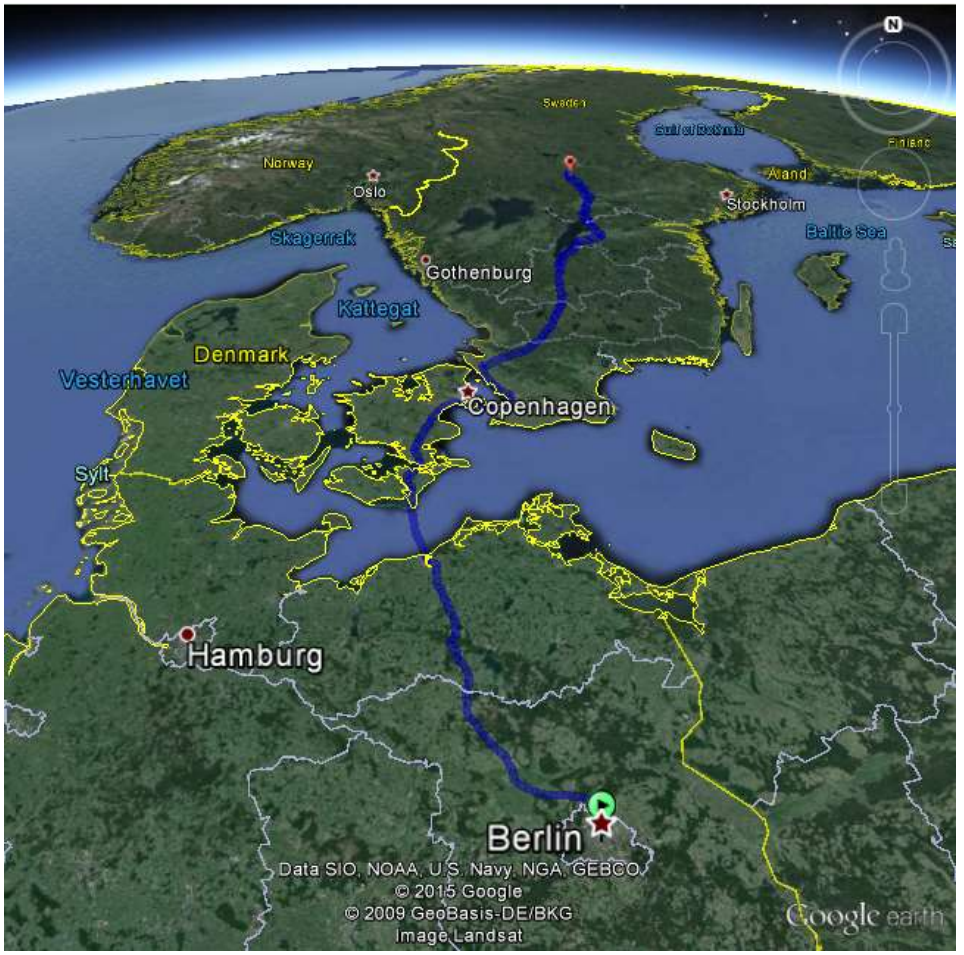
Blötberget Iron Ore Project – From Resource and Mining History to Present

Blötberget Iron Ore Project
Introduction

Project Location

From Berlin

- 1100 km by road (13 hours)
- 1.5 hours by plane to Stockholm plus 2.5 hours by car

