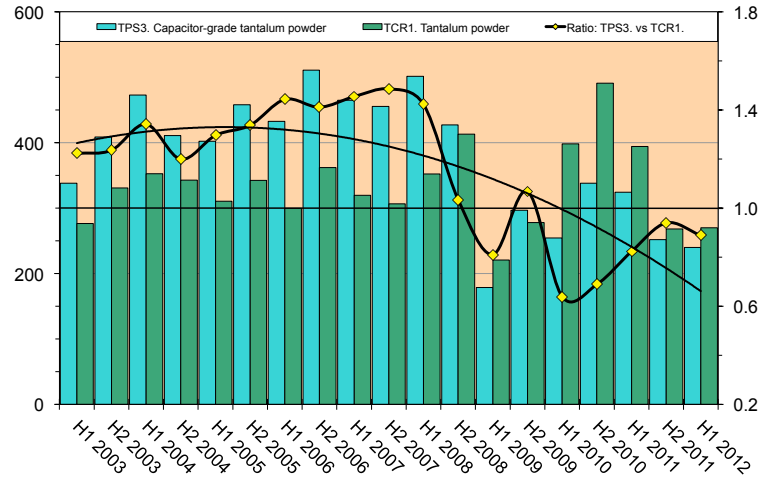

Figure 18 - Tantalum processors' shipments of capacitor-grade powder *versus* capacitor producers' receipts of tantalum powder (mt Ta contained)

The 2003-2008 period shows a consistent surplus of capacitor powder shipments by processors, when 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 the picture has been less clear, with the matching peaks and troughs in shipments and receipts suggesting a balance in supply and demand. Currently the processors' shipments of capacitor powder account for 92% of the receipts by capacitor producers.

When comparing the receipts of capacitor powder with the receipts of wire, the pattern remains stable. Despite both the receipts of capacitor powder and wire increasing over the past ten years, the overall trend has been for wire to form a greater proportion, as would be expected with the ever decreasing size of capacitors.

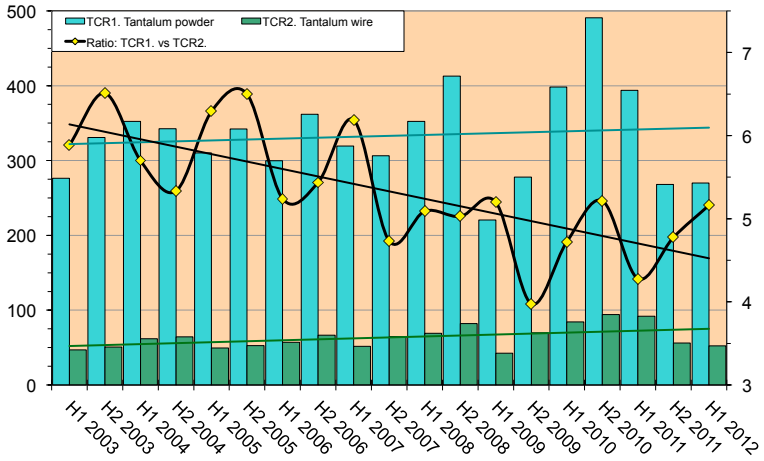

Figure 19 - Tantalum capacitor producers' receipts: powder *versus* wire (mt Ta contained)

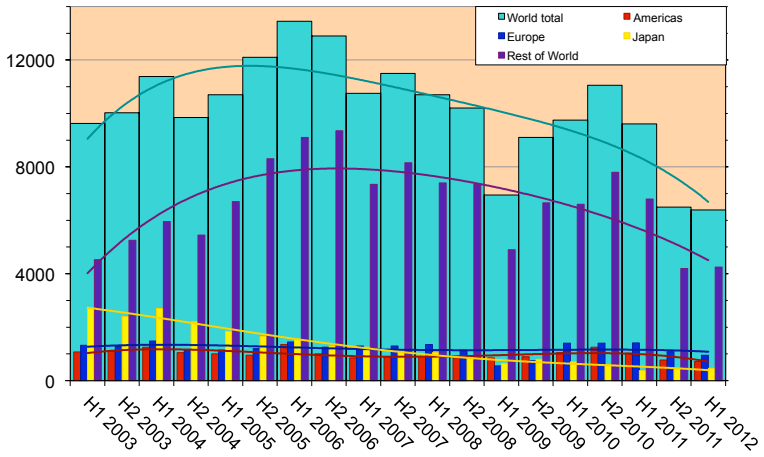

Figure 20 - Tantalum capacitor consumption estimate ('000'000 units)

The figures for capacitor consumption echo those of processors' shipments and capacitor producers' receipts, with an overall year-on-year drop of 38%, mainly due to the 'rest of the world' falling 42%, with similar figures of 35% for the Americas and less so for Europe with 28%, while Japan only declined 7%. The latter is probably due to Japan already losing a third of its volume in 2011 and, as a consequence its share of the total increased to 7%, compared to 11% for the Americas, 15% for Europe and 67% for the rest of the world.

