Dear friends and members of the T.I.C.,

At the time this quarterly bulletin comes to your attention, a successful 2006 for the T.I.C. has come to an end. The last year was successful in many respects:

- We were able to achieve record membership for the association with 96 members.
- We had a most successful General Assembly at Innsbruck with excellent participation.
- We continued our joint work with the IAEA in the hope of overcoming the issue with raw material transportation.
- We finally succeeded in hiring a new Secretary General, who will follow Judy after her retirement.

This of course will automatically lead me to express my sincere thanks to everybody who contributed to these successes.

- To Plansee as generous hosts for the Forty-seventh General Assembly at the beautiful venue of Innsbruck.
- To Judy and Ulric for all of their seen and unseen work.
- To the member colleagues of the Executive Committee for spending their time in helping to run the association.
- And last but not least to my old friend Bill Millman, who not only did an outstanding job in serving the T.I.C. as President for two consecutive years but also did the ground work in finding a new Secretary General.

In addition I would like to welcome two new members to the Executive Committee, Larry Stryker and Richard Burt; we all look forward to their valuable contribution for the association.

Finally, I would like to wish all of you a Merry Christmas and a Happy New Year. I hope that you all will enjoy a peaceful time with your family and friends.

Axel Hoppe
President

The Tantalum-Niobium International Study Center held a conference in Innsbruck, Austria, from October 15th to 17th 2006, including the Forty-seventh General Assembly of the members.

Technical sessions took place on October 16th and 17th. The paper presented by the T.I.C. Technical Promotion Officer is printed in this issue of the Bulletin, and some of the other papers will be published in the coming editions.

A splendid gala dinner, hosted by Plansee SE and the T.I.C., was held in the Riesensaal of the Imperial Palace of Innsbruck for all the delegates and guests and their ladies. Musical entertainment played by a string quartet was most appropriate to Mozart year and the historic and elegant setting. The programme was completed by a Reception at the Hilton Hotel, where the meeting sessions took place and the delegates were warmly welcomed and comfortably accommodated, and by sightseeing tours.

Eight companies were elected as new members of the association, bringing the total membership to 96. The names are printed in the section of this Bulletin covering member company news.

Dr Axel Hoppe was elected as President of the T.I.C. for the coming year, succeeding Mr. William Millman who had served for two years. Mr. Richard Burt and Mr. Lawrence Stryker were elected to the Executive Committee, and Mr. Jose Isildo de Vargas, Mr. He Jilin, Mr. Michael Herzfeld, Mr. William Millman, Mr. David Reynolds and Mr. William Young were re-elected to a further term of office.

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Tantalum-Niobium International Study Center
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The T.I.C. is an association internationale under Belgian law.
The T.I.C. Executive Committee recently discussed and agreed to 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 in comparison with the statistics for the preceding five years. The data collected are considered to cover the vast majority of material in terms of quantity.

The T.I.C. capacitor statistics will not be affected, that process will continue on a quarterly basis as before. It has however been proposed that a category should be added to the capacitor producers' receipts, namely: 'Mill products (except wire)'. This category would include such items as vacuum furnace parts, shields, screens, trays, heater pins and elements, cans, seals and headers, micro chip plates, foil for wet capacitors, and would help complete the picture of the receipts by capacitor producers.

The T.I.C. Executive Committee recently discussed and agreed to change the way in which T.I.C. statistics on production and processing are collected. Forms will be sent out electronically and every quarter. Reports from the members will be required to be sent every quarter to the independent auditor collecting the figures. The auditor will not release any figures until two quarters have been received, therefore the totals will be released every six months as before, after June 30th and December 31st. It is hoped this will make the statistics collection process more regular and less a burden for the members each time.

The total raw material supply indicates ample capacity to meet current demand. For the time being, stocks held down-stream may mean the production capacity is not fully utilised.

The T.I.C. statistics reporting; it is unlikely that the difference is due to tantalum primary production outside of T.L.E. but the whole process still takes more time than necessary. The opinions and views of member companies on how to improve statistics collection are always welcome, even if it is not always possible to act on all suggestions made. While the reporting of company statistics is a confidential one-way process, the discussion of the process itself should be a two-way engagement.

Greenbushes mine has been closed and at its Wodgina mine the company is focussing on improving efficiency. New sources of tantalum (such as those of Commerce Resources, Gippsland and Tertiary Minerals) are due to come on stream and are expected to lead to greater competition among primary producers.
due to the time delay in production figures manifesting themselves in receipts, as the trend is present over a longer period of time and regardless of whether figures are rising or falling. The drop in production figures can also not simply be explained by processors working off their stock, as the receipts figures remain buoyant.

