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T.I.C.

TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

PRESIDENT'S LETTER

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

As we enter 2015, I want to briefly look back at what I believe was the very successful stewardship of my predecessor, Dan Persico. The Executive Committee addressed such issues as the adoption of a transport policy for radioactive materials, decided to proceed with increasing our staffing professionalism with the new position of a Director, and reviewed the need to improve the iTSCi/supply chain program for central Africa. During my tenure, I would like to build on such initiatives, as well as add a few others, such as a revised website, better marketing, and push to promote tantalum and niobium. The Executive Committee has established several subteams to address some of these issues and will form more in the future.

I would also like to take this opportunity to again thank the Executive Committee members, Alan Ewart and Yasukazu Muto, who stepped down in New York City, for their valuable advice and perspective during their years on the Committee. I would also like to welcome their successors, Conor Broughton and Marc Hüppeler, on board. In addition, I would like to thank Emma Wickens and Ulric Schwela for their work in keeping the organization on an even keel.

While the General Assembly in New York was successful, I look forward to seeing you all in Penang, Malaysia next October, where our host will be Malaysia Smelting Corporation. Please reserve the dates of Sunday October 25th through Wednesday October 28th 2015.

Please remember, as an organization, the T.I.C. is only as strong as our membership. We rely upon and need your commitment, enthusiasm, and feedback to improve. Using an old American saying, "united we stand, divided we fall". Please feel free to make your suggestions, criticisms, complaints, questions, etc. known to me or my fellow Executive Committee members, as we sincerely seek your input.

Sincere best wishes to each of you both personally and professionally for a happy, healthy, and prosperous 2015!

Best regards,

David Henderson
President

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GRAHAM B. BROWN

The T.I.C. was sad to learn that Graham Brown had passed away on October 25th 2014, at the age of 98.

Graham Brown was involved with the T.I.C. even before it was officially founded, having been one of the people in the tantalum industry who discussed, in the early 1970s, the possibility of creating an international organisation for tantalum. He contributed to the planning and establishment of the association, and to the expansion of its activities over many years, writing numerous articles and presentations. He was the first editor of the quarterly Bulletin, taking this role from the publication of the first issue until 1985, and also at this time he responded to technical inquiries submitted to the T.I.C.

He was Metals Division Manager at Fansteel, one of the first processing companies to be a member of the association when the Charter was broadened to admit this category. Later he became an industry consultant, guiding and assisting others in finding and using tantalum by sharing his extensive knowledge. He enjoyed travelling to T.I.C. assemblies and meeting people, having a cheerful disposition and a lively mind.

The T.I.C. appreciates all he did for the benefit of this association.

Images courtesy of Rasa Sayang Resort

FIFTY-SIXTH GENERAL ASSEMBLY

The Fifty-sixth General Assembly is scheduled to take place in Penang, Malaysia, and will include a plant tour to Malaysia Smelting Corporation, located in Butterworth. **The dates are Sunday October 25th to Wednesday October 28th 2015. Please note these dates are one week later than the dates initially envisaged**, to avoid coinciding with another conference several members attend. The meeting will take place at the Shangri-La Rasa Sayang Resort, 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**.

Main image: Garden Wing Pool, Rasa Sayang Resort

Inset: Pinang Bar, Rasa Sayang Resort

FIFTY-FIFTH GENERAL ASSEMBLY

The Tantalum-Niobium International Study Center held its annual conference from October 12th to 15th 2014 at the Sheraton New York Times Square Hotel in New York City, U.S.A. This was the Fifty-fifth General Assembly in the T.I.C.'s history, attended by 223 people.

A total of fifteen technical presentations were given in four sessions, spread over Monday and Tuesday.[1] Delegates and accompanying persons enjoyed a Welcome Reception on Sunday evening. On Monday evening, a Gala Dinner was held in the ballroom of the hotel, with stunning entertainment in the form of a Broadway-type show.

On the morning of Wednesday October 15th, delegates were given the opportunity to visit the facility of Hi-Temp Specialty Metals, located in Yaphank, Long Island. The host company invited all participants to lunch at Lombardi's on the Bay, a beautiful venue in the Great South Bay area.

The accompanying persons enjoyed a sightseeing programme on Monday and Tuesday. The first day took them North, to visit the Philipsburg Manor while the second day focused on the city of New York: the 'Top of the Rock' viewing platform on the 65th floor of the Rockfeller Center, a behind-the-scenes tour of the Lincoln Center for the performing arts (Metropolitan Opera, New York State Theater, Juilliard School…), the 9/11 Memorial, the financial district then a guided tour of the Museum of Modern Arts (MoMA).

© Ulric Schwela

The Sheraton New York Times Square Hotel

[1] Members may contact the T.I.C. to obtain a password to download the presentations from tanb.org/ga55files.

Fifty-fifth General Assembly, New York, U.S.A.



A selection of the speakers who presented the fifteen papers: the technical session was opened by Ramez Nasser of UMG, and later included Luc Houben of Jones Day and Carolyn Duran of Intel



Other speakers included Yuri Freeman of KEMET, Sasha Lezhnev of Enough, and Minister Evode Imena of the Rwandan Ministry of Natural Resources

Performers giving their lively rendition of a Broadway musical during the Gala Dinner

The tour for accompanying persons took in sights including the 'Top of the Rock', the Lincoln Center for the performing arts, the 9/11 Memorial, the financial district and the Museum of Modern Arts (MoMA)




With thanks to Royce Gussack and Ulric Schwela for the images.

GENERAL ASSEMBLY

The General Assembly was held on the morning of October 13th. Eight companies were elected as new members of the association, while seven companies had resigned. This brought the total membership of the association at the end of the General Assembly to 95. One company name change and two transfers of membership were also enacted by the Assembly. Full details are provided in the last section of this Bulletin, under 'Member company news'.

Mr Alan Ewart and Mr Yasukazu Muto did not stand for re-election to the Executive Committee. The other ten members of the Executive Committee had confirmed their wish to stand for re-election. Four new candidates had also come forward.

As the number of candidates for the Executive Committee exceeded the twelve positions allowed for by the T.I.C.'s Charter, a secret ballot was held. The member delegates approved the following twelve people to form their Executive Committee: Mr Conor Broughton, Mr John Crawley, Mr David Gussack, Mr Dale Gwinnutt, Mr David Henderson, Mr Marc Hüppeler, Mr Jiang Bin, Mr Ian Margerison, Mr William Millman, Dr Daniel Persico, Mr Itamar Resende and Mr Alexey Tsorayev. Of these twelve, Mr David Henderson was elected as President of the T.I.C. for the coming year.

THERE'S NO STATISTICS LIKE SHOW STATISTICS

Paper presented by Ulric Schwela, Technical Officer of the T.I.C., on October 14th 2014, as part of the Fifty-fifth General Assembly, held in New York, U.S.A.

ABSTRACT

To paraphrase the famous song title may unduly raise expectations of an exciting statistics show. Sadly the turning of statistics into a thrilling Broadway show is beyond the skills of this presentation's speaker, and it would probably be inappropriately distracting anyway. Instead, the title is an oblique way of saying that with no statistics, we have no show!

The complete and timely collection of industry statistics for niobium and tantalum has always been and continues to be a primary concern of the T.I.C. While statistics are collected via an independent intermediary to reassure reporting companies that their commercial confidentiality is preserved, other seemingly unavoidable obstacles will prevent one company or another from reporting in a timely manner and so hold up the entire reporting process. These issues continue to be tackled head on by the T.I.C.