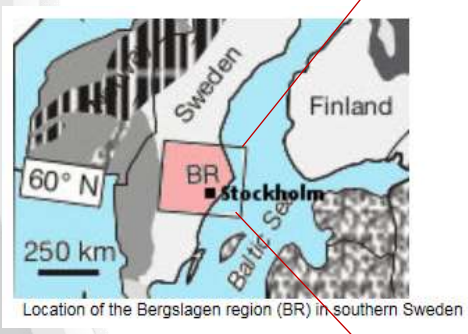


Blötberget Iron Ore Project
Introduction

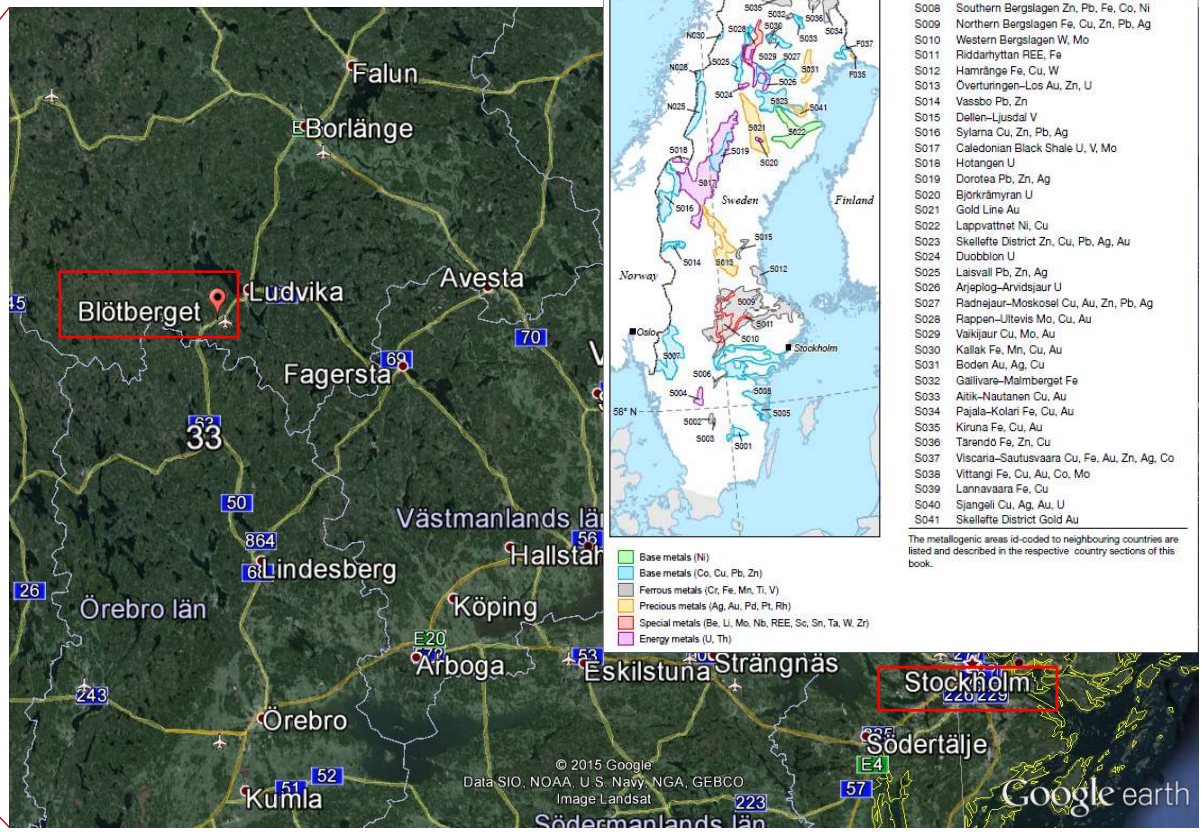
Project Location

Blötberget

- Region **Bergslagen**
- Province Dalarna



Location of the Bergslagen region (BR) in southern Sweden



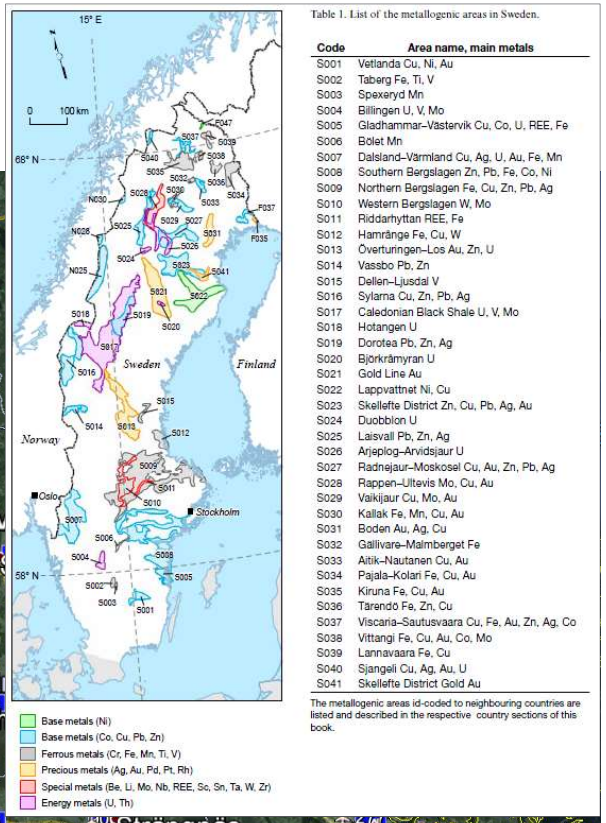


Table 1. List of the metallogenic areas in Sweden.

