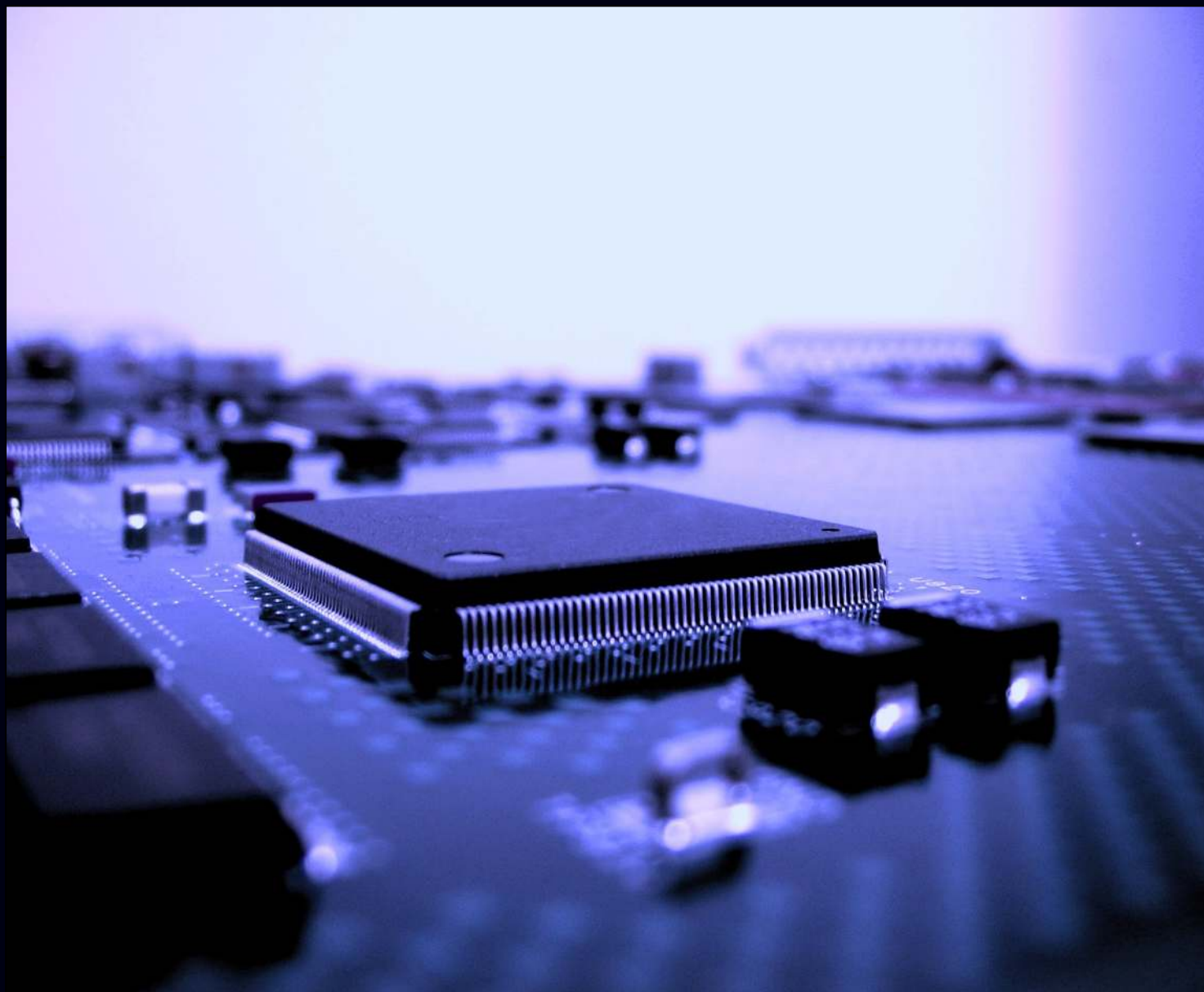


The Crucible

Indium—Critical?

Can you rely on frame contracts?



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**Don't miss our new
MMTA member
profiles on pages 10,
11, 13, 14 & 15**

**The
MMTA promotes
essential elements
that add quality,
safety and
enjoyment to our
lives.**

The MMTA is the
world's leading minor
metals industry
organisation.

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WAREHOUSES AND OTHER MATTERS

The LME Warehousing Consultation Report

Some Members may have seen the LME Warehousing Consultation Report ("LME Report") published in November 2013 which focuses primarily on the operation of the LME warehousing system in the context of the issue of queuing. The LME Report has been referred to in the press as confirming that C Steinweg - Handelsveem BV ("Steinweg") owns a trading company (see past Crucible comment on objections to Steinweg's status as an MMTA approved warehouse).

The LME report contains only one reference to Steinweg on page 18 in a table listing LME warehouse operators, which under the heading "Ownership" states:

"N/A (not by a trading company although Steinweg do own another trading company)".

This reference is inaccurate in that Steinweg did not own the company referred to, Raffemet, but shared the same ultimate parent company. One did not own the other.

The LME have confirmed that the meaning of the phrase "trading company", used in the LME Report is the one used in the context of information barriers namely, "any member or non-member company [of the LME] that enters into LME Contracts or trades metal that is deliverable against an LME Contract" (see LME Notice 11/334).

The regulation of any ownership relationship of a warehouse to a trading company differs substantially between the MMTA and the LME. The LME is a regulated market that allows information barriers between warehouses and other group companies. The MMTA is a members' organisation that has repeatedly rejected any such "Chinese Walls".

The explanation of Raffemet's activities given to the MMTA Directors is consistent with this LME definition of a trading company.

The LME Report does not purport to be a definition of a "trading company" for the purpose of interpreting the MMTA Warehouse Rules. It follows that the LME Report does not suggest non-compliance with these rules.

De-listing of Keystore

The MMTA advised the Membership on 11 December 2013 of the de-listing of Keystore Ltd ("Keystore") as an approved MMTA warehouse.