Additionally, a new statistics subteam has been formed from members of the Executive Committee, to better analyse, discuss and resolve the issues that have been affecting the completeness and timeliness of the industry's statistics.

The T.I.C. statistics are issued to the members every quarter, with two main categories for niobium and four main categories for tantalum:

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

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

The presentation will look at the figures for the last decade to reveal past trends, as well as highlight differences between various categories.

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 2001 to 2013. 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 are only obtained from T.I.C. members;
- For confidentiality, members report data directly to an independent collector[2];
- 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 are provided with statistics reports on a quarterly basis, whereas statistics aggregated by calendar year are available to non-members on request and 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.

SHOW STATISTICS

It should be clear that without any data, there would be no statistics for the T.I.C. to show. Member companies have to show their statistics data to the collector, for there to be a show of statistics by the T.I.C.!

While the goal of the T.I.C. is to provide timely and dependable statistics to its member companies, it can only act as a facilitator. The timeliness and completeness of the statistics relies on all members playing their part in reporting their statistics data. By way of encouragement, there is a condition that a reporting member will only receive the final statistics report if they first submit their own statistics, while 'persistent offenders' that either don't report or are consistently late, are brought to the attention of the Executive Committee for it to consider 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[3], if any;
- Check the reporting rules to ensure figures are reported in the correct units;
- Complete and submit 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 periodically advised of which companies have not reported and so can see which ones are systematically late, and informs the Executive Committee for further action as necessary.

Why bother reporting if all the results are zero?
If the independent collector does not receive a form, all it knows is that the form has not yet been received. It is not a mind reader 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:

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

[2] The T.I.C. has been using the accounting and auditing firm HLB Belgium as an independent intermediary.
[3] Volumes traded between member companies in the same segment are excluded to avoid double counting.

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[4]; in other words *quid pro quo*, or as another formula:

No completed form = No final report

Member companies are encouraged to contact the T.I.C. should they wish to discuss any aspect of reporting statistics, whether by way of clarifications, examples or general guidance.

THE STATISTICS SHOW

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 2001-2013. 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-fifth General Assembly were in a six-monthly format and these original slides are still available for members to download from tanb.org/ga55files. [5]

All trends and percentages noted in this paper are based on the year-on-year difference between 2012 and 2013. [6]

NIOBIUM

PRIMARY PRODUCTION

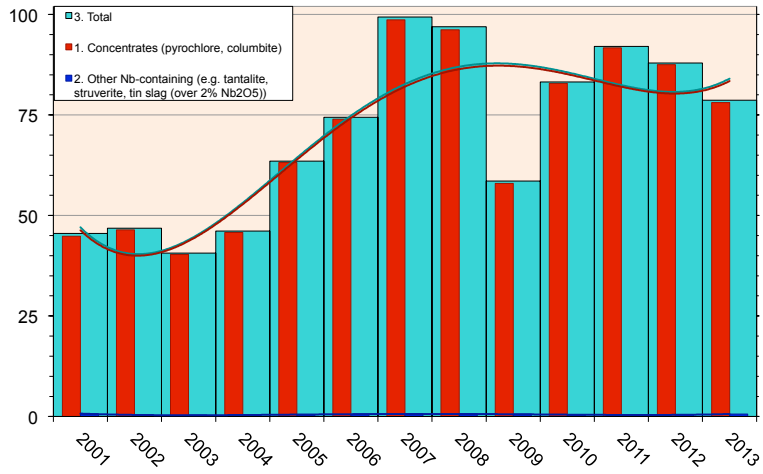

Figure 1 - Niobium primary production ('000 mt Nb_2O_5 contained)

The primary niobium concentrates are derived from pyrochlore and columbite, and 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. Production mostly recovered after this recession, although more recently showing a year-on-year drop of 11% (steepening a 5% dip from 2011 to 2012) and reverting to levels last seen in 2006.

[4] Those companies which are not given the report are informed of why this is done. No complaints about this procedure have been received.
[5] Members should contact the T.I.C. to obtain a password for access.
[6] Members should note that the year-on-year trends presented in the GA55 slides were based on the 12-month periods 2012 H2 – 2013 H1 versus 2013 H2 – 2014 H1 in order to provide the most recent comparison, whereas the trends in this paper are necessarily based on complete calendar years, i.e. 2012 versus 2013; while generally similar, the two comparisons can give rise to significant differences.

Looking at the secondary 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 they often trend the opposite way to the primary raw materials, with the latest comparison giving a rise of 32% (almost exactly repeating a 31% rise the year before).

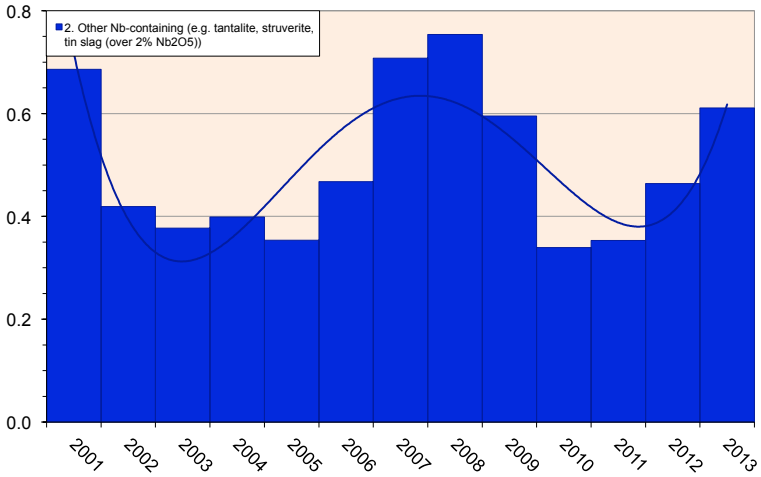

Figure 2 - Niobium primary production, showing "Other Nb-containing" concentrates only ('000 mt Nb_2O_5 contained)

PROCESSOR SHIPMENTS

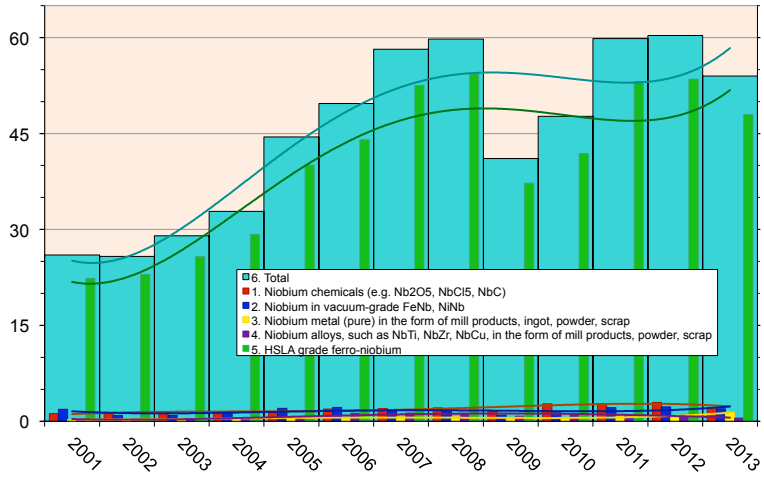

Figure 3 - Niobium processor shipments ('000 mt Nb contained)

The niobium processors report their shipments across five different categories. The breakdown across these categories tends to be fairly consistent over time with changes limited to +/- 1% of the total, and with HSLA ferro-niobium continuing to be the overwhelmingly primary driver.

