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**THE MARKET FOR IRON ORE
CURRENT TRENDS AND FUTURE PROSPECTS**

**PRODUCTION COSTS FOR IRON ORE
RESULTS AND DOCUMENTATION OF COST MODEL**

January 2005

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PRODUCTION COSTS FOR IRON ORE, 2004

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THE MARKET FOR IRON ORE – CURRENT TRENDS AND FUTURE PROSPECTS

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SUMMARY OF IRON ORE MINING COSTS

Business year		2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Site		65	64	63	755	58	67	5740	62	87	61	66	71	
Country		Canada	Canada	Canada	USA	USA	USA	USA	USA	USA	USA	USA	USA	Brazil
Company		IOC	QCM	Wabush	Empire	United Tacon.	Hibbing	Ispat Inland	Keewatin	Northshore	Tilden	USX	Corumbaense	
Mine		Sept Iles	Port Cartier	Pte. Noire	Palmer	Eveleth	Hibbing	Minorca	Keewatin	Reserve	Ishpeming	Minntac	Corumba	
FOB Point		Sept Iles	Port Cartier	Pte. Noire	Escanaba	Duluth	Superior	Duluth	Superior	Silver Bay	Marquette	Two Harbors	N. Palmira	
PRODUCT SHIPMENTS - TOTAL	000t													
Lump ore	000t													
Sinter fines	000t													
Pellet fines	000t													
Pellets	000t													
BF acid BF + DRI	000t													
BF flux	000t													
PRODUCT SHIPMENTS - TRADED														
Lump ore	000t													
Sinter fines	000t													
Pellet fines	000t													
Pellets	000t													
BF acid BF + DRI	000t													
BF flux	000t													
QUANTITIES														
Ore mined	000t													
Total material moved	000t													
OPERATING COSTS BY STAGE														
Cost per tonne ex mine	\$/t													
Cost per tonne ex primary crusher	\$/t													
Cost per tonne ex concentrator	\$/t													
Cost per tonne ex pellet plant	\$/t													
TOTAL COSTS BY STAGE														
Cost per tonne ex mine	\$/t													
Cost per tonne ex primary crusher	\$/t													
Cost per tonne ex concentrator	\$/t													
Cost per tonne ex pellet plant	\$/t													
TOTAL COSTS BY PROCESS														
Drilling, blasting, mining	\$/t													
Crushing, washing, drying	\$/t													
Concentration	\$/t													
Pelletising	\$/t													
Transport at all stages to FOB point	\$/t													
Stack, reclaim and loading at FOB point	\$/t													
Administration, property tax + royalties	\$/t													
Working capital charges	\$/t													
Total Costs, loaded at FOB point	\$/t													
COST SUMMARY														
Raw Materials, Supplies & Services	\$/t													
Energy	\$/t													
Labour & Overheads	\$/t													
Total Operating Costs FOB	\$/t													
Working capital charges	\$/t													
Fixed capital charges	\$/t													
Total Costs FOB	\$/t													
Normal Profit	\$/t													
Total Costs + Profit FOB	\$/t													

