PRECIOUS METALS AUSTRALIA LIMITED

ABN 65 009 131 533

25 October 2005

Company Announcements Office
Australian Stock Exchange Limited
Exchange Plaza
Sherwood Court
PERTH WA 6000

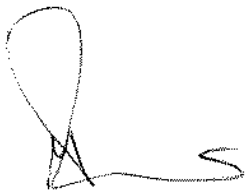
Dear Sir / Madam

Paper Delivered to 2005 International Ferro-Alloys Conference – Tucson Arizona

Please find attached a copy of a paper (and the accompanying presentation) entitled "***A Feasible Strategy for Ferrovanadium and the Windimurra Vanadium Mine***" which has been given at the above conference today by PMA's Managing Director, Roderick Smith.

The International Ferro-Alloys Conference is organised by Ryan's Notes, one of the leading metals industry journals, and which is attended by some 580 delegates from around the world who have an interest in ferro-alloys. These delegates include representatives from the leading steel and ferro-alloy producers and steel industry suppliers.

Yours sincerely
PRECIOUS METALS AUSTRALIA LIMITED



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A FEASIBLE STRATEGY FOR FERROVANADIUM (and THE WINDIMURRA MINE)

Address by :- Roderick J.H. Smith B.Comm. C.A. F.S.I.A.
CEO, Precious Metals Australia Limited
to the
Ryan's Notes 2005 Ferroalloys Conference
Tucson, Arizona
24 October 2005

The theme of this conference is Finding Feasible Strategies for Ferroalloys – by talking about it! Given this is the vanadium paper, I am compelled to talk about a strategy for ferrovanadium. When last addressing this conference in '98, I proposed new vanadium production should be primary production, diversified outside South Africa, and that Windimurra in Western Australia was the first choice.

Since that conference, the giant Windimurra mine was indeed built by my company, Precious Metals Australia Limited with its partner, at a cost of over $115m with further infrastructure investment by others of $70m. Windimurra produced 10% of world production for a few years, however the ownership changed, and the mine was closed and partly dismantled.

My "strategy" for you, is simply to address the wild vanadium price fluctuations that make investment decisions relating to consumption and production difficult. Get rid of the traders, smooth out those price fluctuations, and demand for vanadium and with it production capacity, will increase more certainly and more steadily.

Slide 2 – Agenda

Lets start with a brief look at the vanadium market, its price history and influences (sorry, but every talk on vanadium has to go there) and general observations about vanadium production, before moving on to Windimurra.

This is an educated audience so I'll devote just one minute to vanadium uses.

Commercial production of vanadium only began in the 1960's. Unlike other metals whose markets are fully developed, new applications continue to be found for vanadium's useful chemical and physical properties. Vanadium is indeed a 21st century miracle material. The multiplicity of vanadium uses ensure that as mankind strives to make things smaller, stronger, lighter and safer there will be ever increasing demand for the metal and the need for gradual increases in reliable, cost effective vanadium supply.

Slide 3 – Uses 1

Vanadium's principal use is as a strengthening addition to carbon steel and high strength steels used in structural applications such as oil and gas pipelines, rebar in building and construction and automotive use. Tool steels and stainless steel use are also important.

Slide 4 – Uses 2

Titanium aluminium vanadium alloys are used in aircraft components, high speed air frames, rocket motor casings and gas turbines. Non steel use includes superalloys, welding and hardfacing, magnet and alloys used in nuclear engineering and superconductors. Vanadium chemical catalysts are used in the manufacture of sulphuric acid, maleic anhydride, EPDR rubber and desulphurization of sour gas and oil.

The vanadium price can be volatile over time due to a number of factors including demand for steel which is in turn determined by the prevailing global economy, but it has also been adversely impacted by trading positions.

Look at the 20 year graph of vanadium pentoxide prices.

Slide 5 – Vanadium Real Price Graph

The wild ride is a disgrace really. The average historic pentoxide price is a healthy US$4.11/lb or US$5/lb adjusted for inflation. At this price users profit from vanadium's virtues and producers profit from their investment in plant. The price however, has spent little more than a few days during the last 20 years actually at the average, falling to a quarter of the average a few years ago, and soaring to seven times as much last year!

How can we expect those alloy and chemical makers to research and develop new uses for vanadium when, every few years, they find they can't get any for months at a time, or have to pay seven times the average price!

Fortunately, a little vanadium goes a long way. Alloys containing a few percent vanadium impart vastly superior properties at little cost, meaning the price of vanadium has little impact on the price of the finished goods, and demand is very price inelastic. Within reason!

Ryan's Notes reported that last year Chinese producers switched to higher grade vanadium steel for rebars, due to increased construction standards in their country. Early THIS year though, when prices peaked, they switched back again, convincing the government to eliminate the vanadium requirement. Some mills substituted niobium for vanadium. Several consumers simply used twice the

amount of inferior non-vanadium rebar, to achieve the same strength requirements!

Slide 6 – FeV/FeNb Price Graph

We shouldn't allow this to happen, the niobium industry doesn't! Look at the niobium price compared to the vanadium price over the last 30 years. Which metal's price graph would inspire YOU to invest in usage capacity?

What causes these appalling fluctuations in the vanadium price? There's lots of talk every month attributing recent movements to say a strike at one plant, closure of another, a big pipeline order, changes in supply or demand for various minor causes, but at the end of the day vanadium demand tracks gross steel production, which has grown strongly for the last seven years.

Slide 7 – World Crude Steel Production

Have a look at this graph of vanadium pentoxide prices compared to another metal.

Slide 8 – Vanadium Pentoxide/Steel Making Pig Iron Price

See how the vanadium price follows the metal price faithfully, like a dog on a leash? The price moves are perfectly in sync but vanadium price changes follow the metal price with a regular one year delay. Can you guess the mystery metal? Steel making pig iron.

I've truncated the scale of the iron price in the graph. The prices move in sync OK, but the vanadium price movements are far more exaggerated than the other. Who's the culprit?

The ferroniobium market is characterised by long term contracts at fixed prices. Almost every pound is sold producer to consumer. They do it a lot better than we do! Almost all vanadium sales are priced on the spot market. Frame contracts might be for one year but even then, are commonly priced by reference to the month of delivery Ryan's Notes price.

This suits the traders, but facilitates the volatility that does not suit the people with the big investment, making or using the stuff!

Slide 9 - Vanadium Production Consumption and Stockpiles

In the period crude steel production levelled off in 2000 to 2002 one trader gave a floor price to two of the three mines they represented, close to the long term average. This arrangement kept the mines output at full steam and was almost solely responsible for the huge build up in vanadium inventories. As crude steel

production and therefore vanadium consumption soared in the past two years the trader was able to sell all of that stock into the rising market, reportedly making a vast trading profit – certainly more than any of the mines themselves made!

Of those three mines, one has since run out of ore and closed and another was closed and partially dismantled. That trader now represents half the volume they once commanded, and their influence has diminished.

Traders generally charge a few percent for selling a producer's material, but their real profits can come from trading in a volatile market. Position taking by traders I suspect, has had more of an effect on vanadium price movements than short term changes in supply and demand.

Over 85% of vanadium is "converted" to ferrovanadium, the form required for alloying with steel.

Five years ago there was little conversion carried out by vanadium producers. Independent converters such as Sadaci in Belgium, Nikom in Czechoslovakia, Masteralloys in Canada and Nippon Denko and Taiyo Koko in Japan toll converted vanadium pentoxide flake for traders who took material from a range of sources and then sold the converted ferro to end users. There aren't many individual large users of vanadium outside ferrovanadium, so the traders, not the producers, were often the ones dealing with the important customers.