Nearly half of tantalum output is in the form of capacitor-grade powder, therefore the total tends to follow the fortunes of this category’s application (figure 4). In 2001-03, capacitor manufacturers worked off excess stock accumulated in 2000, and they are understood to be preparing to order greater quantities of metal powder again.

When looking at the picture without capacitor-grade powder, as in figure 5, we can see that the category of mill products is now the next most important to that of capacitor powder. Wire for capacitors is included in the category of mill products and tends to follow the same trend as capacitor powder.

Tantalum chemicals have varied considerably over the years covered by this graph, and peaked in 2003, but in general over the five year period they have shown a steady increase, so that the category of chemicals is the largest total of the period. This can chiefly be attributed to the production of oxide for lenses and audio filter applications.

Tantalum carbide and ingot have both been fairly steady over the five years; the former is employed for tool manufacture and the latter for sputtering targets and as an alloy additive.

Finally, the remaining category encompasses all other products and these ‘others’ have shown remarkable growth. Some uses of metallurgical grade powders and unwrought metal are the making of furnace parts or conversion into carbide.

It is interesting to compare processors’ receipts against their shipments (figure 6) as it shows a marked difference between 2001 and the following four years. If 2001 was a year of purchasing and accumulation, the following years then show a consistent disposal approach, shipping more material than is bought in until stocks reach the desired levels.

Tantalum capacitors are the best components for a number of electronics applications, however they still suffer to some extent...
from the reaction of some companies which phased them out in 2000 and 2001, replacing them with less ideal substitutes due to the poor image resulting from the perception of shortage created in 2000.

Comparing the processors’ shipments of capacitor-grade powder against the capacitor producers’ receipts of the same (figure 8), we note that there is a tendency for the processors’ shipments to be greater than the receipts of powder by the makers of capacitors, and that the difference is increasing. This could be due to an increasing quantity of capacitor-grade powder being shipped to capacitor manufacturers outside the T.I.C. members which report statistics, which could in turn be a result of the continuing shift of capacitor production to countries categorised as ‘rest of the world’ as is shown in figure 11 relating to consumption. The sharp drop in the second half of 2001 may be due to a combination of factors: orders for powder contracting sharply after the sudden increase in 2000; or an unusual time lag between the ordering and shipping and the date of receipt.

As capacitor wire production is only a part of the tantalum mill products category, a direct comparison is not useful. However, it is interesting to note (figure 9) that the proportion of wire receipts as a part of mill products is steadily decreasing, as is shown by the ratio line steadily rising. Because of the multiple applications for mill products, the ‘blip’ in the line in the first half of 2002 can not be explained with certainty, but could, at least partly, be attributed to the lowest point in capacitor producers’ receipts happening to coincide with a peak output in mill products for other applications.

Figure 10 shows the manufacturers’ receipts of powder and of wire, and the ratio of the weight of powder to wire. We are often reminded of the increasing CV capacity of tantalum capacitors and the shrinking format or volume of the same. This logically results in a decreasing amount of tantalum powder per capacitor, while the amount of tantalum wire required is less dependent upon the size of the capacitor. Instead it tends to be related to the number of capacitors produced, with the result that while the number of capacitors produced is increasing the amount of tantalum wire required also increases, whereas the amount of tantalum powder required may only increase a little – or it may remain the same, or even decrease. This is demonstrated by the ratio of powder to wire tending to decrease.

Estimates of tantalum capacitor consumption are shown in figure 11. The tantalum capacitor consumption figures have been increasing almost continuously since 2001 and have topped 25 billion units in the 12 months up to June 2006. As mentioned earlier, the trend in consumption shifting towards the ‘rest of the world’ continues, however it is worth noting that since the second half of 2001 the consumption levels for Europe and North America have essentially remained steady. Japan has had a recent decline and these latter three areas are now almost equal to each other in terms of units produced.

NIOBIUM
PRIMARY PRODUCTION

T.I.C. statistics for primary production of niobium materials are shown in figure 12. After ‘9/11’ in 2001, a slump in aerospace, automotive and civil engineering (construction) industries took hold and slowed niobium consumption. This slump gradually worked its way back to the production end and prompted reduced output by 2003. The 2001 peak output of niobium obtained in association with tantalum can be attributed to the surge in tantalum demand at that time.
Production of concentrates has remained steady until the second half of 2005, when a leap of approximately 35% in output took place in response to demand from industry. A large increase in capacity has been brought on stream, mainly due to the steel industry running at full capacity and prompting an increase in providing value-added products, which in turn promoted the use of niobium. The production has mainly gone into the oil and gas industry for pipelines, both for new projects and for replacement of old pipes. An increase in automotive production has also stimulated a need for steel, particularly in the Chinese market.

