

Supply Situation Report: Chromite in a tight spot

September 2011

As usual, availability for non-metallurgical is hostage to the fortunes of the ferrochrome and stainless steel industries. An effect of the tight market conditions has been the encouragement given to the development of new supply sources focusing on non-met. grades only

- Supply squeeze continues
- Prices rise
- New sources emerge with mixed reactions
- Asian stainless steel growth impact

Mike O'Driscoll

As usual, availability for non-metallurgical, or so-called “special grades” of chromite is hostage to the fortunes of the ferrochrome and stainless steel industries which drive some 95% of demand for the chromium mineral (*see pie charts p.28*).

Recovery in the ferrochrome and stainless steel sectors has created increased demand for chromite and thus shortages in available material for the non-met. sector D foundry, refractories, and chemicals - which has consequently seen prices tighten.



Chromite concentrate from new non-met. grade supplier Oregon Resources Corp. ORC

Another significant effect of the tight market conditions has been the encouragement given to the development of new supply sources focusing on non-met. grades only.

These projects represent a more sophisticated approach to chromite supply, delivering non-met. grades, at admittedly higher prices, to specific target markets with technical support. Such strategy, in the eyes of some, has not really been addressed, nor committed to, by the established chromite suppliers, largely in thrall to the ferrochrome market.

SUPPLY SECURITY

Global resources for chromite are sufficient for the world's needs for many years to come, and world reserves have been estimated at 7,600m. tonnes, hosted mainly by South Africa, followed by Zimbabwe, Russia, and Kazakhstan (*see pie chart*).

Regarding non-met. grades, these are mostly supplied by South Africa, although smaller volumes are available from Oman and Turkey, but their overall production usually takes second place to chromite demand for ferrochrome.

With the exception of Amcol International Corp. and Lanxess (Pty) Ltd (formerly Bayer, supplying mainly chemical grade), virtually all other South African producers are primarily in the ferrochrome business, with chromite sand for non-met. uses being produced as a by-product.

From 2007-2009, world chromite ore and concentrates production decreased from 22.1m. to 18.9m. tonnes, before recovering in 2010 to 22.3m. tonnes (*see chart*).

Chromite production recovery in 2010 was an impressive 34% year-on-year, or 5.5m tonnes, in 2010 to 21.6m tonnes. Fourth-quarter output reached 5.6m tonnes, led by gains in output in both South Africa and Kazakhstan.

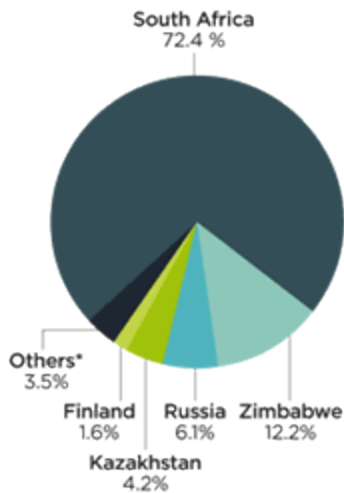
Metal Bulletin Research (MBR), in its latest report for the chromite and stainless steel market (*The Global Chrome Quarterly and Stainless Review- June 2011*) expects positive momentum in chromite output to continue in 2011.

However, the pace of growth is projected to be considerably more modest as last year's impressive growth rates reflected the market's collapse in 2009.

MBR is forecasting global chrome ore output to reach 23.2m. tonnes in 2011, representing a year-on-year gain of 7.1%.

South Africa is expected to maintain its dominant 35% share in chrome ore supply for the foreseeable future, particularly with increased development of UG2 ore bodies. Elsewhere, marginal increases are forecast in Turkey, Zimbabwe, and Russia (*see pie chart*).