Appendix H.2

SUMMARY OF IRON ORE MINING COSTS

Business year		2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Site		65	64	63	755	58	67	5740	62	87	61	66	71	
Country		Canada	Canada	Canada	USA	USA	USA	USA	USA	USA	USA	USA	USA	Brazil
Company		IOC	QCM	Wabush	Empire	United Tacon.	Hibbing	Ispat Inland	Keewatin	Northshore	Tilden	USX	Corumbaense	
Mine		Sept Iles	Port Cartier	Pte. Noire	Palmer	Eveleth	Hibbing	Minorca	Keewatin	Reserve	Ishpeming	Minntac	Corumba	
FOB Point		Sept Iles	Port Cartier	Pte. Noire	Escanaba	Duluth	Superior	Duluth	Superior	Silver Bay	Marquette	Two Harbors	N. Palmira	
OPERATING COSTS BY PRODUCT														
Lump product	\$/t FOB wet													
Sinter fines product	\$/t FOB wet													
Pellet fines product	\$/t FOB wet													
Pellet product	\$/t FOB wet													
Average product, loaded at FOB point	\$/t FOB wet													
Lump product	c/mtu FOB dry													
Sinter fines product	c/mtu FOB dry													
Pellet fines product	c/mtu FOB dry													
Pellet product	c/mtu FOB dry													
TOTAL COSTS BY PRODUCT														
Lump product	\$/t FOB wet													
Sinter fines product	\$/t FOB wet													
Pellet fines product	\$/t FOB wet													
Pellet product	\$/t FOB wet													
Average product, loaded at FOB point	\$/t FOB wet													
Lump product	c/mtu FOB dry													
Sinter fines product	c/mtu FOB dry													
Pellet fines product	c/mtu FOB dry													
Pellet product	c/mtu FOB dry													
OPERATING COSTS BY MAIN ITEM														
Diesel	\$/t													
Thermal energy	\$/t													
Purchased power	\$/t													
Plant labour wages + benefits	\$/t													
Administration salaries + benefits	\$/t													
Property tax, royalties etc.	\$/t													
Drill consumables	\$/t													
Explosives	\$/t													
Grinding media	\$/t													
Water	\$/t													
Flux materials	\$/t													
Other purchases and supplies	\$/t													
Purchased transport services	\$/t													
EXCHANGE RATE														
Local currency		C\$	C\$	C\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$	real
Local currency per US dollar		1.31	1.31	1.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00