2013 showed a distribution of 88% for HSLA ferro-niobium, 4% for niobium chemicals, 4% for vacuum-grade niobium master alloys, 3% for pure niobium metal and finally 1% for niobium alloys such as NbTi. As will be seen below, this is in marked contrast to the tantalum shipments whose proportions according to type of material change considerably from one year to the next.

Overall production declined by 11% from 2012 (having shown a 1% upward nudge from 2011 to 2012), although to be fair 2012 showed a record level in output. The decline was mainly due to HSLA ferro-niobium which dipped by 10% (itself also nudging up 1% the year before).

Examining the shipments without the preponderance of HSLA ferro-niobium, it can be seen that from 2012 to 2013 pure niobium metal rocketed by 124% (compared with a 13% drop the year before), while all other categories declined, with niobium chemicals dropping 27% (compared with a previous 7% rise), vacuum-grade niobium 12% (following a 4% uptick), and niobium alloys 48% (steepening a 10% decline the year before).

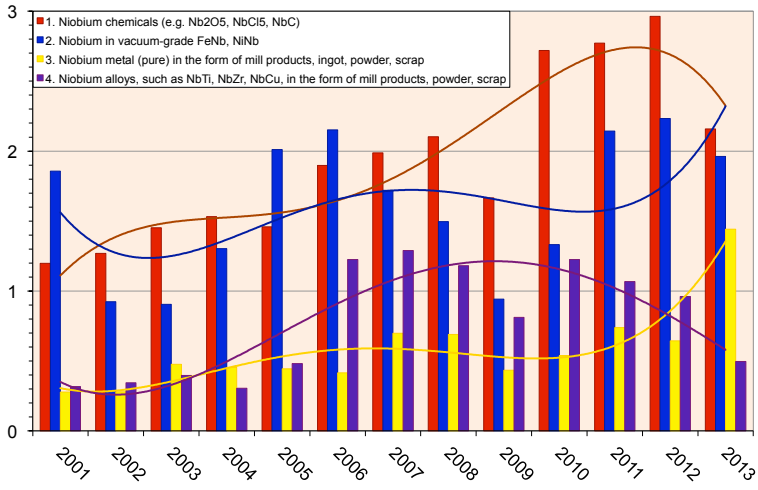

Figure 4 - Niobium processor shipments, without HSLA grade ferro-niobium ('000 mt Nb contained)

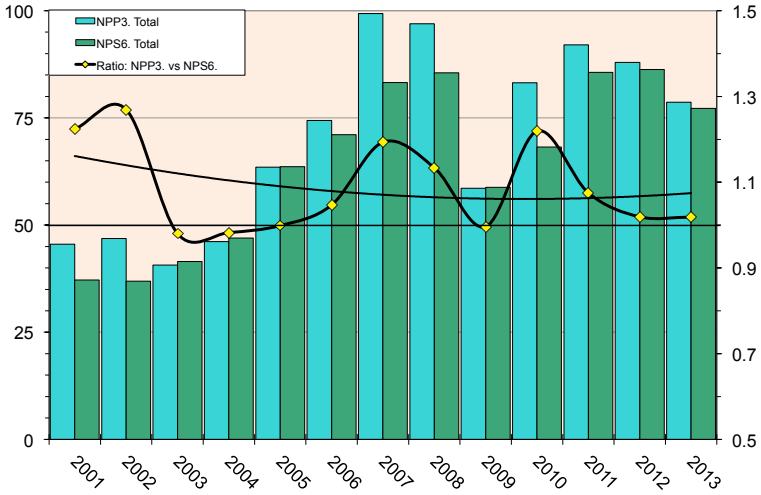

Figure 5 - Niobium primary production *versus* processor shipments ('000 mt Nb_2O_5 contained on the left; ratio on the right)

Comparing the niobium primary production versus the processor shipments, shows closely matching figures for most of the 2001-2013 period (black trend line), 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, with a modest 2% apparent surplus in production both for 2012 and for 2013.

TANTALUM

PRIMARY PRODUCTION

For tantalum primary production there are several key points which distinguish it from niobium:

- Production is broken down into three categories, with tin slag providing 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 more modest contribution from 2009 onwards.

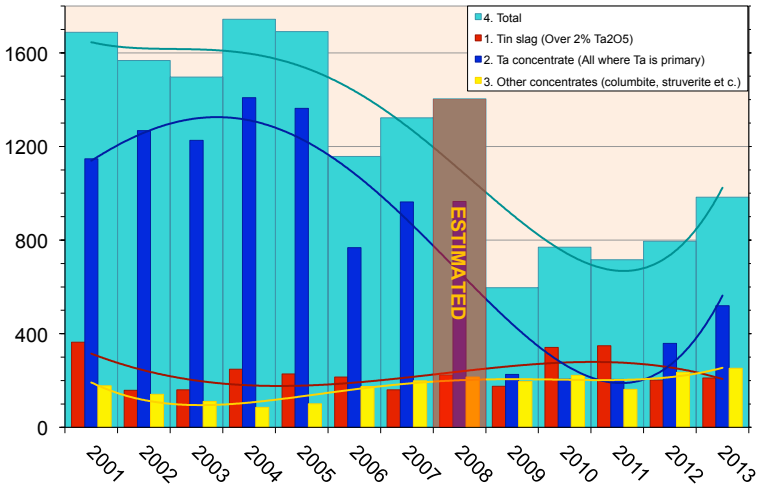

Figure 6 - Tantalum primary production (mt Ta_2O_5 contained)

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 brief return to production by one mine at 50% capacity) opened up the field for an increase in production contributed by artisanal mining sources[7]. Unfortunately, these artisanal mining sources are difficult to capture in the statistics unless purchased by T.I.C. member traders, therefore the total tantalum primary production data for 2009 onwards may at times have covered as little as half of actual production from all sources (*i.e.* both T.I.C. and non-T.I.C.).

Nevertheless, taking the figures as they are, the 2013 distribution of production was approximately 21% for tin slag (down from 25% in 2012), 53% for tantalite (up from 45%) and 26% for other concentrates such as columbite or struverite (previously 30%).

Overall production increased by 24% (building on a previous 11% increase), bringing the total to the highest level since 2008. The increase is mainly due to primary tantalum concentrates climbing by 45% (on top of a surge of 75% the year before), while tin slag recovered by 5% (having fallen by 42% the year before) and secondary concentrates by 8% (on top of a previous rise of 45%).

[7] 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 as this arises from an industrial process.