Up until 2007 there was a clear decline in the amount of capacitor powder per capacitor, as would be expected from the decreasing form factor. As of 2008 this trend appears to be reversing, contrary to the trend shown in the comparison of powder and wire receipts. This would suggest that capacitor producers are continuing to receive more powder than is required for current production.

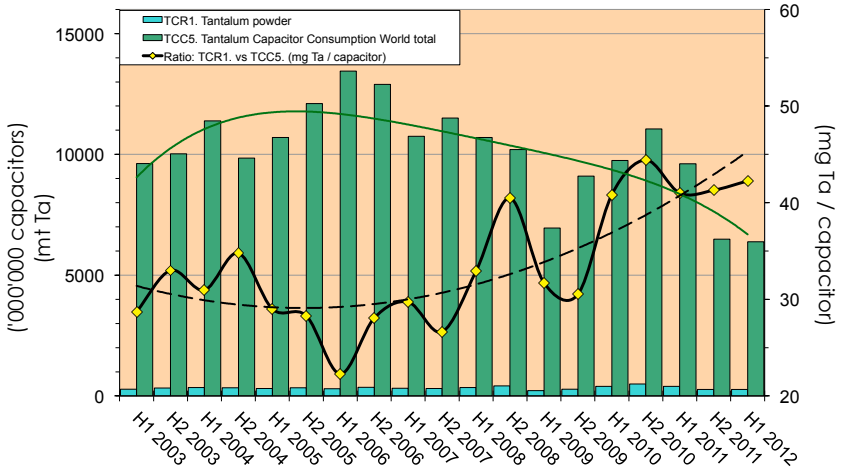

Figure 21 - Tantalum capacitor producers' receipts of tantalum powder versus world total capacitor consumption estimate

PRIMARY PRODUCTION

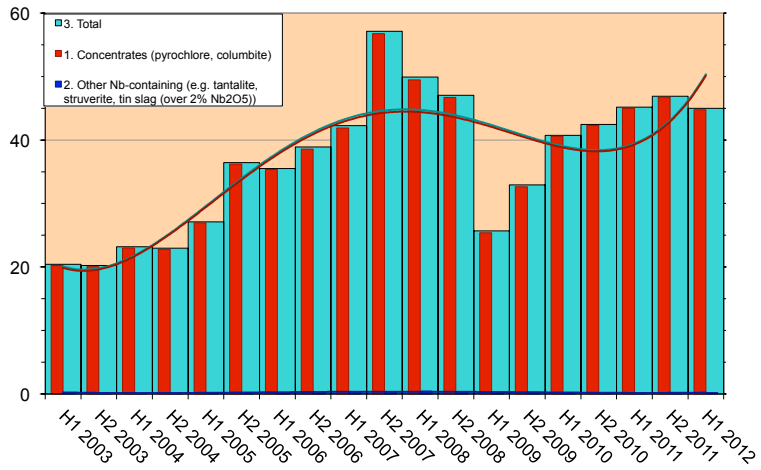

Figure 22 - Niobium primary production ('000 mt Nb_2O_5 contained)

Primary production of niobium saw a steady increase up until 2007 when the global financial crisis hit the industry, with 2009 production levels being down to those of five years earlier. Since then production has steadily recovered, with the latest figures showing a year-on-year increase of 5%. The primary concentrates continue to form the bulk of production, accounting for 99% of the total.

Looking at the secondary raw materials, although they have a negligible impact it is notable that they tend to buck the trend of the primary raw materials, with the latest figures giving a rise of 8%.

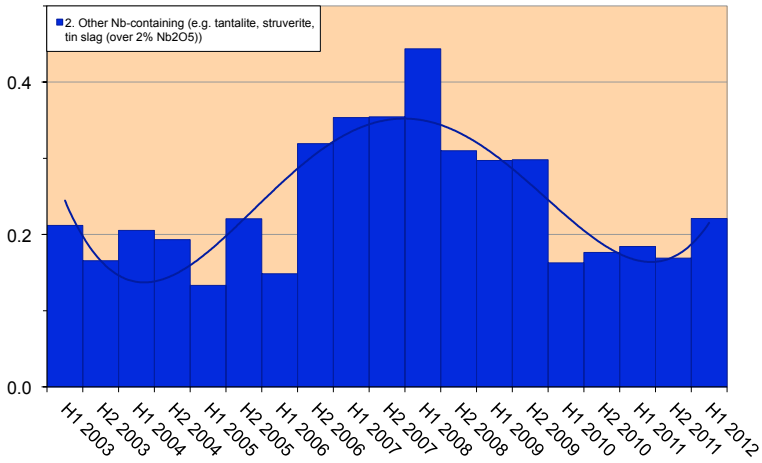

Figure 23 - Niobium primary production, showing "Other Nb-containing" concentrates only ('000 mt Nb_2O_5 contained)