Highveld and Triebacher were early producers to get serious about their own conversion, followed by Xstrata and the Russian producers. In 2005 all producers convert most of their oxides into ferrovanadium at source, leaving independent converters – and the traders out in the cold. There has been a concerted effort by producers to reclaim control of the vanadium market. Interestingly, PMA wanted to convert to ferrovanadium at Windimurra, but was not allowed by its partner.

The location of ferrovanadium conversion activity is also influenced by US tariffs.

Slide 10 - US Tariffs

The US imposed stiff, 100% or so anti-dumping duties on virtually every pound of ferrovanadium sourced from a mine - being that from South Africa, China and Russia. The regular US tariffs alone are 5.5% on pentoxide and 4.2% on ferrovanadium. Because of this Xstrata have built a small facility in Swaziland where they convert material for sale to the US, the Russians go to Czechoslovakia, others go to Canada to benefit from NAFTA.

Russian vanadium producer Vanady Tula bought control of Czech converter Nikom in May, eliminating the possibility of traders converting material for sale

on the free market there, and accelerating a trend that could remove the need for traders in the market, according to Leonid Novikov, the chief of Tula[1]. The "free market" in vanadium may become a thing of the past as the major suppliers take charge of the market. According to Novikov "removing the middleman from the market will increase price stability…producers will benefit from stability whilst traders want turbulence…"

Happily Australia enjoys a new Free Trade Agreement with the US, under which all tariffs on mineral and metal products have been eliminated. Australian mineral and metal exports to the US already exceed $1 billion per year.

Slide 11 – Vanadium Sources est. 2002

Large-scale production of vanadium only started in the late 60s when Highveld found a way of producing steel from a vanadium and titanium-bearing magnetite ore at Mapochs, liberating a co-product slag containing 25 per cent vanadium pentoxide.

Highveld's magnetite ore is low in iron content at 54 per cent compared to say, Australian haematite iron ore grading up to 68 per cent Fe.

Even lower grade magnetite ores have also been exploited for their vanadium content as a co-product of steel production in the other formerly economically and policitically isolated economies of Russia and China. In recent years though, China's enormous growth in steel production has been served by imported Australia haematite iron ore, not by their own low grade vanadium bearing magnetite.

Significant new production has come from Primary producers, where the vanadium is derived from ores mined solely for the purpose of producing vanadium.

Vantech and Rhovan were two successful primary producers at the low end of the cost curve; however Vantech has now exhausted its ore and closed whilst Rhovan has expanded.

Costs of primary production complete well with production from slag, which depends for its economics on the producer's ability to produce and sell steel from a low iron grade ore body. A steel plant costs billions and takes years to build, and produces a slag which still has to be subjected to the same salt roast vanadium recovery method as for primary production.

[1] Interview in Metal Bulletin 11 July 2005

The Rhovan mine producing 20 mlbs of pentoxide equivalent per annum, similar to a rebuilt Windimurra, should make a cash profit of over US$200m this year - many times more than the entire mine cost to build.

US vanadium production is restricted to recycling of vanadium bearing wastes and residues. Whilst an important source, the level of production is dependent on availability of the wastes and residues.

Claims there is unutilized vanadium production capacity in the world are patently false given the robust price and shortages of supply over the last two years. Any economic capacity must already be in production.

There *is* a need for new primary production. The next question is, "where should it be sourced?"

South Africa will always be a reliable and important supplier of vanadium, but it already contributes more than 40 per cent of world production. Western Australia is one of the world's great resource provinces – is a great place to operate a mine, and is close to Asian markets. China now gets most its iron ore, significant chrome, manganese and nickel from WA, and it makes sense to get its ferrovanadium there as well.

Let's compare the Windimurra oxide ore with that treated by competitors. I will assume that the audience has a broad understanding of the commonly used mining and vanadium extraction methodology.

Slide 12 - (Comparison of Windimurra Oxide Ore to Unoxidised Ore)- Ore

Mining at the Windimurra project is considered one of the most straightforward open pit operations in Australia. Mining is by bulldozer push down the face at an angle of 25^0 during which ore is blended in pit, and then hauled to the ROM pad for crushing. Virtually no waste mining, blasting, pit dewatering or grade control is required during the life of the mine.

Click to reveal table

Windimurra is the world's only known deposit of <u>oxidised</u> vanadiferous, titaniferous magnetite. This is because it lies within the oldest known part of the earth's surface, the West Australian archean shield. Chemically it is the same as ores mined in the Bushveld, Russia and China and is the same or better grade. But physically it is very different, in that nature has oxidised the rock to a depth of 40 meters – it is soft and cheap to mine, crush and grind, yet the magnetite can still be separated magnetically.

Ironically this very softness caused problems for the first development of Windimurra, but also gives compelling advantages justifying its rebuilding.

Slide 13 - Comparison of Windimurra Oxide Ore to Unoxidised Ore-Beneficiation

The ore is so soft that considerably less energy is required for crushing and grinding to liberate vanadium. Energy consumption is less than half that for South African ores.

Slide 14 -Comparison of Windimurra Oxide Ore to Unoxidised Ore-Roasting

The major process reagents, a sodium flux and ammonium sulphate, are available as unused by-products of the local alumina and nickel industries. PMA owns Australian and South African patents for use of the freely available sodium oxalate. South African producers have to purchase sodium carbonate instead.

The Windimurra kiln will again be fired by natural gas rather than by coal, which gives advantages in kiln availability, operating cost and product purity and enables it to employ heat recovery, reducing gas consumption by 30%.

A 365km gas pipeline has already been built to the Windimurra mine. Gas in Australia is not tied to other energy sources such as coal or oil and so its cost has not increased dramatically in recent times.

So, this leads to the big question, "How did Windimurra work out the first time?"

Slide 15- How did it Work? Mining and Crushing

Mining of ore turned out as planned. This photograph shows the pit as it is now, after free digging 7 million tonnes of ore. Mined tonnage was 4% above, and the vanadium grade 3% above expectations. Crushing was carried out by a single jaw, at minimal cost.

Slide 16- How did it Work? Milling and Beneficiation

Ironically, the very softness of the ore caused problems in milling and therefore in beneficiation. The 5.6MW ball mill installed was similar to our then partner Xstrata's Rhovan mine, which employs a 5MW mill. Our ore turned out to be so much softer than envisaged, that instead of exploiting the advantage, the mill overground the ore into a slime that was then more difficult to magnetically separate. Consequently magnetite production was limited to about 70% of nameplate.

A replacement mill half the size will not only cost less to install and to run, but will give far higher recoveries and production.

The low power draw at the milling circuit resulted in the power station being too big - it couldn't indeed deliver the lower output. A new power station with smaller units will be more fuel efficient, and have far higher availability.

Slide 17- How did it Work? Roasting

Once the magnetite concentrate containing vanadium was produced, it behaved much like Rhovan's. The roasting kiln functioned extremely well as did the subsequent hydrometallurgical process, which again, were conventional in concept although more advanced. Standard Windimurra pentoxide was 99.9% pure compared to the 98% standard.

The kiln consumed considerably more gas than expected, despite the planetary cooler. The addition of preheating and magnetite drying using waste heat is expected to significantly reduce gas consumption and boost throughput.

Where to from here?

Slide 18 – Windimurra Redevelopment

The previous owner of the mine removed much of the plant and equipment at Windimurra, however key items like the rotary kiln remain, as do all the buildings, plant services, bore fields, roads etc. In total PMA has bought back assets with a construction cost (in 1999) of approximately $58m.

PMA believes that the Windimurra vanadium mine can be successfully reopened, and have appointed a major engineer to carry out a detailed reengineering review and design study, aimed at addressing any shortcomings in the original development, and further exploiting the unique advantages of the Windimurra project. A bankable feasibility study will be completed early 2006 at a cost of approximately $3.5m, including testwork and overheads, followed by rebuilding with first production early 2007.