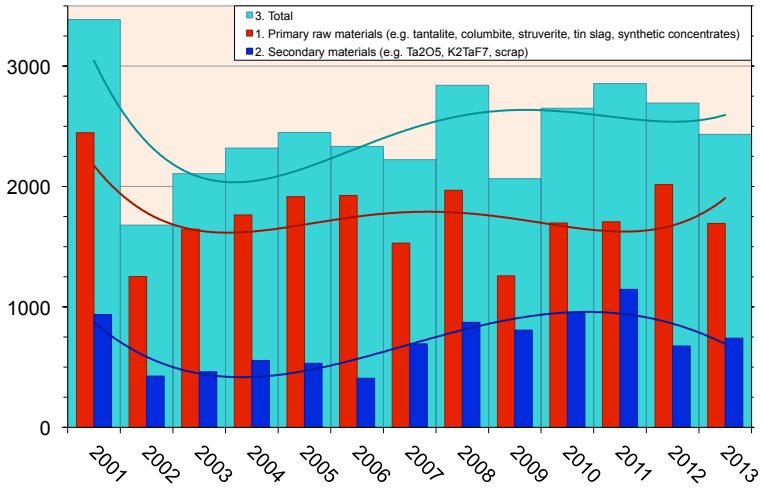

Figure 7 - Tantalum processor receipts (mt Ta_2O_5 contained)

Unlike for niobium, tantalum processors also report their receipts, split into two categories. The first category is primary raw materials which includes all the three categories seen in the previous graph, plus the additional inclusion of synthetic concentrates from recycled scrap. The second category includes all secondary materials, including scrap resulting from external recycling[8].

It can also be seen that the figures for processor receipts are more stable than for primary production, and that there is not a split between pre-2008 and post-2008 figures. In 2013 the breakdown between primary and secondary materials was 70% and 30% respectively, in line with the average for the 2001-2013 period.

Total receipts declined by 10% (further to a previous 6% dip), mainly due to primary raw materials dropping 16% (nullifying the previous 18% gain) and only partially offset by a 9% uptick in secondary materials (following a 41% drop in 2012).

Given the existence of data for tantalum processor receipts, it should be possible to make a better comparison between primary production and processor figures than is possible for niobium. However, as processor receipts of primary raw materials also include synthetic tantalum concentrates, such a comparison should be done with care.[9]

Due to the split in primary production for the pre- and post-2008 periods, we also end up with two separate comparisons when placing them up against the processor receipts. As up until 2008 most primary production was by industrial mining and reported to the T.I.C., the relatively small difference between production and receipts during this period is mainly attributable to receipts of synthetic concentrates, and secondarily to receipts from traders outside of the T.I.C. membership.

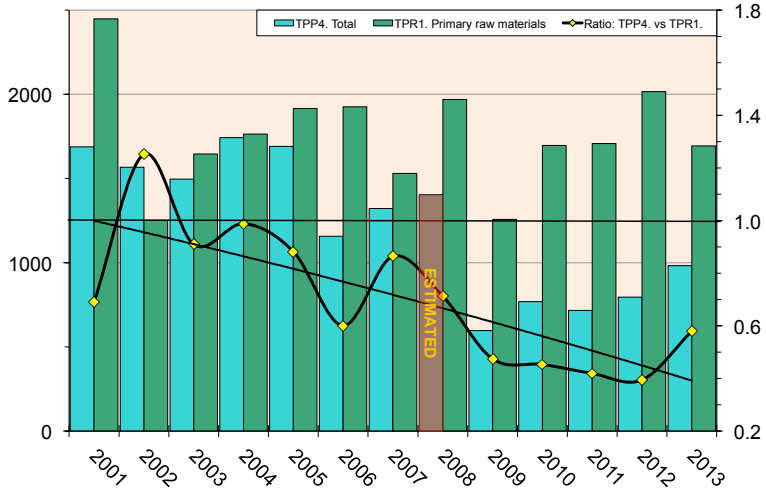

Figure 8 - Tantalum total primary production *versus* processor receipts of primary raw materials (mt Ta_2O_5 contained on the left; ratio on the right)

Post-2008 however, a number of factors came into play around the same time, with increased recycling and generation of synthetic concentrates from scrap, a drop in primary production with the closure of three industrial mines, and also an apparent drop in processor receipts due to the resignation of a major processor. The difference between production and receipts during 2009-2013 is thus accounted for by a combination of increased synthetic concentrates, artisanal mining production, as well as some limited non-T.I.C. industrial production, all three of which not reported in primary production figures.

In 2013 primary production accounted for 58% of processor receipts (up from just 39% in 2012) and the highest level since 2008.

[8] 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.

[9] Synthetic tantalum concentrates are partly generated from tin slags and partly from recycled scrap. Those from tin slags will appear equally in primary production (as tin slags) and equally in processor receipts (whether as tin slags to be converted to synthetic concentrates, or already as synthetic concentrates), so they are not an issue. Those from recycled scrap will not appear in primary production, but are included in the processor receipts of primary raw materials, thus appearing to 'boost' processor receipts.

PROCESSOR SHIPMENTS

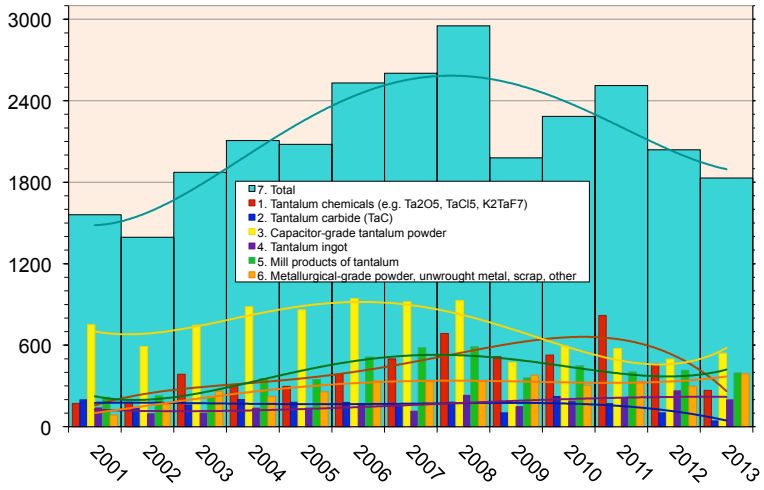

Figure 9 - Tantalum processor shipments (mt Ta contained)

Tantalum processor shipments are sub-divided into six categories, the most important one traditionally being capacitor grade powder with an average 40% of total shipments during 2001-2008. During 2009-2013 capacitor powder has only averaged 25%, which may be attributed to the absence of a processor considered to be a major producer of said powder, with 2013 showing an uptick which could at least partly be due to the return to the membership of said processor.

The distribution of tantalum processor shipments has fluctuated considerably during 2001-2013, with the latest changes from 2012 seeing tantalum chemicals going from 23% to 15% of the total, tantalum carbide from 5% to 2% (the lowest since 2001), capacitor grade powder from 24% to 30%, tantalum ingot from 13% (the highest since 2001) to 11%, mill products from 20% to 22% (almost reaching the peak of 2007), and metallurgical powder and scrap going from 15% to 21% (the highest since 2001).

Overall, shipments are down by 10% (further to a previous 19% drop), with a breakdown of the changes provided below for each category.

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 declined with a drop of 44% and continued this from 2012 to 2013 with a further 42% drop, while tantalum carbide went from a corresponding 40% drop to a further 58% drop. Tantalum capacitor powder dipped 14% and then recovered by 9%, while tantalum ingot peaked in 2012 with a 24% rise and has since dropped again by 25%. Mill products have changed little, nudging up 3% and then down 5%, while metallurgical powder and scrap dipped 10% from 2011 to 2012 and then jumped back by 30% in 2013.