PROCESSORS' SHIPMENTS

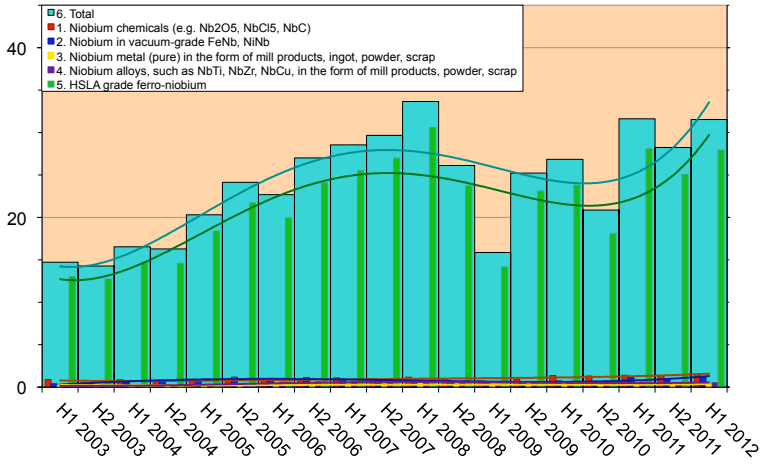

Figure 24 - Niobium processors' shipments ('000 mt Nb contained)

The distribution of niobium processors' shipments remains exactly the same as for 2011, 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. This is in marked contrast to the tantalum shipments whose proportions according to type of material continue to change. Overall production has increased by 15%, helping to maintain levels nearly as high as those of the 2007 peak.

Looking at the shipments without the monolith production of HSLA ferro-niobium, it can be seen that most categories have increased, with 25% for vacuum-grade niobium, 7% for pure niobium metal and 6% for niobium chemicals, while only niobium alloys have shown a decline, down 16%.

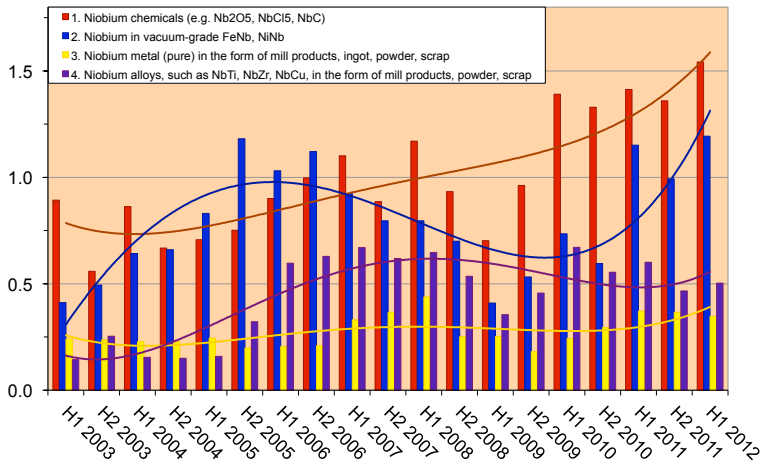

Figure 25 - Niobium processors' shipments, without HSLA grade ferro-niobium ('000 mt Nb contained)

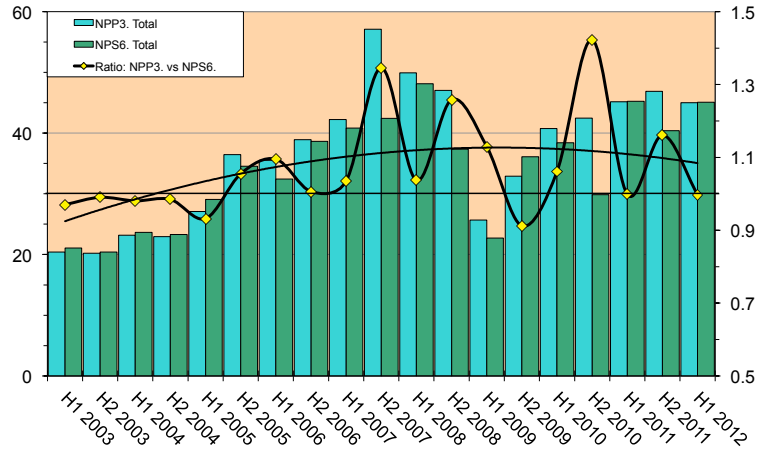

Figure 26 - Niobium primary production *versus* processors' shipments ('000 mt Nb_2O_5 contained)

From 2003 to 2007, the comparison of niobium primary production versus processor shipments (as niobium processor receipts are not collected), shows near parity with production closely matching shipments. In anticipation of increasing shipments there was overproduction at the end of 2007 when the global financial crisis hit the niobium industry and this continued into 2009 as shipments declined ahead of falling production. When volumes recovered in late 2009 there was an apparent shortfall with production accounting for 90% of shipments, however this was more than offset by not only the earlier overproduction but also later overproduction in 2010. Since 2011 the picture looks stable once again, with production closely tied to processor shipments.

STATISTICS CONCLUSION

The tantalum primary production and processors' receipts figures are comparable to those of 2010, which are on the whole fairly flat when taken over the space of the last four years. Even the trend in the separate figures for 2012 Q1 and Q2 is pretty much level for both production and receipts.