Looking briefly at the contribution of other niobium-containing sources in the absence of the primary concentrates (figure 13), we can see that it is slowly decreasing and currently accounts for less than 0.5%.

**PROCESSORS’ SHIPMENTS**

Pure niobium metal and niobium alloys are used in superconducting magnets, magnetic resonance imaging (MRI) and the chemical industry. Two recent particle acceleration projects account for the use of significant quantities of niobium: construction of the Large Hadron Collider (LHC) was recently completed after several years and used 7000 km of NbTi wire; whereas the International Linear Collider (ILC) about to be constructed will require over 500 tonnes of pure niobium, more than the entire pure metal production of the peak year of 2003; construction will, as for the LHC, be spread over several years. Pure niobium metal shipments have remained fairly steady, while niobium alloys NbTi, NbZr and NbCu remained steady until the...
first half of 2005 but since then they have roughly doubled every six months.

Comparing primary production with processors' shipments (figure 16), it can be seen that there has been a tendency for production to exceed processors' shipments. The years 2003 to 2005 showed a very minor 'deficit' in production which is now compensated for. A quick glance at tantalum figures shows this to be quite common for that element, even when comparing processors' receipts and shipments directly. We are unable to make the same comparison with niobium as processor receipts figures are not collected and we cannot see if any such difference is made up by other sources or scrap recovery.

STATISTICS SUMMARY

Tantalum shipments are rising steadily and applications are on the increase; the raw material supply picture is more than adequate for current uses, and new sources are due to come on stream.

Niobium shipments have surged recently and production of raw materials has been increased to match.

TRANSPORT COMMITTEE

The project concerning difficulties encountered by companies wishing to transport tantalum raw materials has progressed significantly. The consultants SENES (Specialists in the fields of Energy, Nuclear, and Environmental Sciences) have completed a report based on surveys of the levels of radioactivity of consignments shipped by member companies. Possible next steps and developments are under discussion.

Members of the Transport Committee are David Cross, Ernst-Joachim Martin, Kevin O'Keefe and Paul Rutter for member companies, Douglas Chambers and Leo Lowe for the consultants, Judy Wickens and Ulric Schwela as T.I.C. staff. David Reynolds and Bill Millman remain included as they have recently served as President, and Axel Hoppe will also be a member ex officio as the new President of the T.I.C.

In May 2006 Michael Tomlin left Sons of Gwalia and thus also the Transport Committee, which lost a very experienced contributor. We are grateful to Kevin O'Keefe for taking his place and becoming an active member of this Committee, and to all the Committee members for their continuing efforts, participation and support.

Since October 2005 and the time of the last General Assembly, the Transport Committee has been very active and we are pleased to be able to report considerable progress.

STUDY PROJECT

In November 2005, the practical work on the study of radioactivity levels and analyses of shipments of tantalum raw materials was completed. Our consultants SENES used the observations and results to compile the report, submitting a draft of well over 100 pages for the consideration of the Transport Committee members in January 2006. The all-important conclusions to the SENES report were then drafted and considered with great care by the members of the Committee. A final draft of the report was provided on October 12th.

CO-ORDINATED RESEARCH PROGRAMME

The Co-ordinated Research Programme (CRP) on Naturally Occurring Radioactive Materials (NORM) is now scheduled to commence in March 2007 at the International Atomic Energy Agency (IAEA). The starting date originally set for July 2006 was postponed by the IAEA for administrative reasons. However, a preliminary 'ad-hoc' meeting is to take place at the IAEA in Vienna from November 13th to 17th 2006, and the Technical Promotion Officer will attend together with Dr Doug Chambers from SENES. The purpose of this meeting will be to compare the work already done and the future work proposed by the various participants, prior to the CRP starting officially.

As the study project is to be put forward to the IAEA as a contribution for the CRP on NORM, the T.I.C. is consulting the IAEA on the use which may be made of the report in other spheres, and a decision on this is expected in November. Without compromising our good relations with the IAEA, we shall seek to obtain authority to use the SENES report elsewhere at the T.I.C.’s discretion.

Much work remains to be done by the Transport Committee, not least the steering of the report through the NORM CRP and its wider distribution and presentation at appropriate conferences, but also providing the IAEA with practical and sensible input into how to handle the requirements for transport, if and when we are able to get the limits changed.