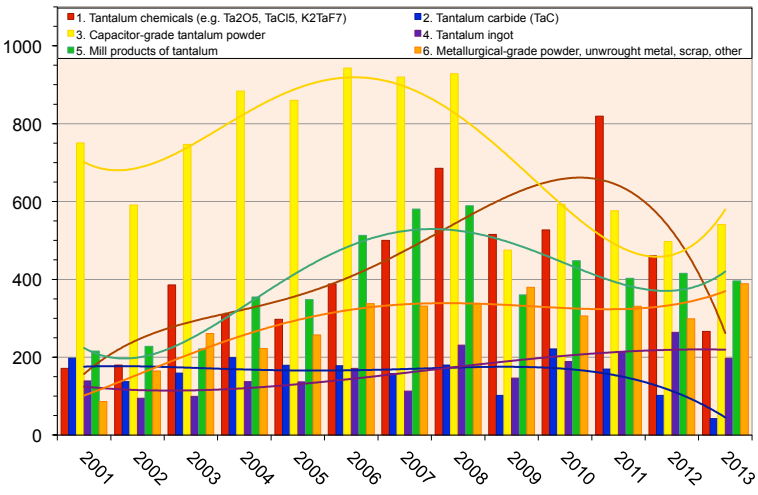

Figure 10 - Tantalum processor shipments (without total) (mt Ta contained)

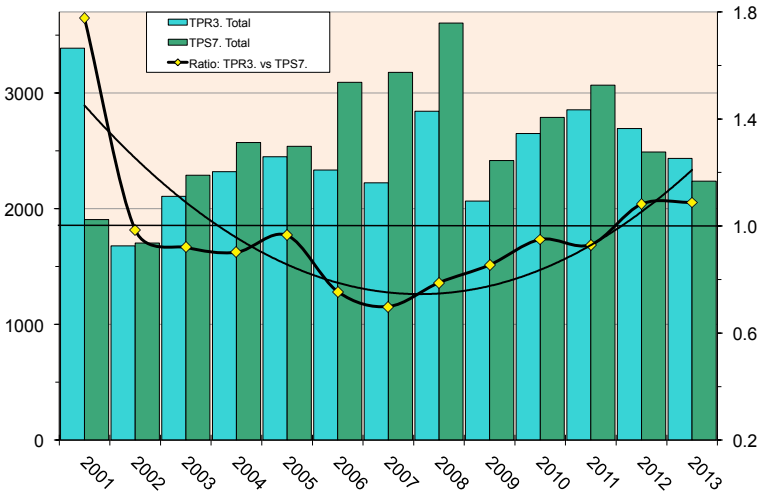

Figure 11 - Tantalum processor receipts *versus* processor shipments (mt Ta_2O_5 contained on the left; ratio on the right)

Being able to compare tantalum processor receipts with shipments, we can see the balance of material entering and leaving the processing stage. There is a clear spike in 2001 showing far more receipts than shipments, which can be attributed to processors overcommitting themselves to purchases of raw materials, followed by an appearance of parity until 2005 as long-term purchase contracts kept the processors stocked. From 2006 these stocks would then have been worked off, leading to a return to near-parity around 2010 onwards.

Overall, for the 2001-2013 period, some 32'000 mt of Ta_2O_5 were received, compared with 34'000 mt Ta_2O_5 in shipments, giving a modest difference of 2'000 mt Ta_2O_5 more shipments than receipts.

If we break this time period down into the segments of 2001-2005, 2006-2009 and 2010-2013, which loosely correspond to the above mentioned turning points that would have been expected to impact on the processor receipts, this shows that for 2001-2005 there was a 930 mt Ta_2O_5 surplus in receipts, while for 2006-2009 this was more than reversed with an apparent 2'800 mt Ta_2O_5 'shortfall' in receipts, and finally for the period 2010-2013 there have been 50 mt Ta_2O_5 more in receipts. This last time period would indicate a near parity in processor receipts and shipments, with 2012 and 2013 showing 8% and 9% surplus in receipts respectively.

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 used in the manufacturing process.

The distribution of capacitor producer receipts has averaged a consistent 85:15 split between powder and wire, with a small fraction for the third category. In 2013 it was 86% powder, 13% wire and 1% for the mill products other than wire.

While capacitor receipts peaked in 2010, since then the volume has declined and from 2012 to 2013 the total has fallen by 22% (down 18% the year before). Powder and wire have individually dropped by 20% and 35% respectively (previously down 16% and 29%).

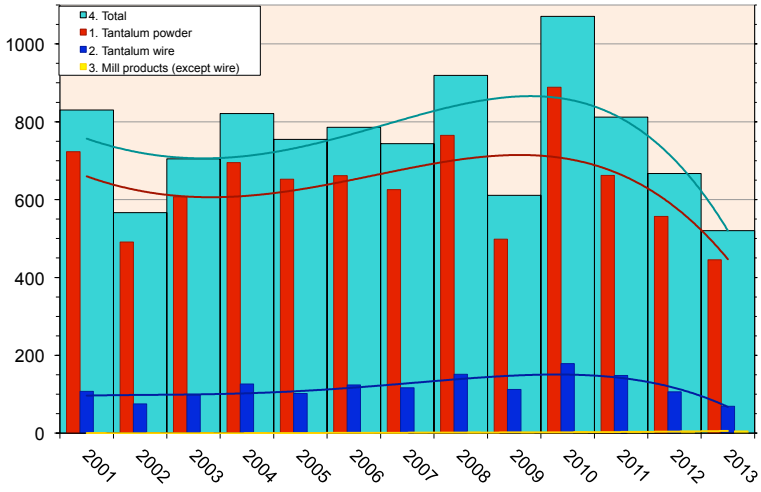

Figure 12 - Tantalum capacitor producer receipts (mt Ta contained)

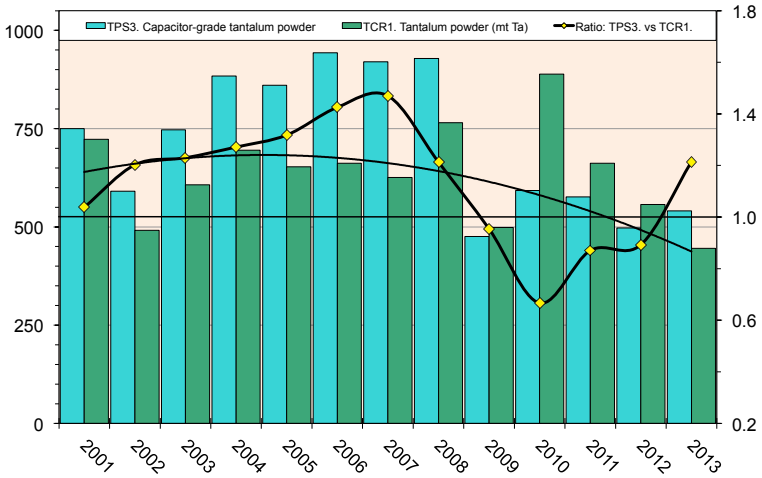

Figure 13 - Tantalum processor shipments of capacitor-grade powder *versus* capacitor producer receipts of tantalum powder (mt Ta contained on the left; ratio on the right)

Having figures for capacitor producer receipts of powder, as well as processor shipments of capacitor powder, we can compare these two sets of figures, which again show two distinctly different patterns before and after 2008.

The 2001-2008 period shows a consistent 'surplus' in capacitor powder production averaging 27%, and this apparent surplus can be attributed to powder being shipped to a number of non member capacitor producers.