Code	Area name, main metals
S001	Vetlanda Cu, Ni, Au
S002	Taberg Fe, Ti, V
S003	Spexeryd Mn
S004	Billingen U, V, Mo
S005	Gladhammar–Västervik Cu, Co, U, REE, Fe
S006	Bölet Mn
S007	Dalsland–Värmland Cu, Ag, U, Au, Fe, Mn
S008	Southern Bergslagen Zn, Pb, Fe, Co, Ni
S009	Northern Bergslagen Fe, Cu, Zn, Pb, Ag
S010	Western Bergslagen W, Mo
S011	Riddarhyttan REE, Fe
S012	Hamränge Fe, Cu, W
S013	Överturingen–Los Au, Zn, U
S014	Vassbo Pb, Zn
S015	Dellen–Ljusdal V
S016	Sylarna Cu, Zn, Pb, Ag
S017	Caledonian Black Shale U, V, Mo
S018	Hotangen U
S019	Dorotea Pb, Zn, Ag
S020	Björkråmyran U
S021	Gold Line Au
S022	Lappvattnet Ni, Cu
S023	Skellefte District Zn, Cu, Pb, Ag, Au
S024	Duobblon U
S025	Laisvall Pb, Zn, Ag
S026	Arjeplog–Arvidsjaur U
S027	Radnejaur–Moskosel Cu, Au, Zn, Pb, Ag
S028	Rappen–Ultevis Mo, Cu, Au
S029	Vaikijaur Cu, Mo, Au
S030	Kallak Fe, Mn, Cu, Au
S031	Boden Au, Ag, Cu
S032	Gällivare–Malmberget Fe
S033	Aitik–Nautanen Cu, Au
S034	Pajala–Kolari Fe, Cu, Au
S035	Kiruna Fe, Cu, Au
S036	Tärendö Fe, Zn, Cu
S037	Viscaria–Sautusvaara Cu, Fe, Au, Zn, Ag, Co
S038	Vittangi Fe, Cu, Au, Co, Mo
S039	Lannavaara Fe, Cu
S040	Sjangeli Cu, Ag, Au, U
S041	Skellefte District Gold Au

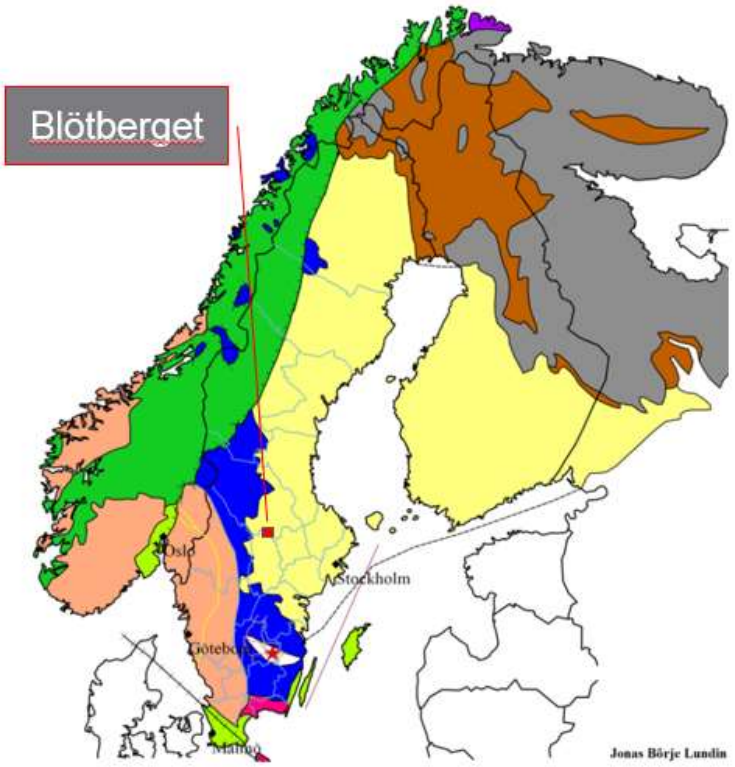
The metallogenic areas id-coded to neighbouring countries are listed and described in the respective country sections of this book.