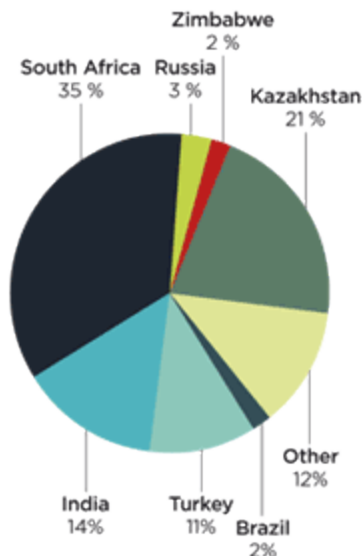
World chromite reserves (7,600m. tonnes in total)



* includes: India, 0.9%; Turkey, 0.3%; Brazil, 0.2%; USA, 0.1%; and Albania, 0.1%.

Source: MBR, USGS

World chromite production 2011 forecast (total 23.14m. tonnes)



Source: MBR

New sources emerge

The tight market conditions for non-met. grades have heightened the interest in the emergence of new sources of supply specifically for non-met. chromite grades, but it has not been plain sailing for the newcomers.

In South Africa, US foundry minerals supplier Amcol International Corp. has brought on stream a new \$50m. chromite processing facility at its Ruighoek Chrome project in South Africa to supply its new Hevi-sand foundry chromite brand targeting customers in Asia, Europe, and South America.

Amcol's development has been in response to the growing shortage of foundry grade chromite, and a perceived lack of "meaningful commitment" from South African suppliers, which was threatening long term customer relationships.

Amcol's strategy was not to compete with the metallurgical grade market, but to focus on a new high yield foundry sand source. Through careful processing of chromite ore from the LG6 ore body, Amcol's aim is to deliver a grade of high chrome content (47.5% Cr₂O₃), low silica levels (0.7% SiO₂), and in a range of consistent sizes, 25-70 AFS.

However, in its second quarter 2011 results, Amcol reported that the rest of 2011 would remain challenging, and for the year, the Illinois-based company expects its chromite operation to generate losses of 8-12 cents per share as the plant is upgraded to improve product yields.

Joe Howden, director business development, Amcol International Foundries Group, told **IM**: “As with all new plants, we have had some start-up problems, these have and are being addressed via modifications and further investment to increase capacity.”

In the USA, Industrial Minerals Corp. Ltd of Australia, through Oregon Resources Corp. (ORC) is developing the Coos Bay heavy minerals deposit in Oregon, hosting chromite, garnet, ilmenite and zircon.

In February this year, ORC finally received permission to begin work at its mine site in Seven Devils, Coos Bay, Oregon, after local environmental activists attempted to file an injunction to stop preparations at the site.

ORC has also constructed a \$45m. processing facility in Bunker Hill. Production capacity at the site will be 120,000 tpa of heavy minsands concentrate, with 70,000 tpa comprising foundry grade chromite.

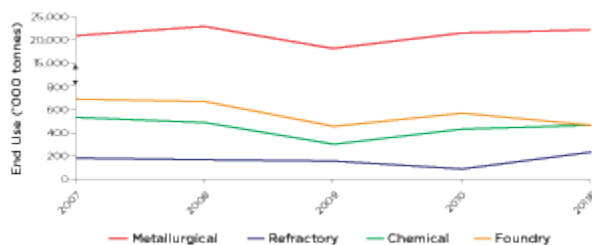
In June, ORC launched its new foundry chromite grade, SpheriChrome, characterised by its round shape and narrow particle size range.

Although the plant’s official opening is late September, ORC started shipments in July and has been gradually increasing volumes while the plant undergoes commissioning.

Philip Garratt, managing director, Industrial Minerals Corp. Ltd told **IM**: “We expect plant commissioning to be completed in the next month [September] and producing at an annual rate of 95,000 tons [short tons] of SpheriChrome^a 8,000 tons of zircon, 20,000 tons of ilmenite (Hi-Iron) and 18,000 tons of garnet.”

“We expect to commence bulk shipment from Coos Bay of bagged product to our main international distribution channels prior to the end of the year.” added Garratt.