This picture changed significantly at the end of 2008 with the resignation of a major capacitor powder producer, after which the surplus appears reversed. In 2013 two things occurred, the T.I.C. regained the same major capacitor powder producer at the same time as losing a capacitor producer, thus once more flipping the balance of figures into an apparent surplus of capacitor powder production, amounting to 21% in 2013.

Within the capacitor producer segment alone, we can compare the receipts of capacitor powder with the receipts of wire, enabling a check of the accepted wisdom that continuing miniaturisation of tantalum capacitors is leading to less and less powder compared to wire. In theory as a capacitor is reduced in size, the powder occupying the three-dimensional volume is reduced faster than the wire terminals used in one-dimensional lengths.

This comparison with 2001-2013 figures shows receipts of capacitor powder decreasing slightly (blue trend line) while receipts of wire have increased slightly (green trend line). Up until 2012, the overall trend (black lines), with minor fluctuation, has been for wire to form an increasing proportion of capacitors. As of 2013 however there appears to be a departure from this established trend, with wire having declined faster than powder and suggesting a greater ratio of powder to wire than would otherwise be expected.

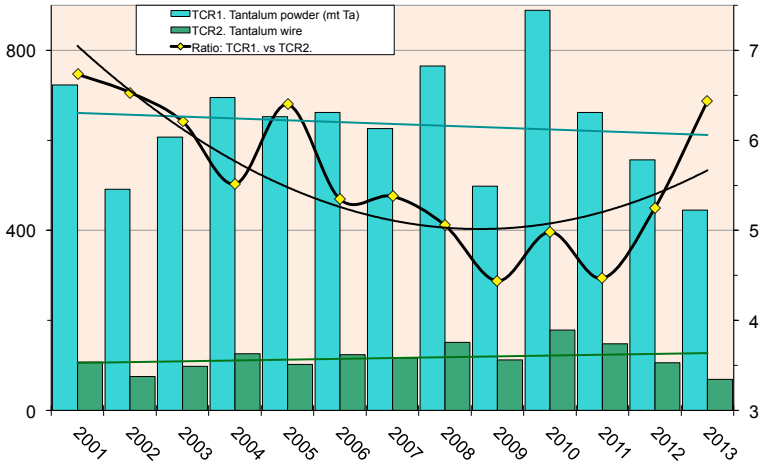

Figure 14 - Tantalum capacitor producer receipts: powder *versus* wire (mt Ta contained on the left; ratio on the right)

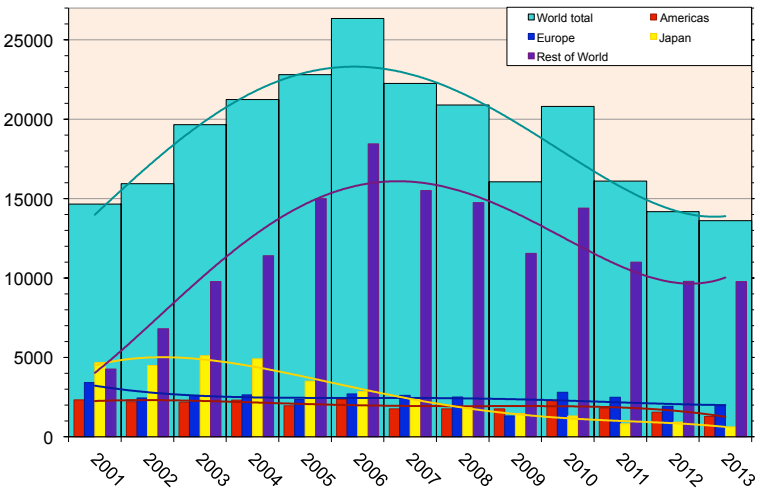

Figure 15 - Tantalum capacitor consumption estimate ('000'000 units)

Capacitor consumption, or the production of capacitors, echoes processor shipments and capacitor producer receipts, with an overall drop from 2012 to 2013 of 4% (further to a 12% drop the year before). Of the individual areas, the Americas declined by 17% (down 14% previously), Europe registered a small uptick of 2% (from being 23% down), while Japan dropped 33% (having previously jumped 13%). The overwhelming majority production in the 'rest of the world' stayed static at -0.2% (having dropped 11% from 2011 to 2012).

Europe's share of the total remained unchanged at 14%, while the Americas dropped from 11% to 9% and Japan from 7% to 5%, with the rest of the world taking up the balance going from 68% to 72% of the total.

STATISTICS CONCLUSION

The niobium primary production for 2013 was on a par with 2006 figures, however showing signs of a rise in the first half of 2014. The same can be said for niobium processor shipments, with output fluctuating around the same level as 2006, again showing an uptick in the first half of 2014.

The distribution of niobium shipments remains consistent across the various categories, with HSLA ferro-niobium continuing to provide the vast majority of demand. There is also a good balance between production and processing activities, with niobium primary production continuing to show a modest apparent surplus on processor shipments, running at 8% in 2013.

For tantalum, primary production figures are the highest of the post-2008 period, almost recovered to the levels of 2006 and continuing upward through the first half of 2014. Tantalum processor receipts have instead been declining since the high point of 2011, although tempered with a levelling off into 2014 and holding at a level which can be considered average for the past ten years, thus showing some stability.

Primary production in 2013 accounted for 58% of processor receipts, again the highest level of the post-2008 period as it combines increased primary production with a dip in processor receipts, and achieving a balance last seen in 2006. Nevertheless this is still an apparent shortfall of some 40%, with the 'missing' material attributable to a combination of synthetic concentrates from scrap and minerals from artisanal mining received from companies which are not T.I.C. members and so not reported in primary production.

Tantalum processor shipments have behaved similarly to processor receipts with a peak in 2011, with 2013 levels having returned to the low point of 2009. On a more positive note half-yearly results show more fluctuation and the first half of 2014 is holding at the average for the past couple of years. Unlike niobium, the breakdown of tantalum processor shipment categories continues to vary from year to year, with capacitor grade powder currently recovering just as tantalum chemicals have been declining, thus balancing out overall tantalum demand.

Despite the recovery in tantalum capacitor powder shipments, the receipts by capacitor producers are showing their lowest level since 2001. In contrast with this, the 21% apparent surplus in capacitor powder for 2013 (with an even higher apparent surplus in the first half of 2014) suggests there is a considerable demand for tantalum capacitor powder outside of the T.I.C. membership.

Meanwhile, to complicate the picture further, within the segment of capacitor producers the traditional trend for powder versus wire that held fast up until 2012, diverged significantly in 2013 due to a steeper decline in receipts of tantalum wire.

And finally to complete colouring in the tantalum capacitor picture, similarly to capacitor producer receipts, the capacitor consumption estimates are also at their lowest level since 2001. The more fine-grained half-yearly figures however show a more nuanced image, with consumption having plateaued for the past three years (2011 H2 to 2014 H1) with little fluctuation.

Overall, the figures for 2013 would challenge even the greatest optimist with painting a rosy picture, the only positive ironically being tantalum primary production which is showing its best performance since 2008. Looking a little ahead to the first half of 2014 does however show an increase in four overall segments (Nb primary production, Nb processor shipments, Ta primary production, Ta processor shipments), while the remaining three remain level (Ta processor receipts, Ta capacitor producer receipts, Ta capacitor consumption), so we may just about be picking up some wind in our sails and heading out of the doldrums.