This action was taken promptly following a Member advising the MMTA of problems experienced at Keystore involving the theft of material. After due consideration, the Main Committee endorsed the Warehouse Sub-Committee's recommendation that this warehouse have its MMTA approval removed with immediate effect.

Guidance on MMTA Warehouse Rule interpretation

To add clarity, the MMTA Directors are working on providing some guidance to Applicants for MMTA Warehouse Approval on the interpretation of a "trading company" within the context of MMTA Warehouse Rules. This guidance will be published in a future edition of The Crucible.

The MMTA Directors decided against devising a detailed definition of what constitutes a "trading company" because it would be complex, potentially long-

winded and risked being skewed by recent events.

Other Matters

The MMTA has had a full year, coupling its customary activities with an office move to fantastic new premises and location and a change of staff with Tamara Alliot joining the team. I would like to give special mention to Maria Cox who is doing a great job as General Manager of the MMTA.

The MMTA Directors, who give their time for free, have worked diligently to aid the developments in the MMTA this year and help ensure the Association continues to bring value to its Members. On behalf of the MMTA, I would like to thank my colleagues for the time they give the Association and for the experience, professionalism, integrity and diligence they provide.

On behalf of the MMTA Directors I wish you all a Merry Christmas and a Happy New Year.

RM Walton
MMTA Chairman

IN BRIEF

- [Click here to view Industry Events.](#)
- [Click here to book the MMTA meeting room.](#)

In Memorium – Suzanne Cammell

As many of you will know, the Minor Metals Industry, as well as all of us at Metal-Pages, have lost a dear colleague and friend, Suzanne Cammell, who sadly passed away on October 3.

Suzanne was one of the first members of the Metal-Pages' team where she ran our pricing department, one of the more challenging jobs in the business; but her extensive industry experience and professionalism held her in good stead, and she was very well respected by her peers.

After studying physics at the University of Edinburgh, followed by a brief stint in the rag trade, her first job in the metals industry was at Brandeis Goldschmidt where she specialised in vanadium and the Romanian and Bulgarian markets.

Following Brandeis, she joined China Industrial Resources (CIR), where she ran a number of books on both minor metals and ferro-alloys. When CIR was wound up, she started her own business specialising in importing goods from Romania, before returning to the metals fold at London Metals.

We have lost a dear colleague and a friend who many in the association will have known for over thirty years. Suzanne combined a generosity of spirit with a keen sense of humour. She always took great delight in pointing out the absurdity of the world.

I only wish she had known how many people have contacted me to say how sorry they were to hear the news and how much she will be missed.

Our heartfelt condolences go out to her family, especially her sister Jo.

Nigel Tunna
Metal-Pages Ltd

MMTA's 40th Anniversary Dinner

Thank you to all those who made the evening such a success.

Click [HERE](#) for more photos.



Our Sponsors:
The MMTA Founding Members
AMC plc, Lambert Metals Intl. Ltd. & Wogen Resources Ltd.



Lambert Metals International Ltd.



Dinner Sponsors

Alex Stewart Int'l & Avon Metals



Raffle in Aid of Cary Mufulira Community Partnership Trust

supporting the Zambian copper mining town of Mufulira.

*Thank you to our Charity Raffle Sponsor, RC Inspection
& our guests for their generosity.*

We were pleased to be able to donate £2,500 to CMCPT.



COMPANIES WHO HAVE ALREADY BOOKED FOR THE MMTA'S INTERNATIONAL MINOR METALS CONFERENCE, VICTORIA PARK PLAZA, LONDON, APRIL 27-29 2014

14TH January 2014 is the cut-off for the MMTA's International Minor Metals Conference final MMTA members' early-bird rate of GBP800 plus VAT, so take advantage of your member discount before the price goes up to £1000 plus VAT.

The delegate fee includes all aspects of the conference:

welcome reception, conference sessions, tea/coffee breaks, lunches, access to the presentations and, new for 2014, it also includes an additional networking reception on the second evening at Tate Britain, kindly sponsored by Lipmann Walton & Co Ltd.

The MMTA's nominated charity is Mufulira, which Anthony Lipmann has been involved with for many years.

If you would like to read more about Mufulira and/or to make a donation, you can click [HERE](#).

There will be a strong focus on the key issues relating to the global minor metals' industry.

We have a number of top speakers already lined up, who will be covering the following topics:

- New materials for aerospace
- Automotive supply chain
- Outlook for alloys in stainless and specialty steels
- Minor metals in catalysts
- Growth markets for refractory metals

For more information on the programme, click on one of the below logos.



ATTENDEES (AT DEC 6 2013)

Aaron Ferer & Sons Co
Advanced Alloys Services Ltd
AIM – Indium Materials
Alex Stewart Assayers Inc
Alfred H Knight International Ltd
Ampere Alloys
Anglo American
AREVA – Fuel Zirconium Sales
Avon Metals Ltd
Beijing Jiya Semiconductor Materials Co Ltd
C. Steinweg
C. Steinweg Belgium NV
Cronimet Central Africa AG
Darton Commodities Ltd
E&C Trading Ltd
EAC Corporation
Earth Metals LLC
Exotech Inc
Firth Rixson
F.W. Hempel Metallurgical GmbH
GE Aviation
Greenbriar Partners
Hard Assets Investor
Heraeus Metal Processing Limited
Indium Corporation
Innova Recycling
Jiujiang Jinxin Non Ferrous Metals Co Ltd
Johnson Matthey Plc
Jurametel S.A.
KGHM Polska Miedz SA
Lambert Metals International Ltd
Lipmann Walton & Co Ltd
Magnesium Elektron
Maritime House Ltd
Metal-Pages Ltd
Metherma KG
Meyer, Unkovic & Scott LLP
MMTA
Natureo Finance
Penningtons Manches LLP
Phoenix Infrared
Powmet Inc
Renault
Rhenium Alloys Inc
Rio Tinto London Ltd
Roskill Information Services Ltd
Select Alloys & Materials Ltd
Shaanxi Huadian Fine Chemical Co Ltd
SMR
Sovereign Int'l Metals & Alloys Inc
Stapleford Minerals & Metals
Terra Commodities
TRADIUM GmbH
Tranzact Inc
Traxys Europe
Traxys North America
Tropag
Umicore Precious Metals Refining
Vital Materials Co Limited
Wogen Resources Ltd
Womet GmbH



Welcome to the festive season!