PMA is in a unique position not afforded when the project was first built, in using actual operating data from 3 years of mining and processing together with the hands on experience of previous key team members whom have been recruited by PMA.

This time around PMA will produce mainly ferrovanadium, for direct sale to end users, rather than vanadium pentoxide as our trader once demanded, thus continuing the strategy being employed by others in the vanadium industry, of disempowering the traders, stabilising vanadium prices and ensuring a long and profitable future for the vanadium industry – and for Windimurra.

Slide 19– Windimurra Summary

Windimurra is the only massive vanadium resource in the world hosted in an oxidised ore. The ore is of the same grade as the best competitor yet enjoys considerable advantages through cheap mining and low cost processing. The project will be somewhat unique in being built and then rebuilt a few years later, taking into account the lessons learned from a seven million tonne "trial". Key elements are already in place, but the new plant will be bigger and more efficient with lower unit cost as a result.

Slide 20 – Vanadium Strategy

Unconsciously working together, the vanadium industry has begun implementing a strategy for rationalisation of the industry and stabilisation of price and supply. The strategy employs the processing by the producers of vanadium through to its most widely used form – ferrovanadium. This is not only cost efficient but minimises the role of traders whose emphasis is on trading profits through price instability. The reduction in the influence of one major trader and a reduction in opportunities for traders generally to speculate on price movement, and to interpose between producers and users, will lead to longer term relationships between the two, and to production and consumption growth and stability.

The Windimurra vanadium mine in Western Australia will have an important role in providing a long term supply of high purity ferrovanadium, to meet this growing market. Our strategy is to be a very long life, reliable producer of the highest quality product, with alliances providing certainty to the mills and other end users giving them the confidence to plan for long term growth using products containing vanadium.

Thank you for your attention.

Slide 21 – Windimurra Design Schematic

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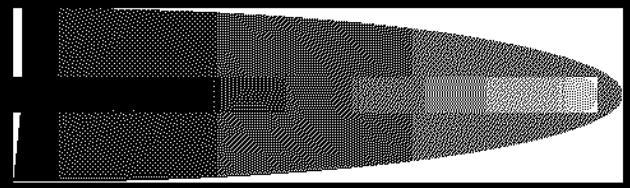

"A Feasible Strategy for Ferrovanadium"

(and The Windimurra Mine)

Roderick Smith B. Comm. C.A. F.S.I.A.
CEO Precious Metals Australia Limited

Ryan's Notes Ferro-Alloys 2005 Conference
Tucson, October 23-25

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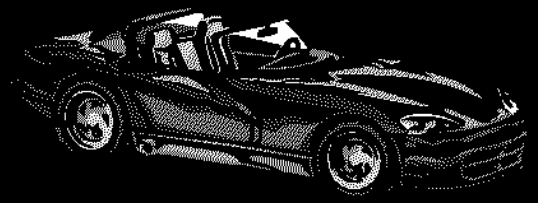
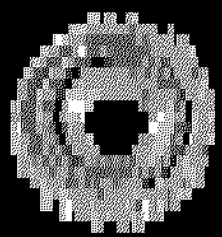
Agenda

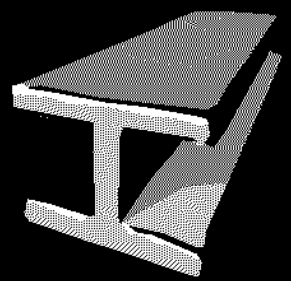
- Vanadium uses
- Price history and influences
- Industry structure
- Windimurra unique advantages
- Windimurra – what happened?
- Windimurra re-development
- Vanadium strategy



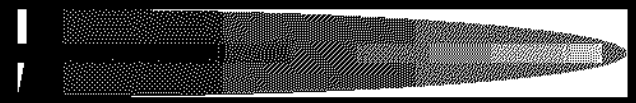
Uses 1

- Carbon steel
  - Reinforcing bars
- HSLA steel
  - Construction, pipelines, ships, autos
- Tool steels
  - High-speed tools, wear resistant parts