World chromite production by end use 2007-2011F (tonnes)



Source: ICDA, MBR, USGS

Mixed reactions

Certainly, the emergence of these new chromite sources has focused the minds of existing suppliers and traders, and has generated mixed comments.

Bernhard Krÿger, managing partner, of trader Cofermin Rohstoffe GmbH & Co. KG, observed: “First of all, competition is good for business. The appearance of new specialised producers is one of the reasons why the market is balancing out again. There is clearly a trend towards a more customised product. Cofermin has been working that way for years. Understanding what a customer really needs is most important in order to optimise quality and price for the final user.”

However, there has been some concern expressed about the new grades coming on to the market. One industry source suggested to **IM**: “AMCOL is short of supply, with limited resources due to open pit mining. There are just a few grades available, quality issues are known, and there are high production costs in grinding raw material to hit the sieve curve.”

In response, Joe Howden, Amcol, told **IM**: “It is much easier to increase production in open cast operations than in underground operations. Our process involves the use of all ROM material which would be a bit difficult without crushing it. We are selling all the sieve grades we envisaged within our business model, and sales levels are close to current plant capacity [100,000 tpa].”

“Amcol’s entry into the market offering foundries technical support, advice, sieve gradings to suit their needs, and our commitment to continuity of supply, have been received as a breath of fresh air to an industry which in the main and historically has been supplied by trading companies, some with little or no foundry trained sales people.” Howden added.

Another cautionary view was expressed by an industry source regarding material from Oregon: “The Oregon material is very fine, and even higher in price than the material from South Africa, and showed a much lower refractoriness than chromite sand from South Africa.”

Philip Garratt, managing director, Industrial Minerals Corp. Ltd, developer of the Oregon deposit, perhaps unsurprisingly, is upbeat on the new sources as bringing benefit to the market: “We view the new supply from Amcol as a positive for the end user. Their focus, like ours, on bringing a quality product to the market will ultimately shift the focus from ‘cheap’, to how foundries are able to improve cost and efficiencies utilising a higher quality facing sand, resulting in cost savings for less scrapped castings and reduced labour time spent on fixing faulty castings directly related to cheap chromite.”

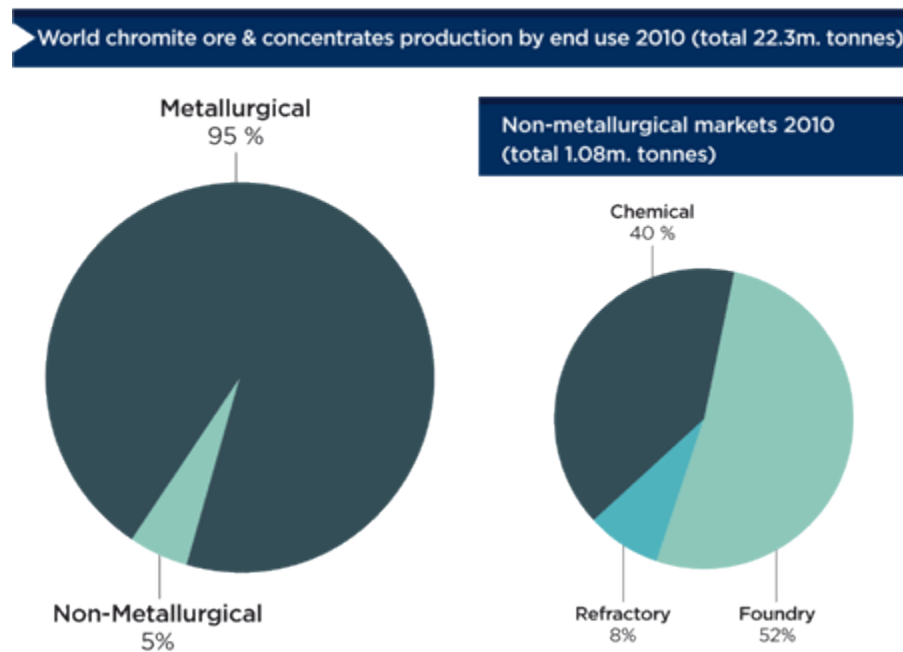
Garratt considers the anticipated volumes from Amcol (around 90,000 tpa) are in the most part replacing the supply that Amcol was buying previously from other South African producers.