There are two main mechanisms to produce colour in fireworks: incandescence and luminescence.

Incandescence is light produced from heat; as the substance becomes hotter, it glows red, then orange, yellow and finally white. By controlling the temperature of a firework, the glow can be manipulated to the desired colour.

Metals such as aluminium, magnesium and titanium burn very brightly and are used to increase the temperature of the firework.

Luminescence is light produced using energy sources other than heat, sometimes known as 'cold light' because it can occur at room temperature or cooler.

Colorants:

Red—strontium salts, lithium salts

Orange—Calcium salts/chloride/sulphate

Gold—incandescence of iron (with carbon), charcoal or lampblack

Yellow—sodium compounds/nitrate

Electric White—white hot metal such as magnesium or aluminium, barium oxide

Green—barium compounds + chlorine producer

Blue—copper compounds + chlorine producer

Purple—mixture of strontium (red) and copper (blue) compounds

Silver—burning aluminium, titanium or magnesium powder or flakes



PENNINGTONS MANCHES

MEMBER ANNOUNCEMENT

Penningtons and Manches combine to create 115 partner law firm

Member firm Penningtons Solicitors LLP has recently joined forces with Manches LLP to become one of the dominant legal players in London and the South East of England. The deal sees all 265 Manches employees, including 46 partners, move to Penningtons which will now operate under the name of Penningtons Manches LLP.

With a combined turnover of £58 million, together with 115 partners and over 600 staff, Penningtons Manches is now represented in seven UK locations - London, Basingstoke, Cambridge, Godalming, Guildford, Oxford and Reading. In addition to adding depth to the existing corporate, commercial, employment, property and litigation practice areas, the agreement also reinforces sector capabilities, particularly in technology, life sciences, education, private wealth and banking, where both firms have significant track records.

This move follows a period of sustained growth for Penningtons over the last five years.

IN THE FRAME: CAN YOU RELY ON A FRAME CONTRACT?

The ability to rely on your contracts being performed is vital for traders. However, the longer the period a contract covers, the greater the difficulty of agreeing in advance all of the elements that a contract for the supply or purchase of material should include. How, for example, do you build sufficient flexibility into the delivery schedule for material due in 3 years' time, or allow for changes in processing costs over a number of years?

Parties often use frame contracts in such circumstances. The key parameters of the contract will be fixed for the whole period of the contract, with some flexibility to change certain elements of the contracts on say an annual basis. This works well for both parties, unless a dispute arises. How then do you "fix" those details which were not agreed in the frame contract? How does English law deal with this problem?

General Principles

Where contracts are made under English Law, they have to accommodate two general principles:

- An agreement to agree on issues in the future is generally unenforceable; and
- A term of a contract cannot be so uncertain as to be meaningless and unenforceable.

Theory in practice

These issues came before the Court of Appeal earlier this year in the context of a dispute between MRI Trading and Erdenet Mining concerning three linked agreements, each providing for the supply of 40,000 WMT per annum of copper concentrates. The first two contracts were performed but a dispute arose over non-performance of the third agreement.

That agreement provided that three issues were to be "agreed between [the parties] during the negotiation of terms for 2010 [a reference to annual negotiations during Metals Week]". Those issues were:

1. "shipping schedule",
2. "treatment charge",
3. "refining charge".

The contract contained an LME arbitration clause so the issue went before arbitrators. They decided that the contract was too uncertain to be performed or was an "agreement to agree" and therefore unenforceable. That decision was appealed to the Commercial Court, and then to the Court of Appeal.

Both the Commercial Court Judge and the Court of Appeal disagreed with the arbitrators and found that the contract for 2010 was enforceable.

The first point to note, before examining the specific reasons for these decisions, is that English Courts strive to enforce commercial deals wherever possible. Their strong preference is to hold parties to their agreements. This in itself is a very positive factor in favour of both choosing English Law for your contracts and choosing a dispute resolution process that will properly apply those principles (English Courts or English arbitration).

The second point is that while the Courts were clear that the contract in question was enforceable, trade arbitrators had reached a different conclusion. The words used clearly left enough scope to be argued over and that uncertainly put the parties through three rounds of litigation over three years, no doubt at great expense. Clearly, those drafting contracts should strive to avoid leaving similar scope for argument in their contracts.

How to avoid uncertainty?

The Courts questioned whether the parties had agreed a binding contract where some of the minor details were left incomplete ("to be agreed"), or whether the terms were imprecisely expressed? If agreed terms were impliedly expressed, the Court could imply an obligation that the reprocessing charge, for example, should be "reasonable".

Alternatively, was this a negotiation in which those "details" were intended to be left sufficiently open so that either party could simply refuse to reach agreement, with the consequence that there would be no binding contract?

The factors that the Court took account of included the following:

- The contract was part of a wider agreement for delivery over three years and part of that agreement had already been performed, making it unlikely that the parties had intended the balance to be unenforceable in the event of disagreement over these matters;
- The contract included a clear obligation to deliver, "the seller shall deliver.....". This showed that the parties intended to form a binding contract. Scheduling of delivery, treatment charges and refining charges were subsidiary matters and the Court or arbitrators could imply a term that they should be "reasonable";
- The parties had agreed all the key aspects of the contract including quantity, specification, and price, which signified the making of a binding contract;

The inclusion of an arbitration agreement may assist the courts in finding that a contract is sufficiently certain as it provides a forum through which disagreements on issues such as the delivery schedule could be resolved using industry experts.