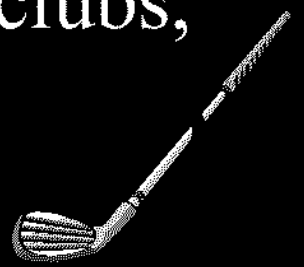


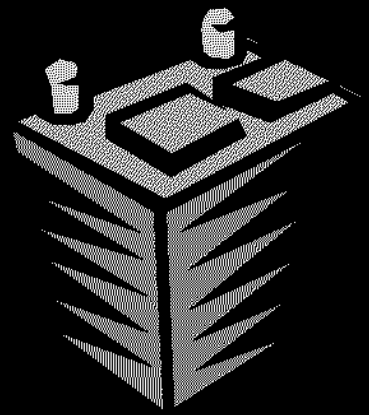


Uses 2

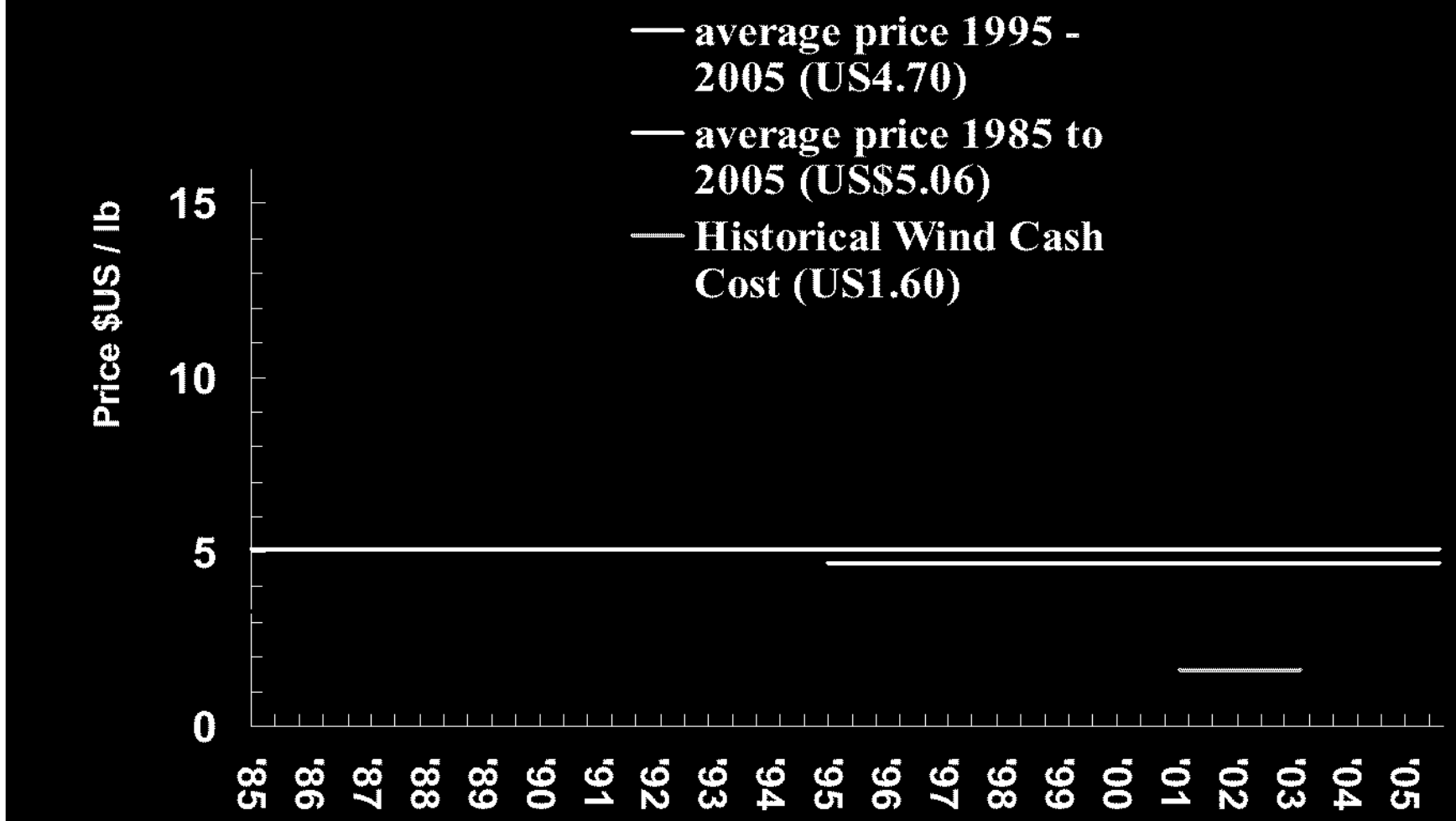


- Titanium alloys
  - Jet engine parts, airframes, golf clubs, rockets, nuclear
- Chemicals
  - Catalyst for sulphuric acid and plastics
  - Dietary, glasses, pigments
- Batteries, new redox technology





Vanadium Real Price (3% inflation)



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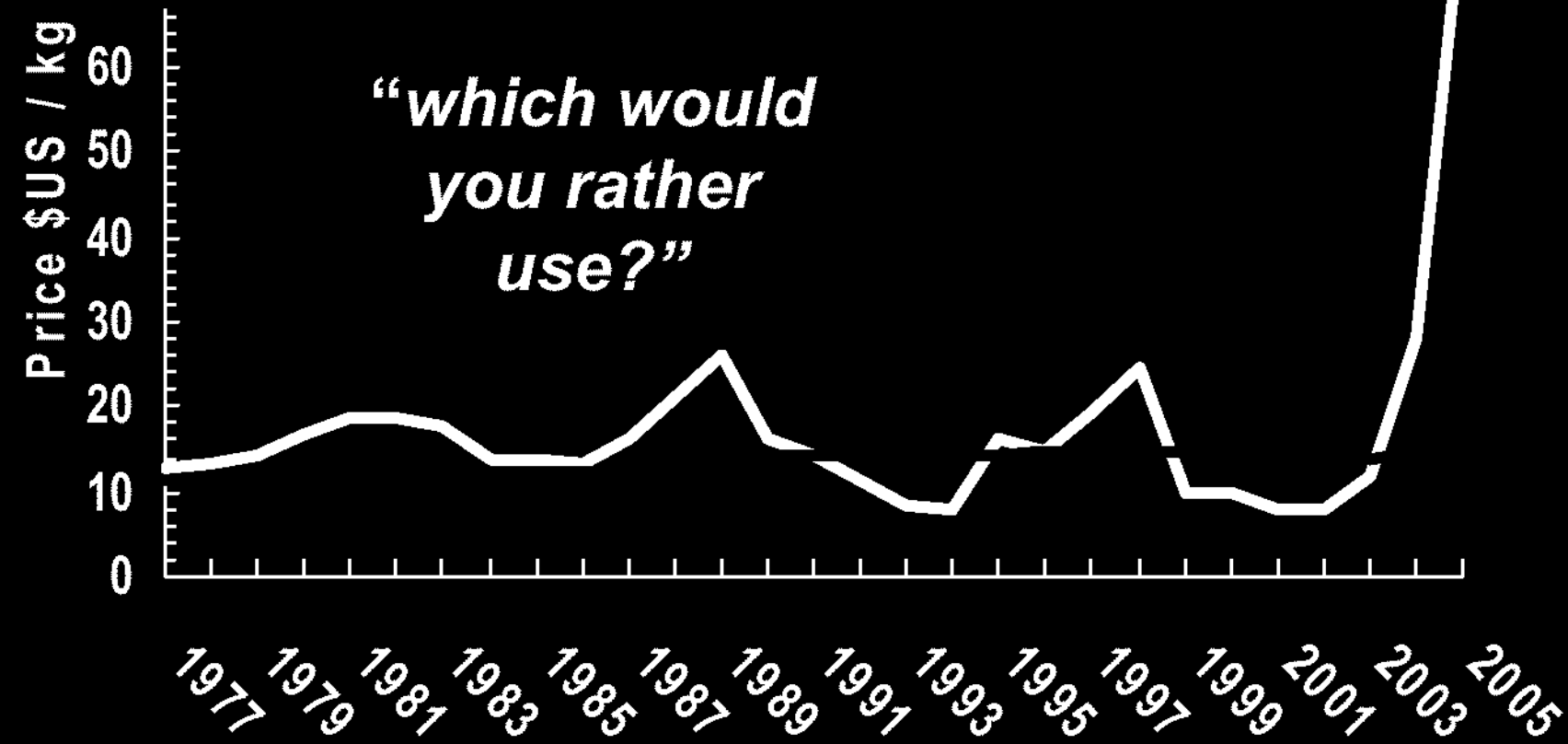
FeV / FeNb Price