“We believe the increased demand from China has enabled [South African producers such as] Rand York to place any lost demand from Amcol. We do not envisage or are aware of any new supply of higher quality chromite product coming to the market in the medium term. Unlike metallurgical grade chromite or other bulk commodities, the end users in our target markets rely on a high level of technical support from us with HA International and Possehl Erzkontor.” added Garratt.

Garratt admitted the ORC material is certainly finer than conventional South African material (85 AFS vs 50 AFS) and added: “Our material is also much cleaner and due to its size and shape enables foundries to reduce the quantity of binder, resulting in less emissions. It is higher in price in some markets than South African material, but is certainly keenly sought by end users”.

Regarding technical properties of the Coos Bay material, Garratt said: “Refractoriness is in fact comparable, and this statement [above, to the contrary] is totally inaccurate as confirmed by numerous world class foundries.”

Key to the Oregon material is one of its target markets as a replacement or alternative to zircon sand in foundry applications, itself in short supply and rising in price. “We are substituted for zircon in many applications and that in itself speaks to refractoriness. If a trader wishes to blend our material with South African material they will find that the results of the castings created are in fact a significant improvement over that which would achieve with the South African material alone.” commented Garratt.



MARKET DEMAND

While new sources of supply might ease the availability for specific non-met. chromite applications, overall, the picture remains one of tight supply and rising prices (*see panel*).

The accompanying charts show the level of non-met. chromite production by end use since 2007 and the split of the non-met. market shares, just over 1m. tonnes in 2010, with foundry and chemicals being the two main markets by volume, followed by refractories.

The chromite chemicals market can be further divided into leather tanning, 37%, metal plating and ABS plastics pickling, 20%, timber treatment, 10%, and colours/pigments, 10%.

In *The Global Chrome Quarterly and Stainless Review - June 2011*, MBR forecasts that chromite production for the three markets in 2011 will rise for refractory and chemical grades, but fall for foundry grades, as follows: refractories, 231,390 tonnes (up a massive 167% on the drop to 86,116 tonnes in 2010); chemicals, 462,780 tonnes (up 7.8%); and foundry, 462,780 tonnes (down 18.4%).

Although there are some mixed opinions about the market, most accounts point to continued shortages in supply for the foreseeable future.

Bernhard Kruger, managing partner, Cofermin, told **IM**: “We feel that the market for chemical and refractory grade chrome is still tight due to strong demand and low availability. Supply and demand for foundry applications seems quite balanced.”

In contrast, Maurizio Ferri, managing director, of trader EuroChrome GmbH, commented: “Foundry is short in supply. In some countries there are still some old stocks left so customers may not realise that material is tight.

“We see a general shortage of supply from South Africa. Refractory grade availability is almost nil.” added Ferri.

Philip Garratt, managing director, Industrial Minerals Corp. Ltd observed: “I believe the current status with respect to the higher quality grades (>46% Cr₂O₃, <0.7% SiO₂) for foundry is tight on the supply side, given the level of demand we are seeing.”

Influencing factors

World chromite production capacity of major producers	
Country	Production capacity
(‘000s tonnes)	
Albania	240
Brazil	900
China	230
Finland	1,300
India	3,250
Iran	400
Kazakhstan	6,300
Madagascar	2,280
Oman	30
Philippines	440

The primary influencing factor for the non-met. chromite market, as ever, remains the ferrochrome market, although this year there have been a number of other significant factors including problems in mining, logistics, utilities, and industrial action in South Africa.