It is also worth noting that Section 8 Sale of Goods Act 1979 provides that:

8 Ascertainment of price.

(1) The price in a contract of sale may be fixed by the contract, or may be left to be fixed in a manner agreed by the contract, or may be determined by the course of dealing between the parties.

(2) Where the price is not determined as mentioned in sub-section (1) above the buyer must pay a reasonable price.

(3) What is a reasonable price is a question of fact dependent on the circumstances of each particular case. [emphasis added]

So, if an otherwise binding contract does not specify the price to be paid, the buyer must pay a "reasonable price". The Courts are free to imply similar provisions for other elements of a contract, such as the treatment charge in this case.

However, it must be remembered that each case must be judged on its own facts. Additionally, if the parties have truly intended to leave some essential matter, such as price, quantity or quality completely open and "to be agreed" in their negotiations, then there will be no binding contract.

What to do

If you are negotiating long term contracts where certain elements will vary in the future, or where you are not in a position to fix those elements when the contract is made, a little care can prevent arguments over the enforceability of the whole contract. Remember that an argument over say what is a reasonable delivery schedule is likely to be much easier to resolve than a consequential dispute over whether or not you have a contract at all.

In this case, that uncertainty would have been removed had the contract provided that the delivery schedule was to be:

"agreed by the parties by the end of October 2010 and in the absence of agreement it shall be a reasonable schedule taking into account the reasonable requirements of both parties. Any dispute over what a reasonable schedule is shall be referred to arbitration under clause [] of this agreement"

Giving indications of objective criteria by reference to which the "reasonable" schedule/price/cost in question can be arrived at will also make it easier for any arbitrator or judge to resolve such a dispute.

For example, the obligation to agree a "treatment charge" for 2010 could have been qualified by saying that the charge was to be a "reasonable" or "market" charge.

Reference could alternatively have been made to a "reasonable charge taking account of the charges agreed for previous years and any movement in power and labour costs in the interim".

**It was great to see
everyone at**

**The Minor Metals
New York Dinner at
The Water Club,
New York 12/12/13**



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EXOTECH



MEMBER ANNOUNCEMENT

MMTA member, Jack Lifton, will be speaking in Paris at a strategic metals seminar: La France et la Guerre des Métaux Stratégiques (France and the war of the strategic metals). The seminar will be held on 13 February 2014 in the National Assembly building, and it is planned that the French Minister of Industry will be the keynote speaker.

Jack will be speaking on the differences between the American and the EU viewpoints on the security of supply for materials strategic to consumer high tech product manufacturing.

For more information on this event, please click [HERE](#).

IN THE FRAME: CAN YOU RELY ON A FRAME CONTRACT, CONT'D....?

If there was no agreement on this issue, that wording would at least direct an arbitrator or Judge to the factors to be taken into account in determining the "reasonable" charge and would make it harder to argue that the contract should be void for uncertainty.

Another approach is to provide that in the absence of agreement, the issue in question shall be determined by an industry figure acting as an expert. Such expert determination provisions are common ways of resolving weight/quality issues. Those issues usually arise where it is said that performance has not matched the contractual obligation.

However there is no reason why expert determination should not be used to resolve issues of the sort we have been discussing in this article, assuming that the relevant class of expertise can be identified and that an expert can be found who would be willing to act. Trade arbitration bodies such as the MMTA or LME may be willing to help identify such experts.

Summary

In summary therefore, parties can avoid costly and distracting litigation arising from frame contracts by including wording suggesting a date for agreement and a procedure to be followed if agreement is not reached. Adding some objective criteria by which agreement should be reached should also assist in ensuring the frame remains structurally sound without being overburdened with the detail the parties need not or cannot agree at the outset.

Donald Lambert is an MMTA board member and a Partner in the Commercial Dispute Resolution practice of member firm Penningtons Manches LLP

THANK YOU!

MMTA members have already kindly donated 3 shelterboxes to the Rotary International appeal to assist those affected by the Philippines typhoon.

It is still possible to make a donation by sending a cheque to MMTA. We will be happy to pass on your donation.



LETTER FROM NORTH AMERICA

Dear Members

Here in New York, it is quite lovely. We are in the midst of autumn (fall) and the leaves were really whirling around this morning as I walked my way through Central Park to my desk. We've already had a couple of nights' frost, but nothing too chilly!

Well, you'll all have seen, the LME's proposed solution to warehouse queues. And, maybe surprisingly, it was upstaged neither by the regulators nor the legislators. It remains to be seen, however, just how effective the new measures will be. For a little bit of background, I would thoroughly recommend reading its [SUMMARY PUBLIC REPORT OF THE LME WAREHOUSING CONSULTATION](#), which was published on November 6, 2013.

In the meantime, last week, over here, the Federal Register gazetted the annual "*National Defense Stockpile Market Impact Committee Request for Public Comments on the Potential Market Impact of the Proposed Fiscal Year 2015 Annual Materials Plan*". For those of you who may be in the dark as to exactly what this is, then, to put it simply, the committee is "*seeking public comments on the potential market impact associated with the proposed FY [Fiscal Year] 2015 AMP [Annual Materials Plan]...*" that covers the sale, upgrade, disposal and acquisition of various materials, mostly metals, in the stockpile.

The materials' plan always provides a little insight as to what the Defense Logistics Agency (DLA) may (or may not) be up to on the "strategic" materials front going forward. (I say "may (or may not) be up to" as, for the life of me, I couldn't find germanium mentioned in any of the recent such notices and yet, in October last year, [5N Plus](#) announced that a majority-owned subsidiary had been awarded a contract by the DLA "*to upgrade a portion of the National Defense Stockpile (NDS) high purity germanium metal inventory to unfinished germanium substrates capable of being ground and polished for use as epitaxial-ready substrates for multifunction photovoltaic solar cells employed in National Security Space (NSS) applications.*" But, there you go! Perhaps conversion doesn't count.)