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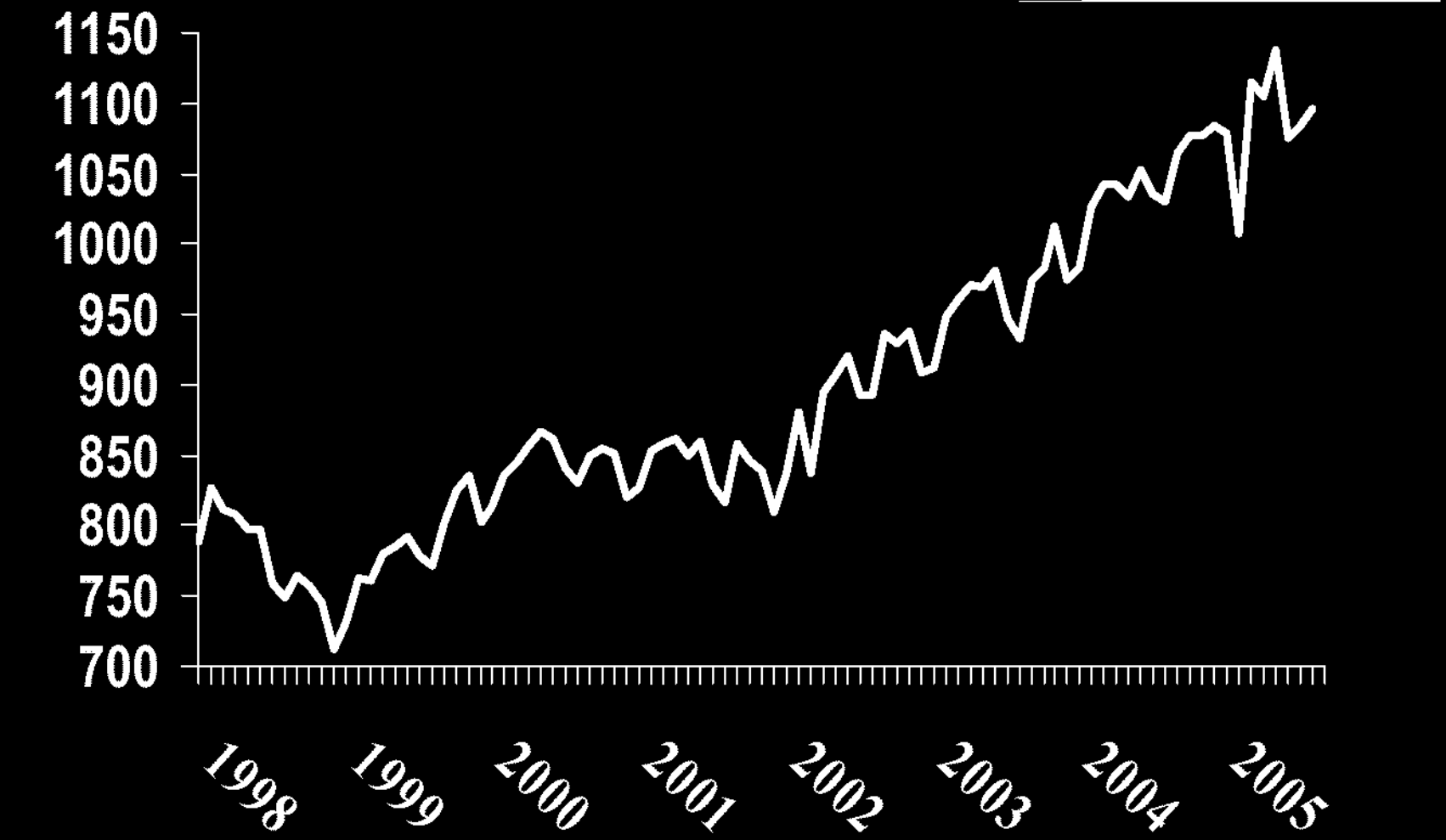
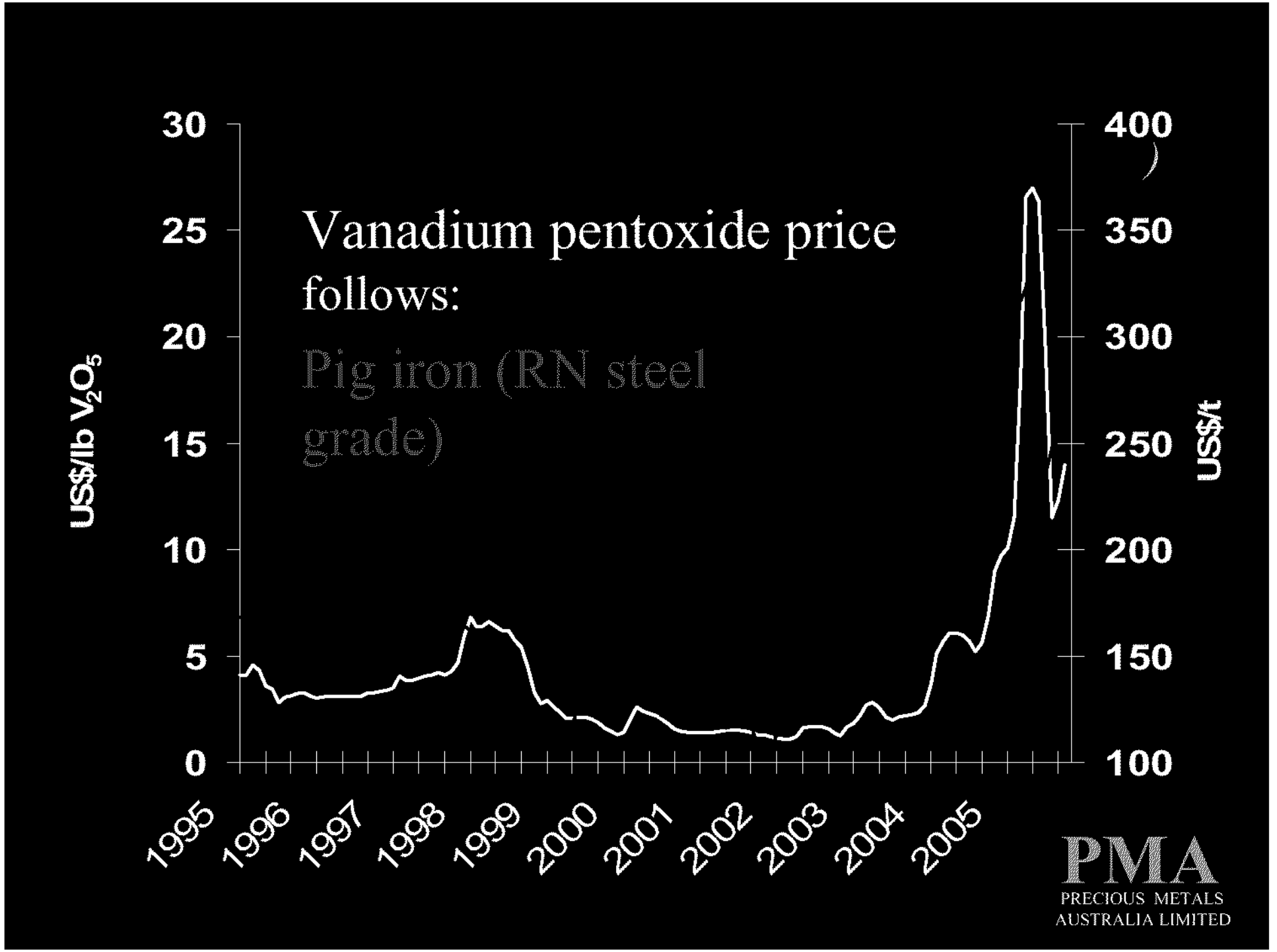
World Crude Steel Production




Vanadium pentoxide price follows:
Pig iron (RN steel grade)
US$/lb V_2O_5
US$/t
30
25
20
15
10
5
0
400
350
300
250
200
150
100
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
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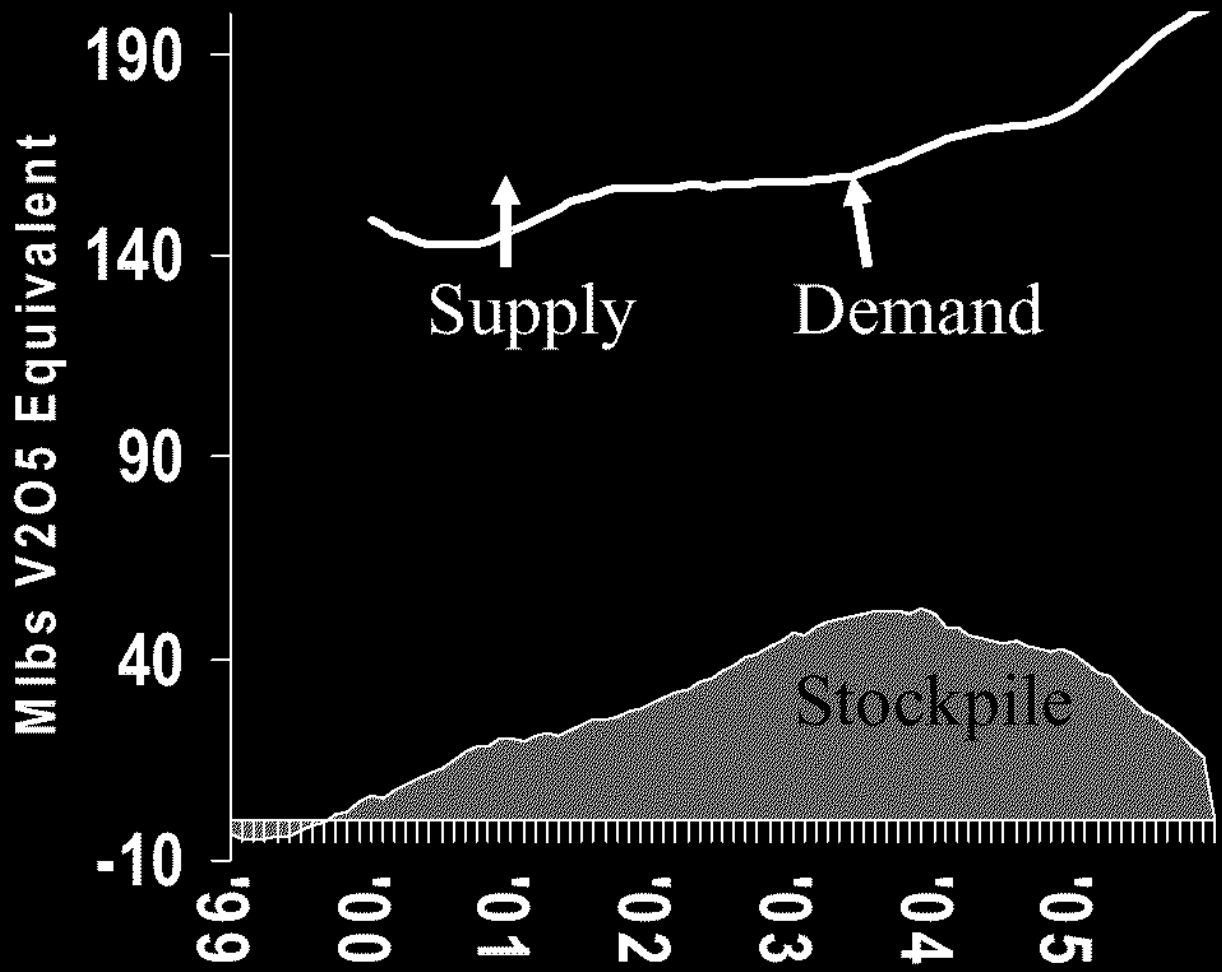
Production, Consumption, Stockpiles