Primary production still only accounts for 45% of processor receipts, the same level as in 2011. The 'other' 55% is due in some extent to production from one or two larger non-member mining companies, but probably mostly due to processors receiving material directly from small traders and mining cooperatives which also are not T.I.C. members.

Tantalum processor shipments are comparable to the levels of 2009, a very low year for tantalum just after the global financial crisis hit. The surge in tantalum chemicals of 2010-2011 has just as quickly subsided again and capacitor powder has taken a further hit, with the latest 2012 Q1 and Q2 figures showing further decline. Processor shipments in general show great fluctuation between categories as presumably one market is in upswing while others are down; this could be seen as a balancing effect on overall tantalum demand.

Tantalum capacitor producers' receipts are also back at 2009 levels, with the record levels of 2010 seemingly having been a 'dead cat bounce'. Still, the trend taken over ten years is still gently upward and the 2012 Q1 and Q2 figures suggest a modest resurgence.

Tantalum capacitor consumption estimates are at the lowest level for over ten years, however here too the latest quarterly figures show a modest recovery.

For niobium the picture is somewhat less gloomy with primary production being level with 2008 figures, in other words only a little short of the record 2007 figures. The latest Q1 and Q2 figures show a continuing flat trend.

Niobium processors' shipments are also level with 2008 however here there is a clear upward trend, the only one in all of this year's statistics. Unlike tantalum, the niobium market appears remarkably stable with very little variation in demand for the various categories and, in any event, HSLA ferro-niobium continues to be the dominant demand and market driver.

So while comparing the figures for 2012 with previous years makes for uncomfortable reading, particularly for tantalum and *especially* for its processors' shipments, there are still positive signs to be found. It could be worse.

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 quite rightly 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 processors' receipts and shipments, less than 25% of the actual volume
- tantalum capacitor producers' 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 producers' receipts, as capacitor powder, as wire and as other mill products.

The next biggest gaps are for processors' 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 producers' receipts, due to smaller producers focused on domestic markets which consequently do not see an advantage in joining an international association.

SURVEY OF MEMBER PRODUCTS AND SERVICES

On the last page of this Bulletin are the results of a recent survey on the products which T.I.C. companies offer to analyse, buy, sell or trade, as well as services and expertise made available by these companies. Company names are as per the official listing on the tanb.org/members page, where their contact details can also be found. Companies which did not respond do not feature on the chart. This chart is available separately both as a pdf and as a spreadsheet, where the latter has additional details in the form of comments to a number of entries; both of these can be found on the tanb.org/pubs page.

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

Six companies were elected to membership by the Fifty-third General Assembly:

ATL
Address: Unit 2, Brickfields Business Park, Woolpit, Suffolk IP30 9QS, England
Nominated delegate: Mr Paul Romaine
Tel.: +44 845 224 8142, Fax: +44 870 838 1224
e-mail: info@atlsteel.com
Web site: www.atlsteel.com

FIR Metals & Resource Ltd
Address: Jiulong Industrial Zone, Yanling, Zhuzhou, Hunan, P.R. China
Nominated delegate: Mr Tang Wenzhi
Tel.: +86 731 28265126, Fax: +86 731 28265303
e-mail: tang396919@hotmail.com
Web site: www.chinatanb.com

Metallurgical Products India Pvt. Ltd
Address: T-27, MIDC Industrial Area – Taloja, District Raigad, Maharashtra 410208, India
Nominated delegate: Mr Vinod Kumar
Tel.: +91 22 27401851, 32984975, Fax: +91 22 27401852
e-mail: vkumar@mpil.co.in
Web site: www.mpil.co.in

Roskill Information Services Ltd
Address: 54 Russell Road, London SW19 1QL, England
Nominated delegate: Mr Patrick Stratton
Tel.: +44 20 8417 0087, Fax: +44 20 8417 1308
e-mail: patrick@roskill.co.uk
Web site: www.roskill.com

Tantec GmbH
Address: Rodenbacher Chaussee 6, Geb. 801, TGZ, 63457 Hanau, Germany
Nominated delegate: Mr Olivier Lallement
Tel.: +49 6181 90669-10, Fax: +49 6181 90669-66
e-mail: olivier.lallement@tantec-group.com
Web site: www.tantec-online.de

Telex Metals, LLC
Address: 105 Phyllis Drive, Croydon, PA 19021, U.S.A.
Nominated delegate: Mr Matthew Danish
Tel.: +1 215 781 6335, Fax: +1 267 895 2746
e-mail: info@telexmetals.com
Web site: www.telexmetals.com

RESIGNATIONS AND TERMINATIONS

The company Niotan Inc has resigned from the T.I.C. following the take-over by KEMET and the consolidation of the two KEMET memberships.

The memberships of Mekios (UK) Ltd and Shamika Resources Inc have been terminated by decision of the Executive Committee following non-payment of dues.

CHANGE IN COMPANY NAME

The following change was announced at the General Assembly:
AS Silmet has changed name to Molycorp Silmet following purchase by Molycorp.