So, what's on the menu this year? Beryllium still features with 17.5 short tons (quantities are "*the proposed maximum quantity*") noted this year as being for upgrade or disposal. Last year the same quantity was noted, but only for upgrade. Both ferro-chromium and chromium metal are slated for continued disposal, as are both ferro-manganese and metallurgical grade manganese, together with tungsten metal powder, ores and concentrates.

For potential acquisition, three new metals or alloys appear: 104.5 tonnes of ferro-niobium, half a tonne of dysprosium metal and 10 tonnes of yttrium oxide. And three items appear once again on the menu: cadmium zinc tellurium (CZT) substrates: 40k cm²; lithium cobalt oxide (LCO): 150 kg; and, lithium nickel cobalt aluminum oxide (LNCAO): 540 kg.

For the non-metal-oriented reader, the DLA is also after 648 kg of meso-carbon microbeads (MCMB) – for, for example, Li-ion battery anodes, and 16k lb of triamino-trinitrobenzene (TATB) – an explosive more powerful than TNT! (Hmm, I wonder where they get that...)

It will be interesting to see what sort of comments the committee receives. I shall, if I can, report back when appropriate.

With best wishes for the forthcoming holiday season from New York to MMTA members everywhere.

Tom Butcher, 18th November, 2013 [Hard Assets Investor](#)

© 2013 Tom Butcher

MMTA 2014 SUBSCRIPTION RENEWALS

**Membership fees held
for the 4th successive
year!**

Being a member of the MMTA offers many benefits, from significant discounts on the [MMTA's International Minor Metals Conference](#) and other networking and educational events, to access to the MMTA's board room in central London for your own meetings or training, free of charge.

We provide multiple opportunities to promote your business, stay connected and keep yourself informed of issues important to you.

The MMTA executive team and committees work to support the needs of the membership as a whole. Click [here](#) to learn how we can work for you.

**MMTA annual subscriptions
from 1st January 2014 until
31st December 2014 are
now due.**

**The cost of membership is
£1200 (plus VAT where
applicable)**

To renew online using a credit or debit card click [HERE](#) to log into the members' area. A receipt will automatically be generated for you. If you prefer to pay by invoice please click the 'request an invoice' button.



NEW MMTA MEMBER

ANGLO PLATINUM MARKETING LTD

The MMTA is pleased to welcome Anglo Platinum Marketing Ltd as a new member.



Anglo Platinum Marketing Ltd is the sales and marketing arm of Anglo American Platinum, and is active in the markets of

Iridium

Ruthenium

Osmium

Contact: Mark Booth

Website:

www.angloplatinum.com

THE NEED FOR TIGHTER TRACE ELEMENT CONTROL IN NI-BASE SUPERALLOY RAW MATERIALS

Ni-base superalloys account for approximately 40-50% of the total weight of an aircraft engine, where they are predominantly used in the hot combustor and turbine sections, withstanding temperatures that can exceed 1200°C. In order to enhance engine efficiency and life, significant demand exists to increase the maximum operating temperatures of the engine and the time interval between engine overhaul; both of which are primarily inhibited by the capability of the materials in use.

Predicting engine life is an exercise in risk management. No component in an engine will last forever, and it is impossible to predict the exact moment any particular component will finally fail. Therefore, components are tested and a 'safe' life, defined below the average and any variability, is calculated.

In order to increase life and efficiency, materials engineers are presented with three options. Firstly, non-metallic alternatives such as ceramics and complex composite materials can be used; secondly, the design of new alloys capable of withstanding even higher operating temperatures; and thirdly, the control of and tightening of elemental levels within existing alloys.

The first two options are both costly and require extensive lead times due to the research and development work of the projects. Tightening the control on existing alloys, however, is where the largest 'bang for the buck' lies, as it is relatively inexpensive and can be done almost immediately.

The mechanical properties of the components are directly affected by the chemical composition of the material and any variation in the composition will, therefore, lead to variation in final properties.

In an attempt to tighten the control of existing alloys, OEMs are either rewriting specifications or requesting that primary melters aim for compositions well within the specification itself. In typical single crystal Ni-base superalloys, specifications can allow for a variation of over 0.3wt% for the main strengthening elements of aluminium and titanium, and unwanted elements can have maxima up to 25ppm. These allowable ranges give rise to variability in the performance of the final material and, in turn, the need to reduce the ideal service interval of the components.

The trend of reducing the trace level maxima can be seen in Figure 1, where the lowest maximum requested for sulphur, zinc, and phosphorous is plotted as a percentage of the relative values in 1996 for cast stick material ordered from Firth Rixson Metals. For all 3 elements the lowest maximum requested in 2012 was less than 25% of that requested 10 years earlier.

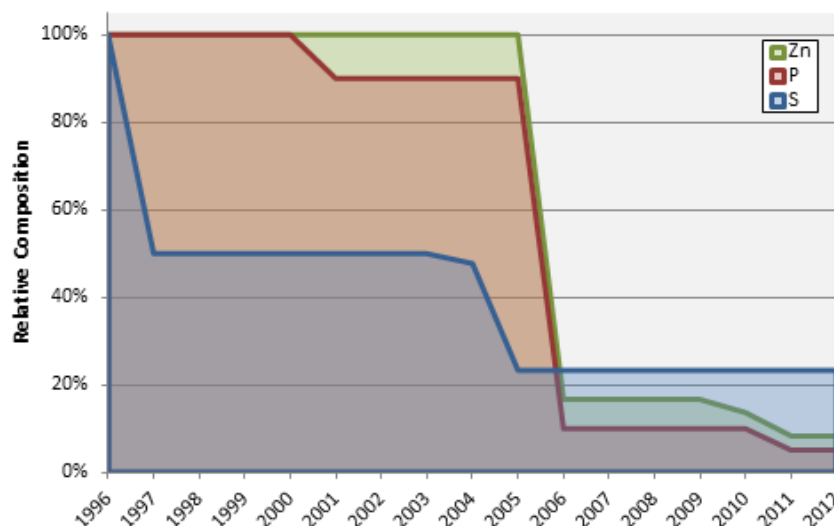


Figure 1: The reduction in the lowest maxima of S, Zn, and P requested by customers of Firth Rixson Metals since 1996

THE NEED FOR TIGHTER TRACE ELEMENT CONTROL IN NI-BASE SUPERALLOY RAW MATERIALS, CONT'D....