PLANTS INCLUDED IN COST ANALYSIS

Ref.	Country	Company	Location	FOB Shipping Point	Transport from FOB Point	Shipments
65	Canada	IOC	Sept Iles	FOB at port of Sept Iles, QC	Great Lakes ships + seaborne export	for third parties
64	Canada	QCM	Port Cartier	FOB at port of Port Cartier, QC	Great Lakes ships + seaborne export	mainly for third parties
63	Canada	Wabush	Pte. Noire	FOB at port of Pointe Noire, QC	mainly Great Lakes, some seaborne export	mainly for owners - Canada + USA
755	USA	Empire	Palmer	FOB at port of Escanaba, MI	Great Lakes ships	mainly for third parties - USA
58	USA	United Tacon.	Eveleth	FOB at port of Duluth, MN	Great Lakes ships	all for owners - Canada + USA
67	USA	Hibbing	Hibbing	FOB at port of Superior, WI	Great Lakes ships	mainly for owners - USA
5740	USA	Ispat Inland	Minorca	FOB at port of Duluth, MN	Great Lakes ships	all for owners - USA
	USA	LTV	Hoyt Lakes	FOB at port of Taconite Harbor, MN	Great Lakes ships	closed in 2002, not in analysis
62	USA	Keewatin	Keewatin	FOB at port of Superior, WS	Great Lakes ships	all for owners - USA
87	USA	Northshore	Reserve	FOB at port of Silver Bay, MN	Great Lakes ships	all for third parties - USA
61	USA	Tilden	Ishpeming	FOB at port of Escanaba, MI	Great Lakes ships	mainly for third parties - USA + Canada
66	USA	USX	Minntac	FOB at port of Two Harbors, MN	Great Lakes ships + rail	mainly for use by owners
71	Brazil	Corumbaense	Corumba	delivered to DRI/steel plants on River Plate, Argentina	river barges to FOB point	for third parties - export
124	Brazil	CSN	Casa de Pedra	delivered to steel plant at Volta Redonda	rail to FOB point	almost all for owners in Brazil
125	Brazil	CVRD	Northern	FOB at port of Ponta Madera	N. Brazil by rail + seaborne export	mainly for third parties
5745	Brazil	CVRD	Southern	FOB at port of Tubarao	S. Brazil by rail + seaborne export	mainly for third parties
5748	Brazil	CVRD	Hispanobras	FOB at port of Tubarao	seaborne export	for partners in Spain + third parties
5749	Brazil	CVRD	Itabrasco	FOB at port of Tubarao	seaborne export	for partners in Italy + third parties
5750	Brazil	CVRD	Nibrasco	FOB at port of Tubarao	seaborne export	for partners in Japan + third parties
5751	Brazil	CVRD	Kobrasco	FOB at port of Tubarao	seaborne export	for partners in Korea + third parties
5752	Brazil	Esperanca	Brumadinho	FOB at port of Tubarao	S. Brazil by rail + seaborne export	for third parties
72	Brazil	CVRD-Ferteco	Fabrica etc.	FOB at port of Tubarao	seaborne export	for third parties
5754	Brazil	Itaminas	Brumadinho	FOB at port of Tubarao	AS. Brazil by rail + seaborne export	for third parties
5755	Brazil	Mannesmann	Brumadinho	delivered to steel plant in Belo Horizonte	rail to FOB point	all for owners
69	Brazil	CVRD - MBR	Aguas etc.	FOB at port of Guaiba Island	seaborne export	for third parties
70	Brazil	Samarco	Ponta Ubu	FOB at port of Ponta Ubu	seaborne export	for third parties
2247	Brazil	Samitri	Alegria etc.	FOB at port of Tubarao	seaborne export	for third parties
68	Brazil	CVRD-Socoime	Sabara	FOB at port of Tubarao	rail to S. Brazil + seaborne export	for third parties
5759	Chile	CMP	Huasco	FOB at port of Guacolda	coastal ship to Chile + seaborne export	part for use by owners, rest third parties
5760	Chile	CMP	El Romeral	FOB at port of Guayacan	seaborne export	for third parties
2085	Mexico	AHMSA	Monclova	delivered to steel plant at the site	conveyor to FOB point	all for owners
132	Mexico	Hylsa	Alzada	delivered to DRI plants in Mexico	rail to FOB point	all for owners
2117	Mexico	Imexsa	L. Cardenas	delivered to DRI plant at the site + FOB Lazaro Cardenas	conveyor to FOB point + seaborne export	all for owner at site + export to owner
733	Mexico	P. Colorado	Manzanillo	delivered to DRI plant in Mexico	rail to FOB point	all for owners
2162	Mexico	Sicartsa	L. Cardenas	delivered to steel plant at the site	rail to FOB point	all for owners
135	Peru	Shougang	S-Nicolas	FOB at port of San Nicolas	coastal ship + seaborne export	for Siderperu + export to owner
1165	Venezuela	Ferrominera	Puerto Ordaz	FOB from transhipment vessel Boca Grande in Orinoco River	conveyor for domestic + seaborne export	for Sidor + third parties
2273	Venezuela	Sidor	Puerto Ordaz	FOB at port of Palua	at own plant + export by Ferrominera	mainly for owners
2955	Netherlands	Corus	Ijmuiden	delivered to steel plant at the site	at own plant + export by Ferrominera	all for owners
5766	Sweden	LKAB	Kiruna	FOB at port of Narvik	seaborne export	for third parties
5767	Sweden	LKAB	Malmberget	FOB at port of Lulea	for SSAB at Lulea + seaborne export	for third parties
5769	Turkey	Iskenderun	Divrigi etc.	delivered to steel plants in Turkey	rail to FOB point	all for owners
5770	Bosnia	RZP Ljubija	Prijedor	delivered to steel plant in Bosnia	rail to FOB point	all for domestic
5789	Algeria	Ispat Tebesa	Ouenza	delivered to steel plant in Algeria	rail to FOB point	all for owners
282	Egypt	Egyptian I&S	Baharia	delivered to steel plant in Egypt	rail to FOB point	all for owners
5790	Mauritania	SNIM	Nouadhibou	FOB at port of Nouadhibou	seaborne export	for third parties
712	South Africa	Assmang	Postmarsburg	FOB at port of Saldanha Bay	seaborne export	for third parties
699	South Africa	Kumba	Sishen	FOB at port of Saldanha Bay	rail to own plants + seaborne exports	part for owners, rest for third parties
5794	South Africa	Kumba	Thabazimbi	delivered to steel plants in South Africa	rail to FOB point	all for owners
3835	Zimbabwe	Zisco	Ripple Creek	delivered to steel plant in Zimbabwe	conveyor to FOB point	all for owners
5798	Bahrain	GIIC	Al Hiddhide	FOB from transshipment vessl off port of Al Hiddhide	seaborne export	for third parties
296	Iran	NISC	various	delivered to steel plants in Iran	rail to FOB point	all for owners