TRANSFER OF MEMBERSHIP

The Fifty-third General Assembly approved the transfer of membership from Companhia Industrial Fluminense to Advanced Metallurgical Group N.V. (AMG). The delegate to the T.I.C. remains Mr Itamar Resende.

CHANGES IN MEMBER CONTACT DETAILS

DM Chemi-Met Ltd
The offices of DM Chemi-Met Ltd have moved. New contact details are:
Broad Quay House, Prince Street, Bristol BS1 4DJ, United Kingdom.
Tel.: +44 117 975 8687, Fax: +44 117 905 8800.
The delegate to the T.I.C. remains Ms Daisy Xie (daisy@dmchemimet.co.uk).

PRODUCTS AND SERVICES OFFERED BY T.I.C. MEMBER COMPANIES

Key to entries in table: A = Analysis; B = Buying; S = Selling; T = Trading (both buying and selling); Y = 'Yes', for services and areas of expertise/research.

Company	Raw materials							Compounds													
	Columbite	Microlite	Pyrochlore	Struverite	Synthetic Concentrate	Tantalite	Tin Slag	Niobium chloride	Niobium hydride	Niobium hydroxide	Niobium oxide, ceramic grade	Niobium oxide, optical grade	Niobium oxide, standard grade	Potassium fluoroniobate	Potassium fluorotantalate	Tantalum chloride	Tantalum ethoxide	Tantalum hydroxide	Tantalum oxide, ceramic grade	Tantalum oxide, optical grade	Tantalum oxide, standard grade
A&M Minerals and Metals Ltd	T					T	T														
A&R Merchants																					
A.S. Metallurgy (Liverpool) Ltd	A	A	A	A	A	A	A														
ABS Industrial Resources						S							S								S
African Mining Metallurgical Group (AMMG)	S					S															
Alfred H. Knight International Ltd	A	A	A	A	A	A	A				A	A	A					A	A	A	A
AVX Ltd	B				B	B									B						B
B.W. Minerals Pty Ltd	S			S		S	S														
Camet Metallurgy Inc. (Iamgold Inc)																					
CBMM										S		S	S								
Conghua Tantalum & Niobium Smeltery										S	S	S	S		S			S	S	S	S
Crevier Minerals Inc								S		S											S
Cronimet Central Africa AG						T															
DM Chemi-Met Ltd	T				T	T	T				T	T	T	T	T				T	T	T
Duoluoshan Sapphire Rare Metal Co	B			B		B						S	S							S	S
Elite Material Solutions																					
Exotech					S																S
F&X Electro-Materials Ltd	B				B	B					S	S	S		S						S
FIR Metals & Resource Ltd										S	S	S	S					S	S	S	S
Fogang Jiata Metals Co., Ltd.				S		S					S	S	S		S				S	S	S
Globe Metals & Mining Limited																					
Heraeus Materials Technology GmbH & Co. KG																					
Hi-Temp Specialty Metals, Inc													S						S	S	S
Honeywell Specialty Chemicals Seelze GmbH																					
Kazatomprom, NAC (Ulba Metallurgical Plant)					S	S															
KEMET Electronics Corp																					
King-Tan Tantalum Industry Ltd	B					B	B			S	S	S	S					S	S	S	S
Kuala Ketil Metal Sdn Bhd				S			S														
Malaysia Smelting Corporation							S														
Metal Do Co. Ltd.																					
Metallurgical Products India Pvt. Ltd										S			S		S			S			S
Metalysis Ltd																					
Mineração Taboca S.A.							S														
Mitsui Mining & Smelting Co Ltd										S	S	S	S					S	S	S	S
Molycorp Silmet									S				S					S			S
Morimura Bros., Inc												S								S	
NEC Tokin																					
New Material Corporation								S		S	S	S	S			S	S	S	S	S	S
Ningxia Orient Group, CNMC											S	S	S			S			S	S	S
Plazaminerals	T					T															
Rittenhouse International Resources LLC	T					T	T					T	T							T	T
Roskill Information Services Ltd																					
Sanyo Electric Co., Ltd.																					
Solikamsk Magnesium Works								S			S	S	S			S		S	S	S	S
Specialty Metals Trading SA	T		T	T		T							T		T						T
Standard Resources Corporation	T	T				T				T								T			
Stapleford Trading Limited	T			T		T	T				S	S	S		S				S	S	S
Tantaline																					
Tantec GmbH																					
Telex Metals LLC					S						S	S	S						S	S	S
Thailand Smelting & Refining Co Ltd							S														
Tinco Investments Ltd																					
Tosoh SMD, Inc																					
Trademet SA	T			T		T															
Traxys	T					T	T												T	T	T
Treibacher Industrie AG												S	S							S	S
TVEL Corporation																					
Wah Chang																					
White Solder Ltda	S					S	S														