Likewise, the trend of tightening the elemental ranges can be seen in Figure 2, where the average range of main strengthening elements requested in Ni-base superalloy melts can be seen to have reduced by approximately 40-60% between 2007 and 2012.

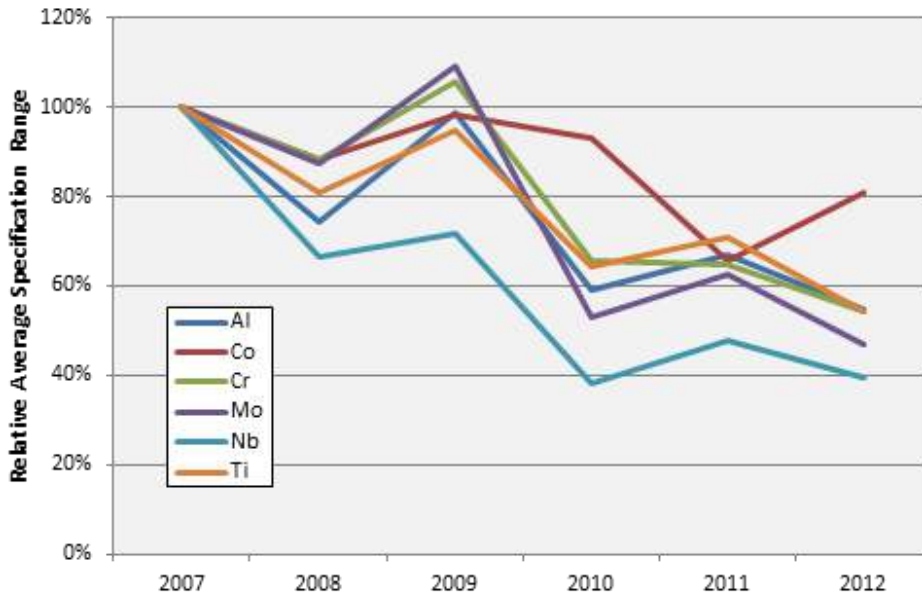


Figure 2: The reduction in the average range of primary strengthening elements requested by customers of Firth Rixson Metals since 2007

Increasing elemental control may seem simple, but there are many reasons it is difficult to achieve. Primary melting furnace capability and reliability are key reasons, as is the uncertainty and repeatability of chemical analysis equipment. If a particular element can only be measured to $\pm 0.2\%$ on industry standard laboratory equipment, developing specifications with a range tighter than this would be counterproductive. The main reason, particularly in the case of trace elements however, is due to the quality control of starting material, be it virgin material or revert.

It is possible to remove gaseous elements (oxygen and nitrogen) and high vapour pressure elements (e.g. lead, selenium, and copper) simply by the vacuum process; and other unwanted elements (e.g. sulphur) can be controlled/removed by tailoring additions to promote specific reactions within the melt. However, many other elements (e.g. tin, zirconium, and phosphorous) are almost impossible to remove from the melt once introduced, and the only guaranteed way of tightly controlling these in the final product is not to add them in the first place.

Although contamination or poor quality in any raw material can be an issue, as nickel contributes the largest percentage of Ni-base alloys, any variation in purity of virgin nickel can have a significant impact in the trace levels of the final product. For example, electrolytic nickel commonly has sulphur levels between 1 and 6ppm, although most material is purchased with a certified 'less than' value.

Due to the criticality of input material, any process or certification advances made by the raw material suppliers in terms of reducing the variability in chemical composition or in more accurate certification would have a positive knock-on effect for the supply chain as a whole. It is a certainty that OEMs will continue to demand more stringent control on materials, and melters will have to move to suppliers who can tightly control and accurately certify the composition of their materials. Suppliers who take steps to advance their analysis and certification systems now will find themselves 'ahead of the game' when these tighter controls move from being just beneficial to melters to a necessity.

Dr Robert Guest, Technical Director, Firth Rixson Metals

NEW MMTA MEMBER

E & C TRADING LTD

The MMTA is pleased to welcome E & C Trading Ltd as a new member.

E&C TRADING LTD.

E&C Trading Ltd., deals on a principal and agency basis with various commodities. We specialize in the trade of:

MINOR METALS
MINOR METAL RECYCLING
ORES AND MINERALS
FERRO ALLOYS
COAL

E&C Trading Ltd., prides itself on its sustained ability to trade on all five continents.

E&C Trading Ltd., enjoys successful long standing relationships with the European metal making community, as well as being a reliable partner working to supply other metal users in the chemical / high tech industry and traders with their needs.

Our well established relationships with forwarders and shippers, who know only too well our commitment to an unrivalled service, enable you to rely on E&C Trading Ltd. with complete confidence and peace of mind.

Contact: Frank Dekker

Website: www.ectrading.com



CRITICAL RAW MATERIALS (CRMS): THE CASE OF INDIUM

Following on from October's edition of The Crucible focussing on Critical Raw Materials in relation to trade and innovation, this piece looks at the case of indium, which appears on both the EU CRMs list and the US Department of Energy (DOE) list. The DOE definition of 'criticality' differs from the EU list in that it applies to materials that are at risk from disruption for clean energy technology applications only, rather than the broader applications considered by the EU. Indium is sometimes cited as a candidate for substitution, which is an attractive solution for materials appearing on these lists, however, research suggests that this may not be the most appropriate means of decreasing the criticality of this material. Malcolm Harrower, Indium Corporation of America, offers some reflections for those considering the critical status of indium, and illustrates that 'criticality' does not necessarily mean that there is a shortage of supply.