COMMENT ON 'GAPS' IN TANTALUM

At various points in the text, references are made or implied as to 'gaps' in the T.I.C. tantalum statistics, i.e. that the data are incomplete due to the absence of a number of companies from the membership, even if the data are considered to cover, in most cases, the majority of the volume of tantalum.

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

Nevertheless the author may attempt 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, a gap up to 30% of the actual volume
- tantalum capacitor producers' receipts, a gap up to 25% of the actual volume

While the gap in primary production has reduced somewhat, it remains significant. There is understood to be an industrial mining company which is currently not a T.I.C. member, however its production is intermittent. Most of the 'missing' material is believed to be from artisanal mining.

There is also a considerable gap in capacitor producer receipts, mainly due to the absence from the membership of smaller producers focused on domestic markets which consequently do not see an advantage in joining an international association, but recently also due to a larger international producer.

CONFLICT-FREE SOURCING INITIATIVE: WHERE ARE WE AND WHERE ARE WE GOING?

Paper presented by Michael Rohwer, Conflict-Free Sourcing Initiative (CFSI) / Electronic Industry Citizenship Coalition (EICC), on October 14th 2014, as part of the Fifty-fifth General Assembly, held in New York, U.S.A.

INTRODUCTION

Founded in 2008 by members of the Electronic Industry Citizenship Coalition (EICC) and the Global e-Sustainability Initiative (GeSI), the Conflict-Free Sourcing Initiative (CFSI) has grown into one of the most utilized and respected resources for companies from a range of industries addressing conflict minerals issues in their supply chains.

Our flagship Conflict-Free Smelter Program (CFSP) offers companies and their suppliers an independent, third-party audit that determines which smelters and refiners can be validated as 'conflict-free', in line with current global standards. We also offer our Conflict Minerals Reporting Template (CMRT), which helps companies disclose and communicate about smelters in their supply chains, and we produce white papers and guidance documents on responsible conflict minerals sourcing and reporting on a regular basis.

Over 200 companies and associations from seven different industries participate in the CFSI today, and we regularly collaborate with other complimentary programs and initiatives in this area. We also run a twice-yearly Conflict-Free Sourcing Initiative Workshop, which brings together hundreds of representatives from industry, government and civil society for updates, in-depth discussions and guidance on best practices on responsible mineral sourcing. As more companies work on this issue we hope for a future in which businesses can contribute positively to the fostering of peace and stability in the Great Lakes region.

OUR ACTIVITIES

We provide a variety of tools and resources to support companies to make informed decisions about conflict minerals in their supply chains. These tools and resources are produced by several program areas and the working groups that support those program areas. CFSI programs are led by a Program Director, an Audit Program Coordinator and a steering committee of volunteers from participating companies. All CFSI members are welcome to participate in our various working groups and vote on governance issues.

Our program areas include:

- **Conflict-Free Smelter Program (CFSP)**. Through the CFSP, we identify smelters and refiners that produce conflict-free materials. In order to confirm this status, we use specially trained third-party auditors to independently verify that these smelters and refiners can be deemed conflict-free. A list of smelters and refiners that meet the standards of the audit is published online. The audit standard is developed according to global standards including the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas and the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act.
- **Conflict Minerals Reporting Template (CMRT).** The CMRT is a free, standardized reporting template that facilitates the transfer of information through the supply chain regarding mineral country of origin and smelters and refiners being utilized. The template also facilitates the identification of new smelters and refiners to potentially undergo an audit via the Conflict-Free Smelter Program.
- **Due Diligence Guidance**. Our due diligence working group focuses on producing white papers and other analyses and guidance for companies about best practices and various standards on addressing conflict minerals in the supply chain and reporting. These resources are all available on our website.
- **Stakeholder engagement**. The CFSI engages with a variety of non-governmental organizations, responsible investor groups, governments and multilateral institutions to discuss emerging issues, best practices and work on addressing shared challenges. Our members can regularly engage with stakeholders via the Multi-Stakeholder Group on conflict minerals convened by the Responsible Sourcing Network, and our bi-annual workshops also provide a forum for dialogue with stakeholders.

WHERE ARE WE?

Over 200 companies and associations from seven different industries are part of the CFSI today and take advantage of a range of member benefits. These benefits include:

- **Free access to Reasonable Country of Origin (RCOI) data** and Country of Origin information associated with facilities that are validated through the Conflict-Free Smelter Program.
- **Opportunity to shape industry response** to conflict minerals reporting requirements and other expectations from stakeholders.
- Access to cutting-edge insight, tips and a like-minded community of industry professionals and issue experts **developing solutions by companies, for companies**.
- **Latest information and insight** about the developments on regional issues, various sourcing initiatives, regulatory schemes and more.

- **Discounted attendance fee** for two representatives from your organization at the Conflict-Free Sourcing Initiative twice-yearly workshops.
- **Facilitated engagement with stakeholder groups**, including civil society organizations, socially responsible investor groups, governments and multilateral institutions and to ensure your company and organization have all the relevant perspectives as you make choices about your supply chain practices.
- Ability to **contribute your perspectives to the development of new tools and resources** from the CFSI, such as white papers on conflict minerals due diligence and training on conflict minerals reporting.

The CFSI's membership began as the members of the EICC and GeSI, but broadened to other industry sectors as the economy-wide impact of conflict minerals became evident. In the fourth quarter of 2013, the CFSI's members included all of the EICC's 90 members, GeSI's 30 members, and around 25 members outside of the EICC and GeSI. That is nearly 150 companies. Now, one year later, the total number of companies in the CFSI is over 220! The EICC and GeSI have both grown, to 100 and 33 members respectively, as of October 2014. Meanwhile, the CFSI has blossomed to over 80 members beyond its founding organizations! This impressive rate of growth reflects the interest companies beyond the electronics sector have taken in responsible mineral sourcing. CFSI members represent companies in the electronics, aerospace, apparel, automotive, equipment, general manufacturing, jewelry, medical, retail, and even extractives industry sectors whose products are sold in every country in the world.

Initiative actives and value all revolve around the CFSP. The first smelter compliant to the CFSP's audit protocol and procedures had its sourcing validated as Conflict-Free in 2010. About one year ago, in the autumn of 2013, we were excited to report that 70 smelters or refiners had already undertaken the CFSP audit or had contractually agreed to do so. Of those 70, 46 were already compliant. Over this last year, we added 76 more smelters to the active list and 102 smelters are complaint and determined to be Conflict-Free, as of October 2014. That represents more than doubling in one year!

This growth is supported by a critical, professional staffing structure and representative governance. Mid-2013 the CFSI brought on its first staff member to help organize, lead, and facilitate the hard work that numerous member-company volunteers have contributed. One year later, to manage the initiatives' numerous activates, CFSI staff has grown to 3 full-time employees! Do not let this diminish the invaluable contribution that volunteers played in establishing the CFSI and still provide in expertise, research, outreach, and general support. Without the volunteers, we would not be where we are today!

WHERE ARE WE GOING?

The CFSI's progress is impressive, but there is always room to grow. Increased attention, participation, and engagement have led us to pursue a CFSP that more closely aligns to international norms and expectations. This includes developing an audit program operations manual that explicitly addresses accountability, impartiality, liability, grievances and complaints, and credentialing. We anticipate this manual to be available in 2015.

Meanwhile, we continue to refine the audit's protocols. A more standardized, readable, and comprehensible audit protocol for all four minerals is expected in early 2015. Akin to the operating manual, the CFSP is also working toward adhering more closely to international norms by adopting a risk-based approach to assessment aligned to the OECD Due Diligence Guidance on Responsible Mineral Sourcing from Conflict-Affected and High-Risk Areas.