Company	Carbides					Alloy additives										
	Binary carbides	Carbide tools	Mixed carbides	Niobium carbide	Tantalum carbide	Ferro-niobium (steel grade)	Ferro-niobium (vacuum grade)	Ferro-niobium-tantalum alloy	Nickel-niobium	Nickel-tantalum	Niobium-copper	Niobium-titanium (aerospace)	Niobium-titanium (superconductor)	Niobium-zirconium	Tantalum-niobium	Tantalum-tungsten
A&M Minerals and Metals Ltd																
A&R Merchants												S	S			
A.S. Metallurgy (Liverpool) Ltd						A	A	A	A	A	A	A	A	A	A	
ABS Industrial Resources	S			S	S	S	S	S	S	S					S	
African Mining Metallurgical Group (AMMG)																
Alfred H. Knight International Ltd						A	A	A	A	A						
AVX Ltd																
B.W. Minerals Pty Ltd																
Camet Metallurgy Inc. (Iamgold Inc)						S										
CBMM						S	S		S					S		
Conghua Tantalum & Niobium Smeltery						S										
Crevier Minerals Inc						S										
Cronimet Central Africa AG																
DM Chemi-Met Ltd						T										
Duoluoshan Sapphire Rare Metal Co																
Elite Material Solutions																
Exotech										S					S	
F&X Electro-Materials Ltd																
FIR Metals & Resource Ltd			S	S	S											S
Fogang Jiata Metals Co., Ltd.																
Globe Metals & Mining Limited																
Heraeus Materials Technology GmbH & Co. KG														S	S	
Hi-Temp Specialty Metals, Inc										S						
Honeywell Specialty Chemicals Seelze GmbH																
Kazatomprom, NAC (Ulba Metallurgical Plant)													S	S		
KEMET Electronics Corp																
King-Tan Tantalum Industry Ltd				S	S	B		B								
Kuala Ketil Metal Sdn Bhd																
Malaysia Smelting Corporation																
Metal Do Co. Ltd.																
Metallurgical Products India Pvt. Ltd						S		S								
Metalysis Ltd					S					S				S	S	S
Mineração Taboca S.A.								S								
Mitsui Mining & Smelting Co Ltd	S			S	S											
Molycorp Silmet																
Morimura Bros., Inc																
NEC Tokin																
New Material Corporation	S	S	S	S	S	S	S					S	S	S	S	
Ningxia Orient Group, CNMC				S	S				S			S	S	S	S	
Plazaminerals																
Rittenhouse International Resources LLC																
Roskill Information Services Ltd																
Sanyo Electric Co., Ltd.																
Solikamsk Magnesium Works																
Specialty Metals Trading SA						T										
Standard Resources Corporation																
Stapleford Trading Limited						S										
Tantaline																
Tantec GmbH																
Telex Metals LLC			S	S	S				S						S	
Thailand Smelting & Refining Co Ltd																
Tinco Investments Ltd																
Tosoh SMD, Inc																
Trademet SA																
Traxys						T										
Treibacher Industrie AG	S		S	S	S											
TVEL Corporation											S		S			
Wah Chang												S	S	S		
White Solder Ltda																

Company	Metallurgical grade products											
	Niobium ingot (alloyed)	Niobium ingot (unalloyed)	Niobium melting stock	Niobium mill products (alloyed)	Niobium mill products (unalloyed)	Scrap (Nb & Ta)	Tantalum ingot (alloyed)	Tantalum ingot (unalloyed)	Tantalum melting stock	Tantalum mill products (alloyed)	Tantalum mill products (unalloyed)	Tantalum powder
A&M Minerals and Metals Ltd												
A&R Merchants	S	S	S	S	S	S	S	S	S	S	S	
A.S. Metallurgy (Liverpool) Ltd	A	A				A	A					
ABS Industrial Resources	S	S	S	S	S	S	S	S	S	S	S	
African Mining Metallurgical Group (AMMG)												
Alfred H. Knight International Ltd	A	A				A	A	A			A	
AVX Ltd											B	
B.W. Minerals Pty Ltd												
Camet Metallurgy Inc. (Iamgold Inc)												
CBMM	S	S										
Conghua Tantalum & Niobium Smeltery												S
Crevier Minerals Inc												
Cronimet Central Africa AG												
DM Chemi-Met Ltd		T			T	T		T			T	
Duoluoshan Sapphire Rare Metal Co		S			S			S			S	S
Elite Material Solutions	S	S		S	S		S	S		S	S	
Exotech			S			S			S			
F&X Electro-Materials Ltd												S
FIR Metals & Resource Ltd	S	S	S	S	S		S	S	S	S	S	
Fogang Jiata Metals Co., Ltd.												
Globe Metals & Mining Limited												
Heraeus Materials Technology GmbH & Co. KG	S	S	S	S	S	S	S	S	S	S	S	
Hi-Temp Specialty Metals, Inc		S			S	S		S	S	S	S	
Honeywell Specialty Chemicals Seelze GmbH												
Kazatomprom, NAC (Ulba Metallurgical Plant)	S	S		S	S	S	S	S		S	S	
KEMET Electronics Corp												
King-Tan Tantalum Industry Ltd	S	S				B		S				
Kuala Ketil Metal Sdn Bhd												
Malaysia Smelting Corporation												
Metal Do Co. Ltd.						T						
Metallurgical Products India Pvt. Ltd												
Metalysis Ltd						S				S	S	S
Mineração Taboca S.A.				S						S		
Mitsui Mining & Smelting Co Ltd												
Molycorp Silmet		S				S		S				
Morimura Bros., Inc												
NEC Tokin												
New Material Corporation	S	S		S	S		S	S		S	S	
Ningxia Orient Group, CNMC	S	S	S	S	S	S	S	S	S	S	S	S
Plazaminerals												
Rittenhouse International Resources LLC		T		T	T			T		T	T	
Roskill Information Services Ltd												
Sanyo Electric Co., Ltd.												
Solikamsk Magnesium Works												
Specialty Metals Trading SA	T	T					T	T				
Standard Resources Corporation					T	T			T			
Stapleford Trading Limited						T						
Tantaline						B						
Tantec GmbH				B	B	S				B	B	
Telex Metals LLC	S					S	S	S				
Thailand Smelting & Refining Co Ltd												
Tinco Investments Ltd												
Tosoh SMD, Inc						S					S	
Trademet SA												
Traxys						T		T				
Treibacher Industrie AG												
TVEL Corporation	S	S										
Wah Chang	S	S	S	S	S		S	S	S	S	S	
White Solder Ltda												