Indium is a key material in many modern technologies, being used as a transparent conductor in devices including touchscreens, with one particularly useful property being its moisture resistance. Although an apparently expensive material, it makes up only a small proportion of an item's overall cost, and due to the small quantities used, prices have not historically been a deterrent to its usage. Indium is a by-product of other mined materials, and is mostly generated during zinc ore processing. It is also found in lead, copper and tin ores, and is therefore mainly found in South America, China, Canada and Australia.

A lot of indium is not recovered from these large mining operations, as the quantities are so small, for example, when compared to zinc, in 2012 there was 12,500,000 MT refined in total compared with only 1,500 MT of indium, with a large proportion of that amount coming from internal recycling. However, large mining companies are starting to give greater consideration to the extraction of more minor metals, including indium, to add value to their operations. The large proportion of recycled indium

used comes from the Sputtering processes in which indium is often a component, with Sputtering targets being recycled and the excess material re-incorporated into the system, resulting in high process efficiency. Research into retrieving the indium at the end-of-life stage is currently being undertaken, but is not yet considered to be economically viable.

Malcolm Harrower points to several key facts relating to the supply and demand ratio for indium, which have a direct bearing on its designation as a CRM:

- **Demand** for indium **is increasing** at significant rates.
- The **amount** of indium in proven reserves **is sufficient** for 50 -100 years to come.
- Extraction and refining **capacity** can be **expanded** to meet demand for new technologies.
- There will be both pricing and supply volatility, but there will be **enough indium to meet demand** for a very long time.
- **There is a plentiful supply** in zinc and copper concentrates.

Ref: The Indium Corporation of America

Malcolm Harrower also states that the key reason for indium being considered to have a risk of supply shortages and being therefore designated as 'critical' is that 50% of the world's indium is produced in China. However, it should be noted that in recent years China has become a net importer of indium with little effect on world supply availability. He believes that opaqueness in the supply chain is another factor which does not help create confidence in the sustainable supply of indium.

The European Commission-funded CRM Innovation Network* has published reviews of the 14 CRMs with analysis of both economic and technical possibilities for replacing them in certain applications.

As a CRM, indium has been analysed in terms of its suitability for substitution. The results are that for its main application, that of flat-screen panel displays,

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indium is not a good candidate to be substituted, and achieving this would result in 'high cost and/or a loss in performance'. Malcolm Harrower points out that one of the economic barriers is that there have been large investments in the past in indium machinery and infrastructure, creating a disincentive to change to a different material.

One of the key problems, however, lies in inconsistencies in the assessments of the likelihood and desirability of substitution from different parts of the EU, with a recent press release from the European Commission stating, in direct contrast to the CRM Innovation Network, that one of the next key aims the European Innovation Partnership was:

*'the **substitution** of indium in transparent conductive layers, such as those used in touch screen devices, flexible electronics, solar energy and OLED lighting (organic light-emitting diode used to create digital displays in devices such as television screens, computer monitors, portable systems such as mobile phones, handheld games consoles and PDAs' (dated 26th September 2013)*

By contrast, in the USA Critical Materials Institute at the Ames Laboratory, which works on various projects related to the DOE CRM list, there are currently no activities related to indium, either for substitution or for improving recycling and recovery. Despite discrepancies in Europe and inaction in the US, the fact that it is perceived supply chain risks which make indium critical, indicate that focus in the case of indium should be redirected away from substitution research and instead focused on trade policies to ensure a sustainable future supply.

Reliance on 'technology breakthroughs', rather than improving trade relations and investigating other supply options does not seem to be a sustainable or effective approach to managing the availability of CRMs that will be essential for many industries for the years to come. Focusing on recovery and recycling, and designing for end-of-life are actions that can be taken now to reduce the 'criticality' of some of these materials. Driving innovation and high-technology is a worthwhile aim, but it is important to not look solely for a

technical solution to criticality, which may prove to be extremely costly and difficult to implement without the required infrastructure and private investment.

Appendix

*The CRM Innovation Network is made up of experts linking academics and industry research and development departments, and indium's status and possibilities for substitution are in the 'raw material profiles' produced by the network.

For those wishing to comment on any of these profiles, comments may be submitted until August 2014.

EU CRMs:

Antimony, Beryllium, Cobalt, Fluorspar, Gallium, Germanium, Graphite, Indium, Magnesium, Niobium, PGMs (Platinum Group Metals), Rare earths, Tantalum, Tungsten

(A revised list will be published in early 2014, with an increase to 20 materials expected)

The US Department of Energy has produced a CRMs list based on the materials used in energy applications, in particular clean energy technologies, split up according to their relative criticalities.

Less Critical	Most Critical
lanthanum	dysprosium
cerium	neodymium
praseodymium	terbium
samarium	europium
terbium	yttrium
gallium	Indium
tellurium	
cobalt	
lithium	

Additional Sources of Information:

http://europa.eu/rapid/press-release_IP-13-863_en.htm
<http://www.criticalrawmaterials.eu/>

Tamara Alliot, MMTA, in conversation with Malcolm Harrower, Indium Corporation of America

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TODINI & CO SPA



The MMTA is pleased to welcome Todini & Co SPA as a new member company.

Todini & Co SPA is a multi-brand distributor and agent of chemical products.

Todini is **European leader** in the distribution of salts and oxides of non-ferrous metals such as Nickel, Selenium, Cobalt, Iodine, Bismuth, Copper, Tin, Molybdenum, Vanadium and Tellurium.

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NEW MMTA MEMBER

TERRA COMMODITIES LLC



The MMTA is pleased to welcome Terra Commodities LLC as a new member company.