Russia	1,300
South Africa	15,340
Turkey	1,850
UAE	100
Zimbabwe	170
Total	34,130

“Looking back at the past months, strong demand by the industry has been associated with weak performance by various South African mines. Infrastructural and logistical problems in South Africa have influenced the market strongly.” commented Kruger.

Garratt told **IM**: “I see the pressure for higher wages in South Africa having the most effect as it is not limited to chromite production, but across the board, which impacts all areas of business. There is no doubt that utility prices together with wages will continue to increase because failing infrastructure has to be repaired and capacity increased. These upgrades and improvements can only be financed from increased revenue.”

Source: ICDA, MBR, USGS

Zelda du Preez, chief executive officer, Rand York Minerals (Pty) Ltd said: “We are trying to survive the next load of strike action that is taking place throughout various sectors in the South Africa economy. One of which is the petrochemical workers threatening our fuel supplies.”

Transportation within South Africa continues to be a challenge and requires upgrading and capacity expansion. Again funding for these improvements must come from additions in usage charges and tolls. These increases are inevitable as wages, utilities, and transportation are slowly brought in line with the rest of the world.

Contributing factors to the squeeze in supply of South African refractory and chemical grades were considered to include port access and transportation issues coupled with a reduction in current mine output compounding the situation.

Indeed, the expected supply from Amcol’s new operation at Ruighoek was not at the levels anticipated and the company is taking steps to improve this.

MARKET OUTLOOK

Maurizio Ferri, managing director, EuroChrome GmbH, summed up the bottomline: “Regarding [non-met.] chromite availability, the driving force for chromite sand is ferrochrome production.”

“Foundry and refractory sand are value added products, but before producing it, the mine can still decide to feed its ferrochrome smelter with chrome fines. That’s the link between ferrochrome production for stainless steel and the foundry/refractory industry. “ said Ferri.

The major application for ferrochrome is the stainless steel industry. World stainless steel output has been growing at an average of 5.7% pa, and has become the key driver for the growth in ferrochrome output.

MBR reported that global high-carbon ferro-chrome/charge chrome production surged to a new high of around 2.3m tonnes in the first quarter of 2011, with producers encouraged by rebounding demand from stainless steel mills.

However, the second quarter and into mid-year saw demand for ferrochrome from stainless mills recede as stainless steelmakers face reduced demand from their customers as OEMs delayed purchasing owing to plunging nickel prices and a decline in stainless surcharges.

MBR expects ferrochrome supply and demand to become more balanced in the September/October period as lower ferrochrome output meets improved demand from stainless steelmakers.

Global ferrochrome consumption is expected to rise approximately 8% year-on-year in 2011 to 9.1m tonnes.

In the long term, MBR predicts that steady growth in stainless steel production will drive ferrochrome consumption higher, with global ferrochrome consumption forecast to reach 10.4m tonnes in 2015.

Despite new ferrochrome production capacity in South Africa being delayed owing to power outages and the recession, MBR considers that sufficient new ferrochrome production capacity will proceed in time to prevent severe supply deficits or market panics that would drive prices back to 2008 levels.

Periods of significant market tightness are forecast to be most pronounced in 2012-2014, with these years likely to see the highest ferrochrome prices.

“As Asia continues its growth we must link stainless steel production in Asia with chromite availability in Europe.” urged Ferri.

China is the biggest importer of chrome ore, and according to the International Chromium Development Association (ICDA), accounts for 85% of global chrome ore import demand.

In 2010, China imported 8.6m tonnes, an increase of 28% compared to 2009. China was the driving force in the stainless steel industry in 2009 and, in 2010, Chinese stainless steel reached a record high of 11.84m tonnes, an increase of 31%.

However, MBR reported that Chinese apparent consumption of ferrochrome rose a mere 4.3% year-on-year in 2010 to 3.6m tonnes, a sharp contrast to the steeper rise in Chinese stainless steel output in 2010.