Source: Stratcor paper, RN conf 2004

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US Vanadium Tariffs

	V_2O_5	FeV	FeV Anti-Dumping
South Africa	5.5%	4.2%	116%
China	5.5%	4.2%	67%
Russia	5.5%	4.2%	108%
Australia (FTA)	zero	zero	zero

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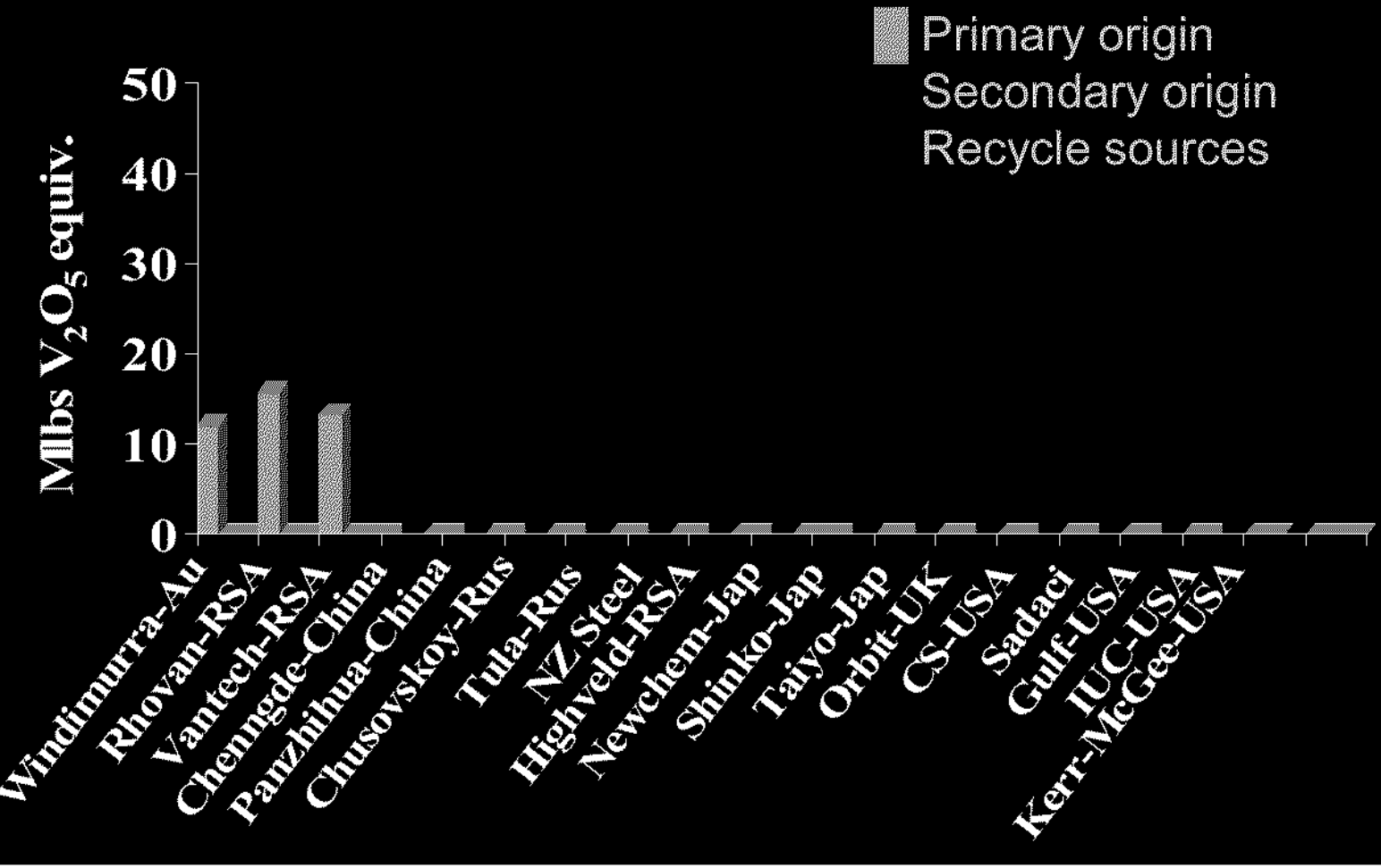
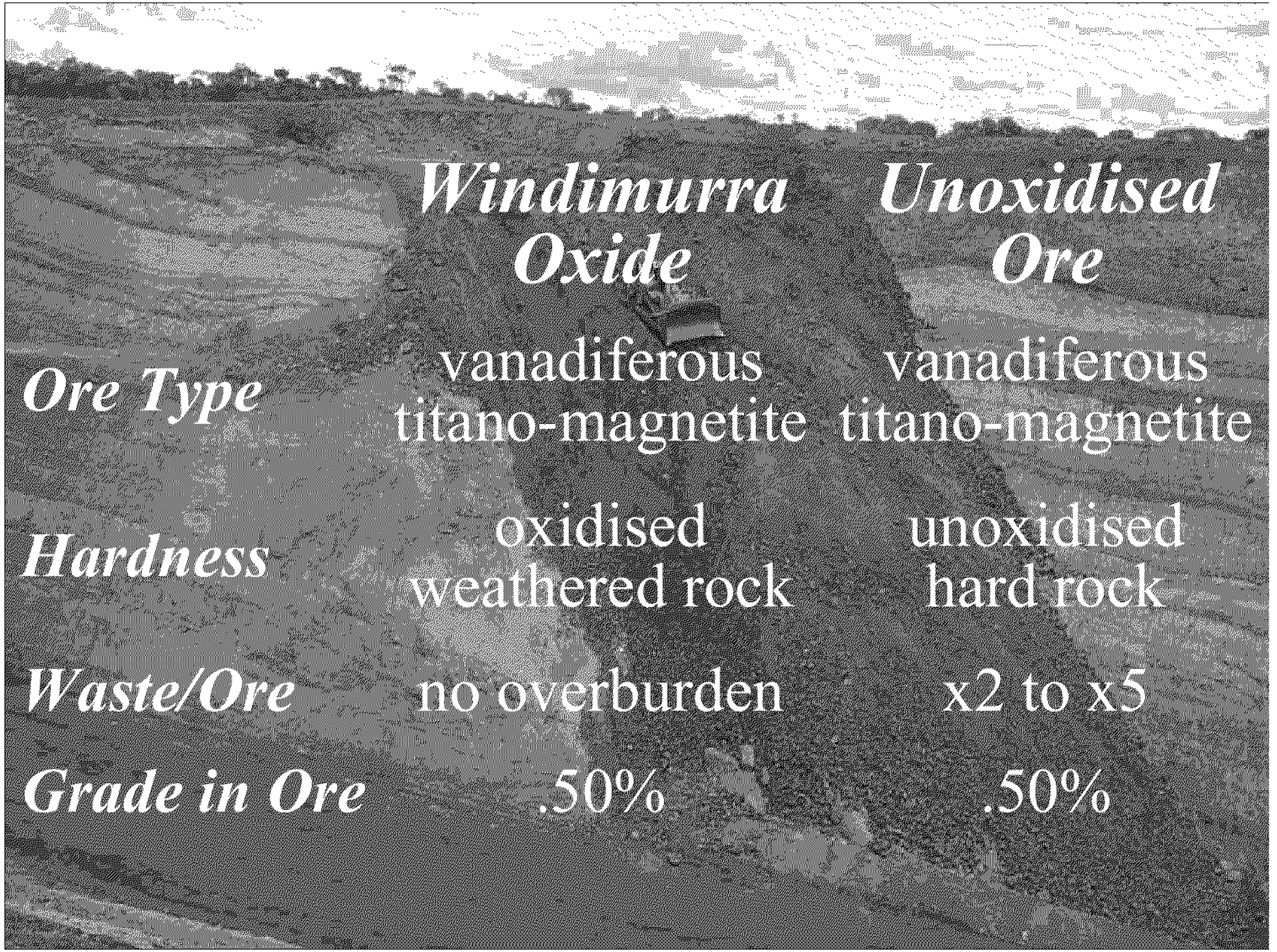
Vanadium Sources guess 2002