DENIAL OF SHIPMENT

The IAEA has become concerned by the reports which have reached it from companies and organisations encountering increasing problems raised by transport companies refusing to carry radioactive shipments even though the shipments conform to the regulations for such material. The T.I.C. was invited to take part in a meeting on Denial of Shipment at the IAEA in May 2006. In April, in preparation for this, the Technical Promotion Officer and the Secretary General conducted a fact-finding exercise among T.I.C. members and also maritime carriers. Members were asked to report cases where they had tried to place business with transport companies and the request had been refused, or the proposed journey had been made so difficult that the member had abandoned the attempt. Twenty possible maritime carriers were identified, and routes which might reasonably be used for tantalite and which appear to be served by these carriers were selected. The firms were then asked to quote for transporting a container of 20 tonnes of tantalite with a level of radioactivity between 10 and 20 Bq/kg, that is, very low level but considered as Class 7. Of the 20 companies, eight did not reply, 11 declined for a variety of reasons or for no given reason, one entered into correspondence about details of the load but in the end no quotation was obtained. This information was given to the IAEA meeting on Denial of Shipments in our presentation in May.

The meeting in Vienna dedicated to the issue of Denial of Shipment was attended by about 50 delegates and was intended to raise the profile of this issue in general, as it included a session briefing the permanent missions to the IAEA on the issues involved. In one of the working groups the Technical Promotion Officer helped define the terms of reference and structure of a new body called the Steering Committee.

STEERING COMMITTEE

The International Steering Committee on Denial of Shipment of Radioactive Material was endorsed by the IAEA’s Director General and approved at its General Conference in September, with the express intent of facilitating the transport of radioactive materials. Its objective is to ‘serve as a mechanism to facilitate the
coordination of a comprehensive international work plan of activities conducted by the organisations of the Committee membership related to delays and denials of shipments of radioactive material. It is intended to be a high profile body and should include senior government officials. The T.I.C. has been invited to represent industrial ores on the Steering Committee, providing us with the most significant opportunity yet for influencing the decision makers at a political level. Data made available to the Committee will be treated as confidential. The first meeting was to be convened in November 2006.

IMO

The International Maritime Organisation (IMO) has resolved that its member states should assist with the facilitation of transport of radioactive material which conforms with the requirements of international regulations. The Technical Promotion Officer attended a meeting of the Facilitation Committee of the IMO in July as part of a UK delegation, which helped to build a bond with the UK Maritime and Coastguard Agency, and he joined a correspondence group assisting the IMO with resolving Denial of Shipment. This group then worked on the elaboration of a flow sheet to track shipping problems from the initial refusal to accept a load through stages of information and explanation until the material was transported or finally refused. The relevant authorities and organisations would be made aware of the difficulties encountered and the reasons for refusal advanced by firms denying shipment.

CONFERENCES

Early in October a paper on transport problems of the tantalum industry was presented by the Technical Promotion Officer at a conference on 'Radioactive Transportation' with the intention of bringing our point of view before a wider audience, maintaining the position of the T.I.C. and reminding the authorities of the problem. The two main difficulties were emphasised: whether the current regulations are appropriate to the level of risk from tantalum raw materials, and, given that current regulations apply, means of dealing with denial of shipment. The evidence of denial of shipment was described, with the solutions tested so far (i.e. communication and education), and proposals for future solutions. The paper affirmed the need for all the stakeholders to be involved in discussion, such as the shippers, the carriers, the regulators. The organisers of this conference are planning an event concerning NORM in March 2007.

ASSISTANCE

One T.I.C. member contacted the Technical Promotion Officer directly for assistance in resolving shipping problems being experienced with low-level radioactive tantalum/niobium raw materials. In one instance there was success in having a restriction lifted, after a local authority had stopped a shipment and it was engaged in discussion about the applicable regulations. Direct intervention in support of the member company resulted in the release of the shipment.