Blötberget Iron Ore Project
Geology

Baltic Shield

Svecofennian Orogeny

- 1.8 to 2 Ga
- Accretion of numerous island arcs in such manner that the pre-existing craton grew with this new material from what is today NW to the SE
- Volcanism; the formation of magma that then cooled to form igneous rocks
- Metamorphism of rocks

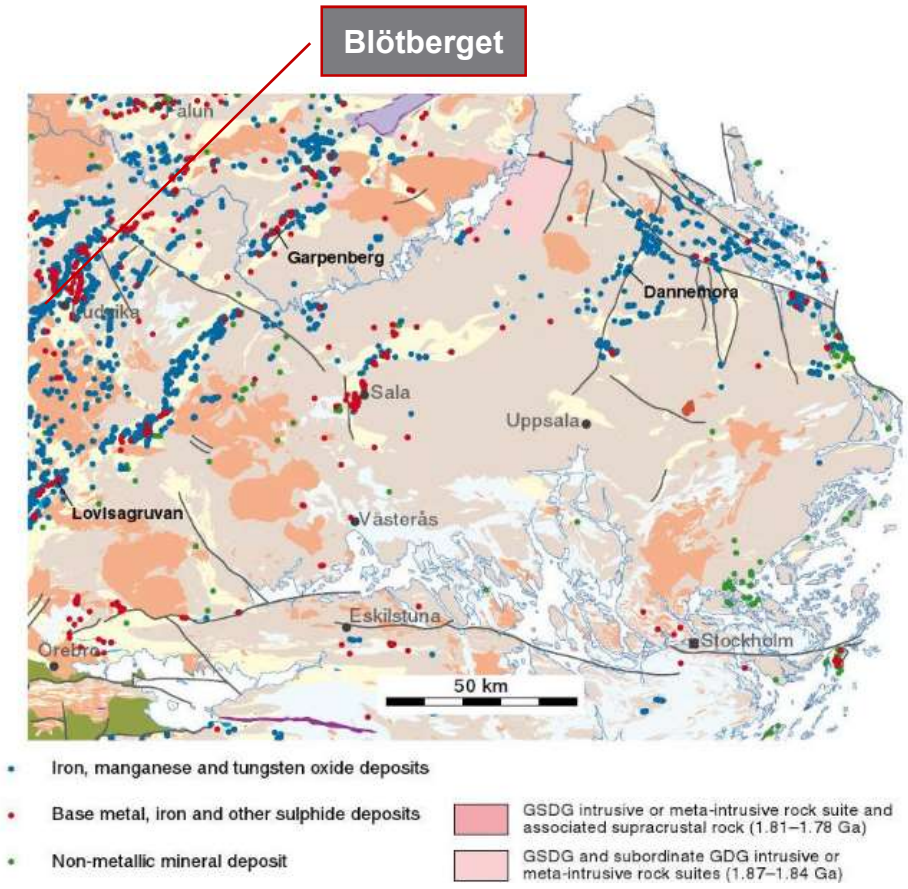


Blötberget Iron Ore Project
History of Mining in Bergslagen

Bergslagen District

Historical Mining District

- Medieval traditions of mining for
  - **Iron Ore**
  - Basemetals
  - Silver
  - Tungsten
- More than 8500 historical deposits are known
- Three active mining districts (Garpenberg, Lovisagruvan and Zinkgruvan).