As the CFSP matures, the CFSI looks forward to growing its member base through aggressive outreach and marketing to companies that rely on our work without joining the initiative. Membership in the CFSI not only includes all the benefits listed above, but also is a critical element to companies' adherence to the OECD Due Diligence Guidance. Step 4 of the Guidance states that companies should either audit their smelters or refiners sourcing, or rely on an industry scheme to do so. Today, our partners in the London Bullion Market Association (LBMA) and Responsible Jewellery Council (RJC) help validate gold refiners' responsible sourcing, but the CFSP is the only program to audit tantalum, tin, and tungsten (3T). We plan to encourage all 3T users to join the CFSI to meet their Step 4 expectations and better market our benefits.

CONCLUSION

We are very proud of everything we have accomplished since 2008. However, there is still a lot of work to do. We remain dedicated to helping companies make more informed choices about conflict minerals in their supply chains and to enable companies that choose to do so, to source responsibly from conflict-affected areas. We look forward to growing over the next years and we are eager to have you join us!

MEMBER COMPANY NEWS

NEW MEMBERS

Eight companies were elected to membership by the Fifty-fifth General Assembly:

Buss & Buss Spezialmetalle GmbH
Address: Sassnitzer Strasse 10, 18551 Sagard, Germany
Nominated delegate: Mr Dag-Peter Buss
Tel.: +49 38302 56360, Fax: +49 38302 563636
e-mail: buss@buss-spezialmetalle.de
Website: www.buss-spezialmetalle.de

D Block Metals LLC
Address: 1111 Jenkins Road, Gastonia, NC 29052, U.S.A.
Nominated delegate: Mr Craig Hafner
Tel.: +1 908 238 2600, Fax: +1 855 851 2815
e-mail: craig@dblockmetals.com
Website: www.dblockmetals.com

Guangdong Zhiyuan New Material Co., Ltd.
Address: Qiaotou Town, Yingde City, Guangdong Province, China 513056
Nominated delegate: Ms Belinda Huang
Tel.: +86 763 2706268, Fax: +86 763 2706293
e-mail: belindahuang@jycmetal.com
Website: www.jycmetal.com

ICD Alloys & Metals
Address: 3946 Westpoint Blvd., Winston Salem, NC 27103, U.S.A.
Nominated delegate: Mr Ian Machent
Tel.: +1 336 793 2222, Fax: +1 336 793 2273
e-mail: ian@icdalloys.com, steve@icdalloys.com
Website: www.icdgroup.com

Krome Commodities Limited
Address: 23 Ashburton Avenue, Ilford, Essex IG3 9ET, England
Nominated delegate: Mr P.S. Mony
Tel.: +44 7771 788256, Fax: +44 203 7193106
e-mail: psmony48@gmail.com
Website: www.kromecommodities.com

Nanoscale Powders LLC
Address: 60 South Street, Suite 1120, Boston MA 02111, U.S.A.
Nominated delegate: Mr Andrew Matheson
Tel.: +1 617 459 2627
e-mail: andrew.matheson@nanoscalepowders.com
Website: www.nanoscalepowders.com

Paumanok Publications, Inc.
Address: 502 Ballad Creek Court, Cary, NC 27519, U.S.A.
Nominated delegate: Mr Dennis Zogbi
Tel.: +1 919 468 0384, Fax: +1 919 468 0386
e-mail: info@paumanokgroup.com
Website: www.paumanokgroup.com

Solar Applied Materials Technology Corporation
Address: No. 1, Gongye 3rd Rd., Annan District, Tainan City 70955, Taiwan
Nominated delegate: Dr Chien-Yung Ma
Tel.: +886 6 5110123 Ext. 6315, Fax: +886 6 6001201
e-mail: harryliao@solartech.com.tw
Website: www.solartech.com.tw

RESIGNATIONS

The following companies have resigned from the association: *African Mining Metallurgical Group (AMMG), Fogang Jiata Metals Co. Ltd, Morimura Bros. Inc., Niobec Inc., Pacific Ores Metals and Chemicals Ltd, Sanyo Electric Co. Ltd and Tantalite Resources (Pty) Ltd.*

CHANGE IN COMPANY NAME

The following change was announced at the General Assembly:
ATI Wah Chang has changed name to **ATI Specialty Alloys & Components**.

TRANSFERS OF MEMBERSHIP

The Fifty-fifth General Assembly approved the following transfers of membership:

From AVX Ltd to
AVX Corporation
The delegate to the T.I.C. remains Mr William Millman.
Contact details for the company are:
Address: 1 AVX Boulevard, Fountain Inn, SC 29644, U.S.A.
Tel.: +1 864 228 8852
e-mail: bill.millman@avx.com

From White Solder Ltda to
ECO White Comercio de Sucatas Ltda
The delegate to the T.I.C. remains Mr Ricardo Torrente.
Contact details for the company are:
Address: Rua Peru 1789, Vila Mariana, 14075-310 Ribeirão Preto, SP, Brazil
Tel.: +55 16 3512 5835
e-mail: gerentegeral@ecowhite.com.br, administrativo1@ecowhite.com.br

CHANGES IN MEMBER CONTACT DETAILS

Anglo American Nióbio Brasil Ltda.
Mr Frank Jackel has become the delegate to the T.I.C. for Anglo American Nióbio Brasil Ltda., instead of Mr Fabio Prieto. His e-mail address is frank.jackel@angloamerican.com.

ATI Specialty Alloys & Components
ATI Specialty Alloys & Components has nominated Mr James Stearns as delegate to the T.I.C., in the place of Mr Tony Nelson, who is retiring. He can be reached on james.stearns@atimetals.com.

Commerce Resources Corp
Mr Chris Grove has become the delegate to the T.I.C. for Commerce Resources Corp, in the place of Mr David Hodge. His e-mail is cgrove@commerceresources.com.

H.C. Starck Ltd
H.C. Starck Ltd has nominated Mr Marc Hüppeler to represent the company within the T.I.C., in the place of Mr Yasukazu Muto. He can be contacted on marc.hueppeler@hcstarck.com.

Thailand Smelting & Refining Co Ltd
The new delegate to the T.I.C. for Thailand Smelting & Refining Co Ltd is Mr David Wilkinson, in the place of Mr Nicholas Thorne. He can be reached on david.wilkinson@thaisarco.com.

EXECUTIVE COMMITTEE

© Ulric Schwela

The Executive Committee of the T.I.C.
meeting in New York on Sunday October 12th 2014

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 13th 2014, and it currently consists of (in alphabetical order):

- Conor Broughton — conor@amgroup.uk.com
- John Crawley — jcrawley@rmmc.com.hk
- David Gussack — david@exotech.com
- Dale Gwinnutt — dalegwinnutt@elitematerial.com
- David Henderson (President) — dhenderson@rittenhouseir.com
- Marc Hüppeler — marc.hueppeler@hcstarck.com
- Jiang Bin — jiangb_nniec@otic.com.cn
- Ian Margerison — ian.margerison@metalysis.com
- William Millman — bill.millman@avx.com
- Daniel Persico — danielpersico-rc@nec-tokin.com
- Itamar Resende — itamar.resende@mtaboca.com.br
- Alexey Tsorayev — tsorayevaa@ulba.kz