Company	Capacitors, capacitor material										
	Anodes	Capacitors (niobium)	Capacitors (tantalum)	Capacitors (polymer)	Cases	Foil	Powder, EB-melted	Powder, electro-chemical reduction	Powder, sodium-reduced	Scrap (Ta capacitor material)	Wire
A&M Minerals and Metals Ltd											
A&R Merchants						S	S		S	S	S
A.S. Metallurgy (Liverpool) Ltd	A	A	A	A	A	A	A		A	A	A
ABS Industrial Resources							S			S	
African Mining Metallurgical Group (AMMG)											
Alfred H. Knight International Ltd	A		A		A	A			A	A	A
AVX Ltd	S	S	S		B		B		B	B	B
B.W. Minerals Pty Ltd											
Camet Metallurgy Inc. (Iamgold Inc)											
CBMM											
Conghua Tantalum & Niobium Smeltery											
Crevier Minerals Inc											
Cronimet Central Africa AG											
DM Chemi-Met Ltd							T		T		
Duoluoshan Sapphire Rare Metal Co											
Elite Material Solutions					S	S					S
Exotech											
F&X Electro-Materials Ltd									S		S
FIR Metals & Resource Ltd											
Fogang Jiata Metals Co., Ltd.											
Globe Metals & Mining Limited											
Heraeus Materials Technology GmbH & Co. KG						S					S
Hi-Temp Specialty Metals, Inc											
Honeywell Specialty Chemicals Seelze GmbH											
Kazatomprom, NAC (Ulba Metallurgical Plant)						S	S		S		S
KEMET Electronics Corp			S								
King-Tan Tantalum Industry Ltd										B	
Kuala Ketil Metal Sdn Bhd											
Malaysia Smelting Corporation											
Metal Do Co. Ltd.										T	
Metallurgical Products India Pvt. Ltd											
Metalysis Ltd								S			
Mineração Taboca S.A.											
Mitsui Mining & Smelting Co Ltd											
Molycorp Silmet											
Morimura Bros., Inc											
NEC Tokin				S							
New Material Corporation	S						S		S		S
Ningxia Orient Group, CNMC						S	S		S	S	S
Plazaminerals											
Rittenhouse International Resources LLC											
Roskill Information Services Ltd											
Sanyo Electric Co., Ltd.	B			S					B	S	B
Solikamsk Magnesium Works											
Specialty Metals Trading SA											
Standard Resources Corporation											
Stapleford Trading Limited											
Tantaline											
Tantec GmbH						B					B
Telex Metals LLC	S		S				S			S	S
Thailand Smelting & Refining Co Ltd											
Tinco Investments Ltd											
Tosoh SMD, Inc											
Trademet SA											
Traxys										T	
Treibacher Industrie AG											
TVEL Corporation											
Wah Chang											
White Solder Ltda											