Appendix H.1

PLANTS INCLUDED IN COST ANALYSIS

Ref.	Country	Company	Location	FOB Shipping Point	Transport from FOB Point	Shipments
144	India	Goa	total/typical	FOB at port of Mormugao	seaborne export	for third parties
715	India	Hy-Grade	Vizag	FOB at port of Vishakapatnam	coastal ship + seaborne export	part for owners, rest for third parties
4407	India	Jindal	Vijaynagar	delivered to steel plant in India	rail to FOB point	all for use by owners
4436	India	Kudremukh	Mangalore	FOB at port of Mangalore	seaborne exports	for third parties
5817	India	Chowgule	Goa	FOB at port of Mormugao	seaborne exports	for third parties
5831	India	NMDC	Bailadila	FOB at port of Vishakapatnam	rail + seaborne exports	part for plants in India; rest export to third parties
5832	India	NMDC	Bellary-Hospet	FOB at port of Chennai (Madras)	rail + seaborne exports	part for plants in India; rest export to third parties
5835	India	various	Orissa	FOB at port of Paradip	rail + seaborne exports	part for plants in India; rest export to third parties
713	India	various	Karnataka	FOB at port of Chennai (Madras)	rail + seaborne exports	part for plants in India; rest export to third parties
360	India	SAIL	various	delivered to steel plants in India	rail to FOB point	all for owners
4576	India	Tata	various	delivered to steel plants in India	rail to FOB point	all for owners
4832	Japan	Kobe	Kakogawa	delivered to steel plant at the site	at own plant	all for owners
5858	Australia	OneSteel	Whyalla	delivered to steel plant at the site	rail to FOB point	all for owners
5855	Australia	BHP	Yarrie	FOB at port of Port Hedland WA	seaborne exports	for third parties
5861	Australia	BHP	Newman	FOB at port of Port Hedland, WA	local plant + seaborne exports	mainly for third parties
5857	Australia	BHP	Yandi	FOB at port of Port Hedland, WA	seaborne exports	for third parties
493	Australia	Hammersley	all mines	FOB at port of Dampier, WA	seaborne exports	for third parties
5863	Australia	Portman	Cockatoo	FOB at port of Cockatoo Island, WA	seaborne exports	for third parties
5864	Australia	Portman	Koolyanobbing	FOB at port of Esperance, WA	seaborne exports	for third parties
829	Australia	Robe	Cape Lambert	FOB at port of Cape Lambert, WA	seaborne exports	for third parties
658	Australia	ABM	Savage River	FOB at port of Port Latta, TAS	seaborne exports	for third parties
447	New Zealand	BHP NZSM	Taharoa	FOB at port of Taharoa	seaborne exports	for third parties
448	New Zealand	BHP NZSM	Waikato	delivered to steel plant in New Zealand	by pipeline to FOB point	all for owners
3438	Bulgaria	typical	various	delivered to steel plant in Bulgaria	by rail to FOB point	all for owners
5775	Kazakhstan	SSGPO	all mines	delivered to steel plant in Kazakhstan	by rail to own plant + rail to China	mainly for owners
77	Russia	Karelsky	Kostomuksha	delivered to steel plants in Russia + FOB Murmansk	rail to FOB point + seaborne exports	part for owners
3579	Russia	Lebedinsky	Gubkin	delivered to steel plants in Russia + FOB Izmail	rail to FOB point + barge export	part for owners
3612	Russia	Stoilensky	Stary Oskol	delivered to steel plants in Russia + export	rail to FOB point	mainly for third parties in Russia
75	Russia	others	typical	delivered to steel plants in Russia	rail to FOB point	mainly for owners
5786	Ukraine	SevGOK etc.	Krivoy Rog	delivered to steel plants in Ukraine + export	rail to FOB point	mainly for third parties in Ukraine
15	Ukraine	Poltavsky GOK	Komsomolsk	delivered to steel plants in Ukraine + FOB Komsomolsk	rail to FOB point + barge export	mainly for third parties in Ukraine
3676	Ukraine	others	typical	delivered to steel plants in Ukraine	rail to FOB point	mainly for third parties in Ukraine
299	China	various	typical	delivered to steel plants in China	rail to FOB point	mainly for owners
408	Korea DPR	State	Musan	delivered to steel plants in North Korea	rail to FOB point	all for owners