	Windimurra Oxide	*Unoxidised Ore*
Ore Type	vanadiferous titano-magnetite	vanadiferous titano-magnetite
Hardness	oxidised weathered rock	unoxidised hard rock
Waste/Ore	no overburden	x2 to x5
Grade in Ore	.50%	.50%

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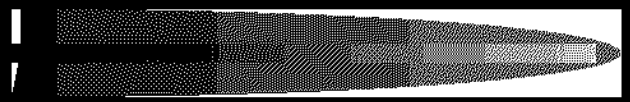
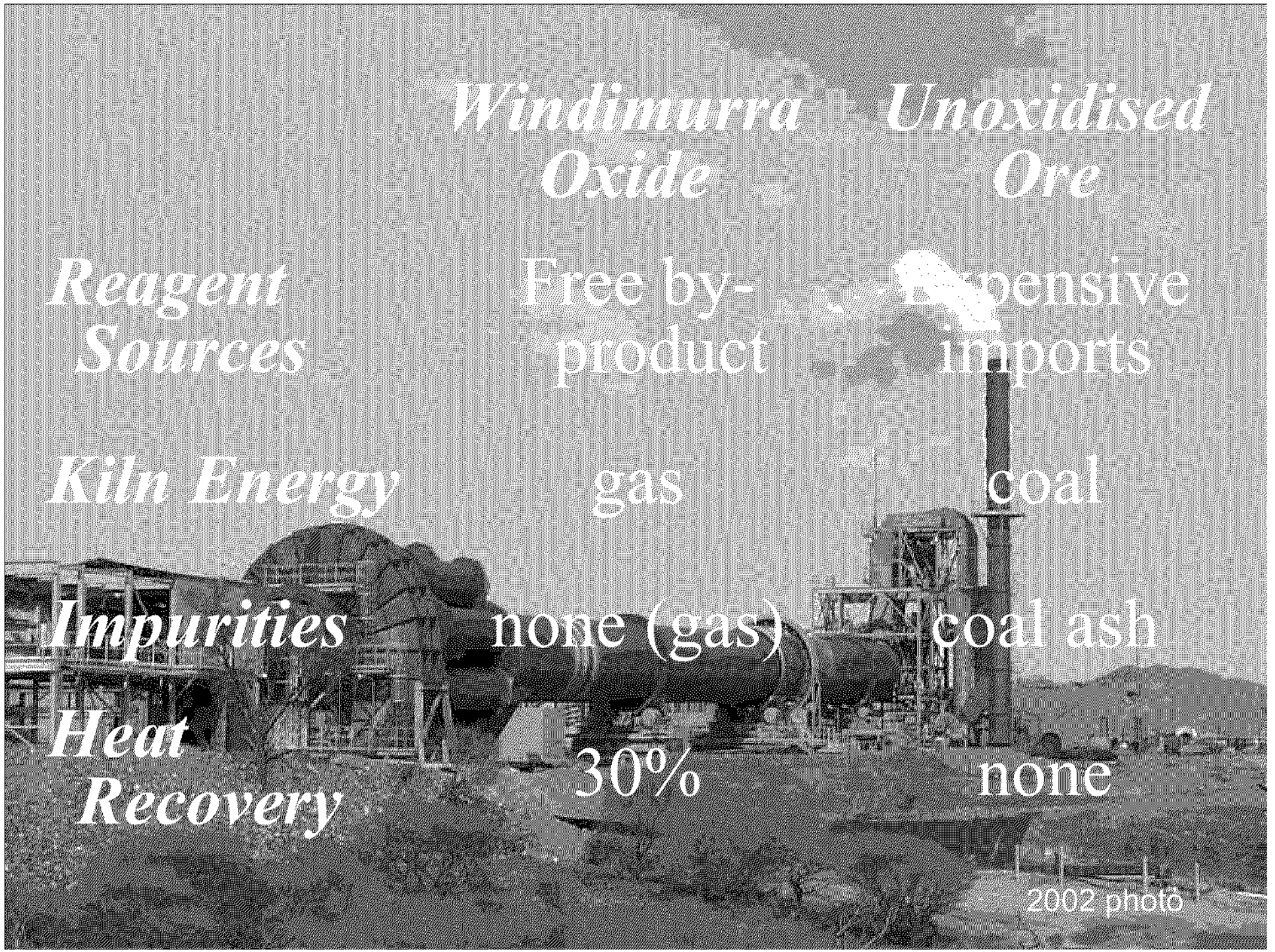
Comparison - Beneficiation



	Windimurra Oxide	Unoxidised Ore
Mining	Free Dig	100% Blast
Milling	2.5MW	5 MW
Bene-ficiation	high intensity magnetic	low intensity magnetic


Windimurra Oxide
Unoxidised Ore
Reagent Sources
Free by-product
Expensive imports
Kiln Energy
gas
coal
Impurities
none (gas)
coal ash
Heat Recovery
30%
none
2002 photo