Company	Finished components							Services				
	Aerospace	Chemical process equipment	Furnace equipment	Medical	Niobium parts for superconductors	Niobium sputtering targets	Tantalum sputtering targets	Assaying, analysis	Market research	Potential mining and exploration	Reagents (e.g. KF, KCl, HF)	Weighing and sampling
A&M Minerals and Metals Ltd												
A&R Merchants												
A.S. Metallurgy (Liverpool) Ltd								Y				
ABS Industrial Resources												
African Mining Metallurgical Group (AMMG)												
Alfred H. Knight International Ltd								Y				Y
AVX Ltd												
B.W. Minerals Pty Ltd												
Camet Metallurgy Inc. (Iamgold Inc)												
CBMM												
Conghua Tantalum & Niobium Smeltery						S		Y				
Crevier Minerals Inc										Y		
Cronimet Central Africa AG										Y		
DM Chemi-Met Ltd								Y		Y		
Duoluoshan Sapphire Rare Metal Co												
Elite Material Solutions												
Exotech												
F&X Electro-Materials Ltd												
FIR Metals & Resource Ltd												
Fogang Jiata Metals Co., Ltd.												
Globe Metals & Mining Limited												
Heraeus Materials Technology GmbH & Co. KG				S	S	S	S	Y				
Hi-Temp Specialty Metals, Inc												
Honeywell Specialty Chemicals Seelze GmbH											Y	
Kazatomprom, NAC (Ulba Metallurgical Plant)												
KEMET Electronics Corp												
King-Tan Tantalum Industry Ltd												
Kuala Ketil Metal Sdn Bhd										Y		
Malaysia Smelting Corporation												
Metal Do Co. Ltd.												
Metallurgical Products India Pvt. Ltd												
Metalysis Ltd												
Mineração Taboca S.A.												
Mitsui Mining & Smelting Co Ltd												
Molycorp Silmet												
Morimura Bros., Inc												
NEC Tokin												
New Material Corporation												
Ningxia Orient Group, CNMC										Y		Y
Plazaminerals												
Rittenhouse International Resources LLC												
Roskill Information Services Ltd									Y			
Sanyo Electric Co., Ltd.			B									
Solikamsk Magnesium Works												
Specialty Metals Trading SA												
Standard Resources Corporation												
Stapleford Trading Limited												
Tantaline		S										
Tantec GmbH		S										
Telex Metals LLC												Y
Thailand Smelting & Refining Co Ltd												
Tinco Investments Ltd										Y		
Tosoh SMD, Inc						S	S	Y				
Trademet SA												
Traxys												
Treibacher Industrie AG												
TVEL Corporation					S							
Wah Chang						S		Y				
White Solder Ltda										Y		

Company	Areas of Expertise/Research															
	Aerospace	Alloying	Catalysis	Corrosion	Fuel cell technology	Instrumentation	Market analysis	Medical	Mining and mineral concentration	Nuclear power	Processing and refining	Recycling	Superconductors	Thin film	Transport	Welding
A&M Minerals and Metals Ltd																
A&R Merchants	Y	Y										Y				
A.S. Metallurgy (Liverpool) Ltd																
ABS Industrial Resources	Y	Y							Y		Y					
African Mining Metallurgical Group (AMMG)									Y							
Alfred H. Knight International Ltd																
AVX Ltd												Y				
B.W. Minerals Pty Ltd																
Camet Metallurgy Inc. (Iamgold Inc)																
CBMM	Y	Y	Y	Y	Y				Y		Y					Y
Conghua Tantalum & Niobium Smeltery	Y	Y		Y							Y					Y
Crevier Minerals Inc									Y							
Cronimet Central Africa AG									Y							
DM Chemi-Met Ltd	Y	Y	Y						Y						Y	
Duoluoshan Sapphire Rare Metal Co											Y					
Elite Material Solutions				Y		Y		Y			Y			Y		
Exotech	Y	Y									Y					
F&X Electro-Materials Ltd																
FIR Metals & Resource Ltd																
Fogang Jiata Metals Co., Ltd.																
Globe Metals & Mining Limited																
Heraeus Materials Technology GmbH & Co. KG		Y		Y	Y			Y			Y	Y	Y	Y		
Hi-Temp Specialty Metals, Inc											Y	Y				
Honeywell Specialty Chemicals Seelze GmbH			Y													
Kazatomprom, NAC (Ulba Metallurgical Plant)									Y		Y					
KEMET Electronics Corp																
King-Tan Tantalum Industry Ltd																
Kuala Ketil Metal Sdn Bhd									Y							
Malaysia Smelting Corporation									Y		Y					
Metal Do Co. Ltd.												Y				
Metallurgical Products India Pvt. Ltd											Y					
Metalysis Ltd	Y	Y		Y							Y					
Mineração Taboca S.A.									Y		Y					
Mitsui Mining & Smelting Co Ltd																
Molycorp Silmet																
Morimura Bros., Inc															Y	
NEC Tokin																
New Material Corporation		Y									Y					
Ningxia Orient Group, CNMC	Y	Y		Y							Y					
Plazaminerals																
Rittenhouse International Resources LLC																
Roskill Information Services Ltd							Y									
Sanyo Electric Co., Ltd.																
Solikamsk Magnesium Works																
Specialty Metals Trading SA																
Standard Resources Corporation																
Stapleford Trading Limited																
Tantaline				Y												
Tantec GmbH				Y								Y				Y
Telex Metals LLC											Y					
Thailand Smelting & Refining Co Ltd											Y					
Tinco Investments Ltd																
Tosoh SMD, Inc		Y									Y					Y
Trademet SA																
Traxys																
Treibacher Industrie AG																
TVEL Corporation										Y			Y			
Wah Chang	Y	Y		Y							Y					Y
White Solder Ltda									Y							