GALA DINNER IN INNSBRUCK

The ladies
Courtesy of Rayce and Mark Gussack

Riesensaal, Hofburg

Musicians "Vicebravi"
MEMBER COMPANY NEWS

The following companies have resigned from membership since the last General Assembly:

Furisa
Mitsubishi Development

The companies elected to membership by the Forty-seventh General Assembly were:

Abinger Trading Ltd
P.O. Box 22657, 1523 Nicosia, Cyprus.
Tel.: +357 2242 9442 • Fax: +357 2242 9449
e-mail: metalman1@mail.gr

Elite Material Solutions Ltd
5 Marche Close, Caddington, Bedfordshire LU1 4EZ, England.
Tel.: +44 1582 418423 • Fax: +44 1582 418483
e-mail: info@elitematerial.com

Gippsland Limited
Post Box 352, Nedlands, WA 6009, Australia.
Tel.: +61 8 9389 8611 • Fax: +61 8 9389 8612
e-mail: info@gippslandltd.com
Web site: www.gippslandltd.com

Jiujiang Jinxin Non-ferrous Metals Co., Ltd
Room 401, Unit 3, Building 1, District A, Langxi Garden, Changhong Road, 258#, Jiujiang City, Jiangxi Province, China.
Tel.: +86 792 8533181 • Fax: +86 792 8522511
e-mail: jiujiang_jx@yahoo.com, janny@jiujiangjx.com
Web site: www.jiujiangjx.com

Rexwell Mining Company Limited
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P.O. Box 79872, Dar-Es-Salaam, Tanzania.
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Stapleford Trading Limited
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Web site: www.staplefordtrading.co.uk

Tantalite Resources (Pty) Ltd
Muirfield, Fourways Golf Park,
Roos Street, Fourways, 2055, Sandton, South Africa.
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e-mail: gary.marcx@tantalitesa.co.za

Wasser LLC
830 Snowdoun Chambers Road, Snowdoun, Alabama 36105, U.S.A.
Tel.: +1 334 221 9736 • Fax: +1 334 264 9738
e-mail: michellewssw@aol.com

Cabot Supermetals
Cabot Corporation reported net income for its fourth quarter fiscal 2006 compared with a loss in the equivalent quarter one year earlier. The Supermetals business continued its transition from ‘fixed price, fixed volume’ contracts to market based arrangements, with ‘significantly lower prices’. Costs had been reduced, by eliminating jobs and by decreasing inventory, and assets had been written off in the year. CEO Kennett Burnes said he was confident that the company was positioned to withstand disruption due to the volatility of energy prices on a long term basis, and anticipated growth in demand overall.

Cambior
The acquisition of Cambior, operator of the Niobec Mine in Canada, by lamgold was completed on November 8th 2006. On November 16th, the new owner announced increased sales at Niobec for the third quarter of 2006 compared with the corresponding period in 2005. Higher volumes were sold and average sales prices were higher, it reported, due to ‘favourable market conditions prevailing in the niobium industry’.

Gippsland
Gippsland announced on November 13th 2006 that it was terminating on November 23rd the mandate of the International Finance Corporation, a member of the World Bank Group, as Lead Debt Arranger for the Abu Dabbab Tantalum-Tin Project in Egypt, an appointment dating from March 2006. On November 27th Gippsland appointed Linden Advisory & Consulting Services, based in Frankfurt, as Financial Advisor to assist in arrangement of finance for the project, and was expecting the completion of a technical and financial review of the Abu Dabbab feasibility study and Information Memorandum for investors and banks.

H. C. Starck
On November 23rd 2006, Bayer announced the successful conclusion of its auction process to sell the H.C. Starck companies; these would be sold to a financial consortium formed by Advent International and The Carlyle Group. Advent and Carlyle intended to ‘continue developing the H.C. Starck business, with the aim of positioning the company for an initial public offering in three to five years’, said Carlyle’s Managing Director. The General Manager of the Advent International commented that H.C. Starck ‘not only holds leadership positions in its markets, but also has enormous growth potential, both in existing and prospective business areas’. Dr Heinz Heumüller of Starck described Advent and Carlyle as ‘ideal partners for our future expansion’.

We were very sad to learn of the death in November 2006 of Dr Wilfried Rockenbauer, formerly of H.C. Starck.

DLA/DNSEC
The Annual Materials Plan (AMP) FY 2007 has been in effect from October 1st 2006 and will expire on September 30th 2007. Materials for sale include:

- columbium concentrates 560 000 lb Cb
- columbium metal ingots 20 000 lb Cb
- tantalum carbide powder 4000 lb Ta
- tantalum metal powder 10 000 lb Ta (or amount remaining in inventory)
- tantalum minerals 5000 000 lb Ta
- tantalum oxide 20 000 lb Ta

No sales were made in October 2006 but on November 3rd tantalum carbide and a large amount of tantalum minerals were offered, with offers due by November 8th.

The DLA invited comments, to be submitted by November 15th 2006, on its proposed AMP 2008, which included columbium (niobium) concentrates and ingot, tantalum carbide, metal powder and minerals.

The DLA web site has been redesigned and gives a greater variety of information than before.

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