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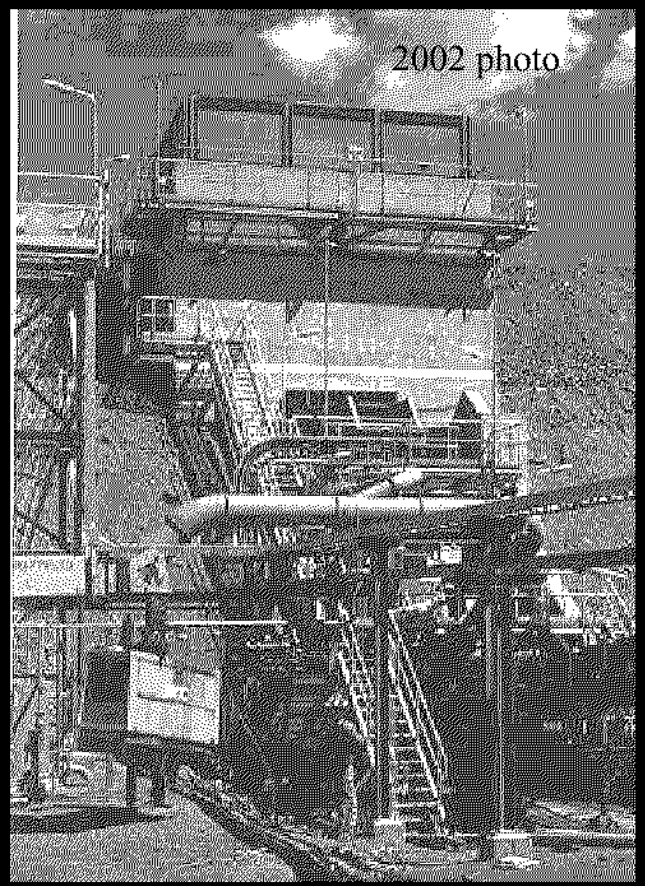
So how did it work?

Open Cut Mining - as planned



Crushing – as planned

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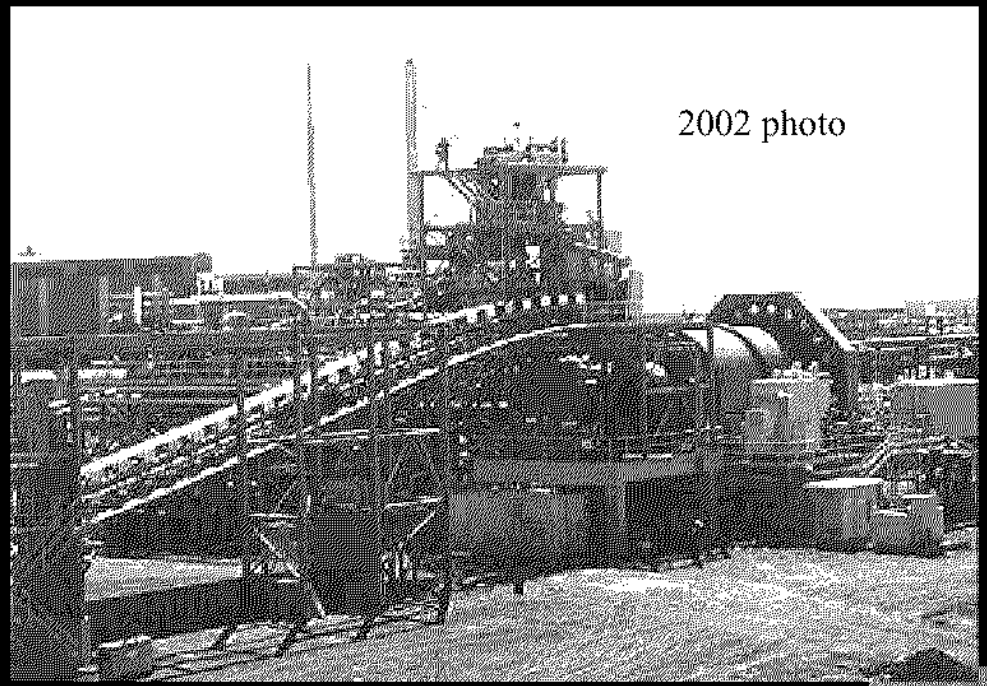
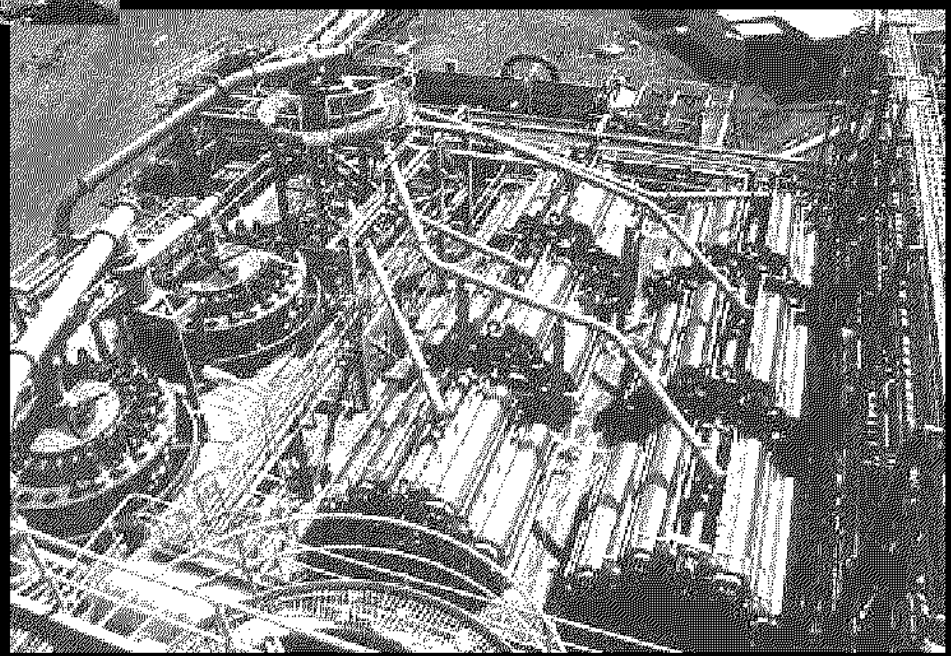


Beneficiation –
suffered from
overgrinding



Milling – major issue

- Ore twice as soft
- Mill x2 overpowered

→ ore was overground

→ reduced recovery

Roasting Kiln – functioned well

- gas consumption higher than expected
- Pre heating is a solution

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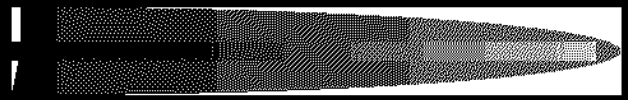
Windimurra Redevelopment

- Re-engineering study (Dec ’05)
  - Engineers appointed
    - Identify efficiency gains
    - Identify cost saving opportunities
    - Re-optimisation of plant design
- New Bankable Feasibility Study (mid ’06)
  - Finalise and cost optimised design
- Mine re-building 9 months

Windimurra Oxide Vanadium Mine



- Only oxide vanadium ore
- Same grade
- Fundamental advantages
- Lowest quartile costs
- 7 million tonne “trial”
- Lessons applied in redevelopment

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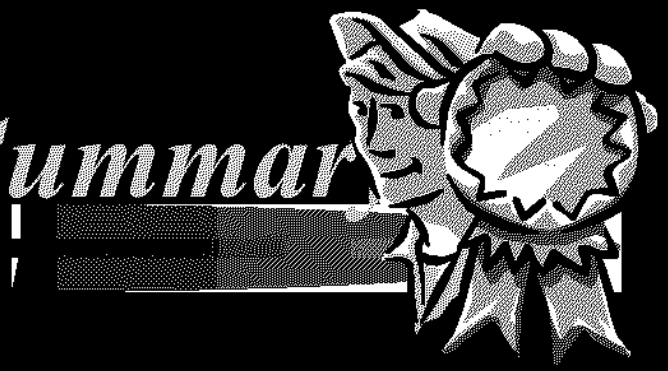
Strategy Summar



- Producers become converters
- Minimise role of traders
- Long term Producer – User relationships
- Stable prices
- Consumption and Supply grow together


Windimurra Design