Both Chinese ferrochrome production and imports were up sharply through the first five months of 2011, contributing to the excess stock position. However, demand has not been as robust as market participants expected, with mills looking to cut production over the summer months.

MBR sees Asian stainless steel consumption growing by 7-10%, European consumption growing by 10%, while overall global demand growth should be in the region of 7-10%, which is expected to continue through 2012.

Maurizio Ferri, managing director, EuroChrome GmbH, told **IM**: “We see different [chromite] material being brought to the market, with some traders blending raw material to overcome the shortages or even to get a better margin.”

“As these blends and lower quality material, such as UG2 sourced material from platinum production, will have an effect on the final [foundry] castings, we are sure customers will support their known producer.” commented Ferri.

Certainly, the recent slump in ferrochrome demand and resultant pricing, has left certain South African chromite producers with excess low value met. grades, eg. MG4 super met. grades, which they have aimed to sell as foundry grade.

So, the slow mid-year period of stainless steel production in China might, and in some cases has already, eased chromite demand somewhat, and thus loosened South African chromite fines supply for non-met. markets.

This climate might persist for a time as the financial markets remain in disarray. But in the medium to long term, ferrochrome demand and stainless steel production in China is likely to pick up and grow significantly, again consuming more chromite and squeezing non-met. grade availability.

By that time, the new sources in Coos Bay and Ruighoek are likely to have come fully to fruition, and who knows? other new players might be encouraged to join the new breed of chromite suppliers focusing solely on the non-met. chromite sector.

Chromite prices

The chart below shows the story of chromite prices for met. and non-met. grades over the last twelve months - a steady rise in prices to around the second quarter of 2011, when the market stabilised.

Higher energy costs in South Africa, a hike in Chinese chromite demand, and overall tighter supply were all cited as reasons for the rising market.

In addition to the traditional South African 46% Cr₂O₃ foundry grade specification illustrated above, other foundry grades are now on the market such as: +47% Cr₂O₃ grade, specifically for foundry applications, at \$540-580/tonne, 1 tonne bags FOB; and 45.8% Cr₂O₃, wet bulk, FOB at \$480-540/tonne.

Perhaps reflecting the ease in chromite supply as the ferrochrome market dipped a bit mid-year, Bernhard Kruger, managing partner, Cofermin Rohstoffe GmbH & Co. KG told **IM**: “We expect prices for foundry grade chrome sand to remain stable during Q3 and Q4 2011.”

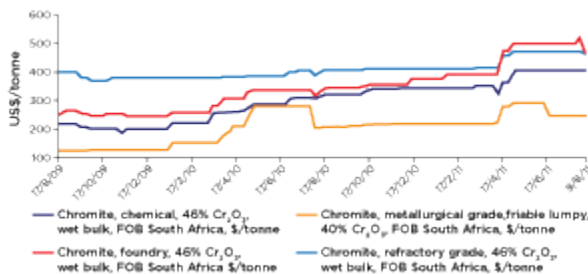
Maurizio Ferri, managing director, EuroChrome GmbH agreed that prices were currently “stable on the high side”, but added “We cannot see prices coming down. We expect a further increase in the second half 2011.”

Philip Garratt, managing director of Industrial Minerals Corp. Ltd, bringing on a new US chromite source, told **IM**: “With respect to the future, we see all chromite grades increasing in price, with these increases becoming evident very shortly as increased costs in South Africa will be offset somewhat by higher prices.”

On the impact of logistics, Garratt said: “Unlike South Africa, moving containerised product from the USA to most world markets is a major cost component for us, and a significant influence. We are generally about 10-15% higher in price, but at least half that is freight. We are impacted by much higher freight costs than the South African producers.”

Thus, the high end of chromite prices might be expected to hit the \$600-700/tonne level before the year is out.

Average chromite grade prices 2009-2011



Source: IM

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