Terra Commodities LLC is a full service physical metals, chemicals, and minerals merchant serving North America, Europe, and Asia. Established in 2008, Terra is headquartered in the United States with representation throughout Europe, Central Asia and South Asia.

Terra specializes in supplying primary materials, secondary materials, and intermediary products for use in superalloys, specialty steels, optoelectronic, microelectronics, thermal spray powders, and photovoltaics.

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Contact: Michael Rapaport

Website:

www.terra commodities.com

CONFLICT MINERALS REPORTING—WILL IT AFFECT ME?

Conflict Minerals Reporting arises from the requirements of Section 1502 of the Dodd-Frank Act as applied by the SEC to all issuers of stock in the United States where Gold, Tin, Tantalum or Tungsten (“3TG”) are necessary to the functionality or production of a product manufactured or contracted by that issuer to be manufactured.

On the face of it, this new law will impact about 8,000 public companies. However, those companies rarely purchase all components within their final product from the source of origin, instead relying upon extensive supply chains. By extension, the law could reach as many as 300,000 public and private entities across a wide variety of industries.

What are the obligations on public companies and how will these affect their supply chain?

Public companies are required to disclose their use of Conflict Minerals in SEC filings for the year ended 31 December 2013 by 31 May 2014. The SEC filing should be accompanied by an audited Conflict Minerals Report if the company has reason to believe it uses minerals sourced from the Democratic Republic of Congo (DRC) or adjoining countries. For these purposes, the minerals currently defined as Conflict Minerals are:

- Tantalum – extracted from columbite-tantalite (17% of world supply from DRC)
- Tin – extracted from Cassiterite (4%)
- Tungsten – extracted from Wolframite (3%)
- Gold (2%)

Step 1	Determine the applicability of the rule.
Step 2	Conduct a Reasonable Country of Origin Inquiry (RCOI) to determine whether or not there is reason to believe that conflict minerals from the DRC are present in any products.
Step 3	Conduct due diligence to determine the source and origin of conflict minerals and the smelter in which they were processed. Due diligence should be based upon a recognised framework. The recognised framework is contained in guidance crafted by the Organisation for Economic Co-operation and Development (OECD).

MMTA members may therefore form part of the supply chain of a company covered by the SEC filing requirements.

The process followed by companies covered by the filing requirements is a three stage process.

MMTA members may therefore receive inquiries, in the form of EICC / GeSI templates, from their customers seeking specific data regarding the type and source of minerals supplied. Additionally, customers may request information on supplier sourcing policies and management controls related to the metals they supply as the due diligence process is pushed down the supply chain.

Metal traders are termed “downstream companies” under the OECD guidance along with exchanges, manufacturers and retailers. The Supplement on Tin, Tantalum and Tungsten in the guidance recommends:

‘that downstream companies identify, to the best of their effort, and review the due diligence process of the smelters/refiners in their supply chain and assess whether they adhere to due diligence measures put forward in this guidance’

CONFLICT MINERALS REPORTING—WILL IT AFFECT ME? (CONT'D)...

The guidance defines 'red flag' suppliers whom companies are likely to seek to exclude from their supply chain, unless they have appropriate due diligence procedures in place, as:

- Suppliers or upstream (from mine to smelter/refiner) companies that have shareholder or other interests in companies that supply minerals from or operate in red flag locations of mineral origin and transit.
- Suppliers or upstream companies known to have sourced minerals from red flag locations of mineral origin and transit in the last year.

Red flag locations of mineral origin and transit are defined as:

- Minerals that originate or have been transported through a conflict affected or high risk area.
- Minerals that are claimed to originate from a country that has limited known reserves, likely resources or expected production levels of the mineral in question.
- Minerals that are claimed to originate from a country in which minerals from conflict affected and high risk areas are known to transit.

If a trader believes that they are, or potentially may be, a red flag supplier, they should consider establishing due diligence and management systems within the company to address risks associated with minerals from conflict affected or high risk areas. The OECD guidance and SEC final rule recognise that a company's processes must be tailored to its particular facts and circumstances, taking into account size, complexity and supply chain characteristics.

And Europe?

In Europe, the European Commission has now closed its consultation period and is likely to move towards draft legislation. During the process it was notable that unlike the Dodd Frank Act, references were to conflict affected and high risk areas as in the OECD guidance, suggesting a wider definition than just the DRC and adjoining area. Whilst the ultimate legislation is likely to differ from that in the United States, it will draw extensively on the processes highlighted in the OECD Guidance. We would recommend that companies potentially affected by this legislation start to consider embedding procedures into their control environment in line with OECD guidance.

Authors: [Chris McClure](#) & [Ian Weekes](#), [Crowe Horwath](#)/[Crowe Clark Whitehill](#)

Crowe Horwath International through its local offices is a leading provider of services to international traders and is currently advising companies on compliance with conflict mineral legislation. Chris McClure is a US based partner at Crowe Horwath with a specialism in providing consulting and audit services to corporations complying with SEC conflict metal filing requirements.

Ian Weekes is a UK based partner at national tax, audit and advisory firm Crowe Clark Whitehill with extensive experience of working with international trading and warehousing businesses.

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The MMTA is pleased to welcome Noble Group Ltd as a new member company.

Noble is listed in Singapore (SGX: N21), with headquarters in Hong Kong and operates from over 140 locations. We are ranked number 76 in the 2013 Fortune 500. Noble Group is a market-leading global supply chain manager of agricultural and energy products, metals and minerals. Noble Group was established in 1987 in the belief that urbanisation would drive demand for the products and services that we aimed to provide. We connect low cost producing countries with high demand growth markets.

Our investments focus on key stages of the supply chain to create and extract additional value, manage risk and secure long-term flows of products and information.

Noble is committed to building sustainable product flows of commodities that generate long-term value. We manage a diverse – and diversified – portfolio of agricultural, energy and hard commodity products supported by integrated sourcing, marketing, processing, financing and transportation operations.

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