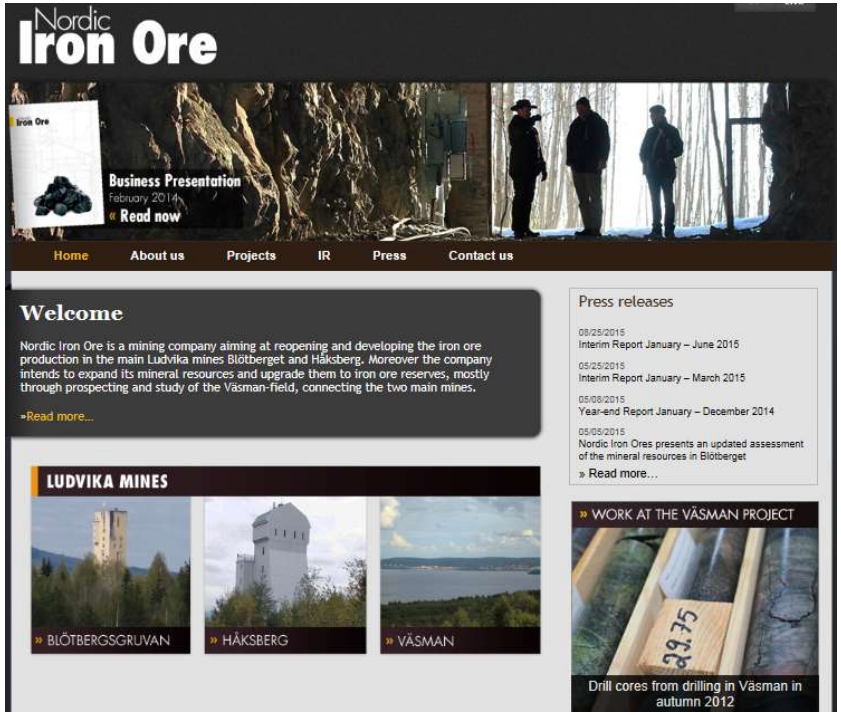
Blötberget Iron Ore Project
Nordic Iron Ore AB

Exploration and Mining Company

- Nordic Iron Ore AB
- http://www.nordicironore.se/en/
- Offices in Ludvika and Stockholm

Business Concept

- to own iron ore deposits in the mining district known as **Bergslagen** and develop them into operational mines that can supply products to **steel mills in Europe** and other parts of the world
- Aiming at reopening and developing the iron ore production in the main Ludvika mines **Blötberget and Håksberg**
- Expand its mineral resources and upgrade them to iron ore reserves by ongoing programs for exploration, resource definition and feasibility studies.

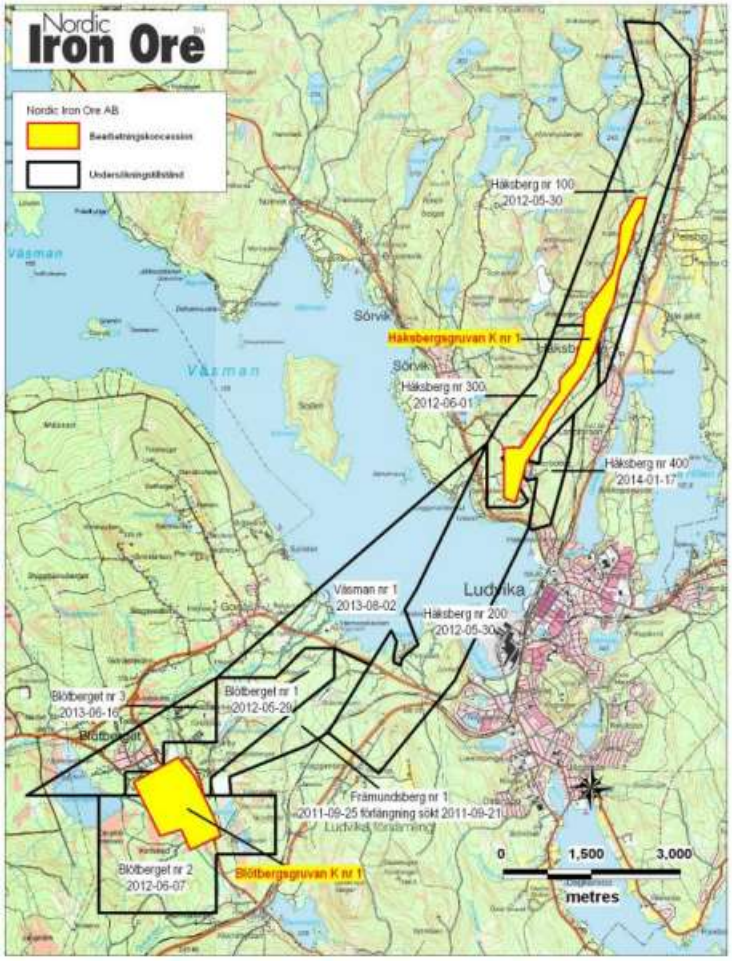


Blötberget Iron Ore Project
Nordic Iron Ore AB - Permits

License Area

Blötberget

- Exploration Licenses
- Exploration & Mining Licenses (yellow)

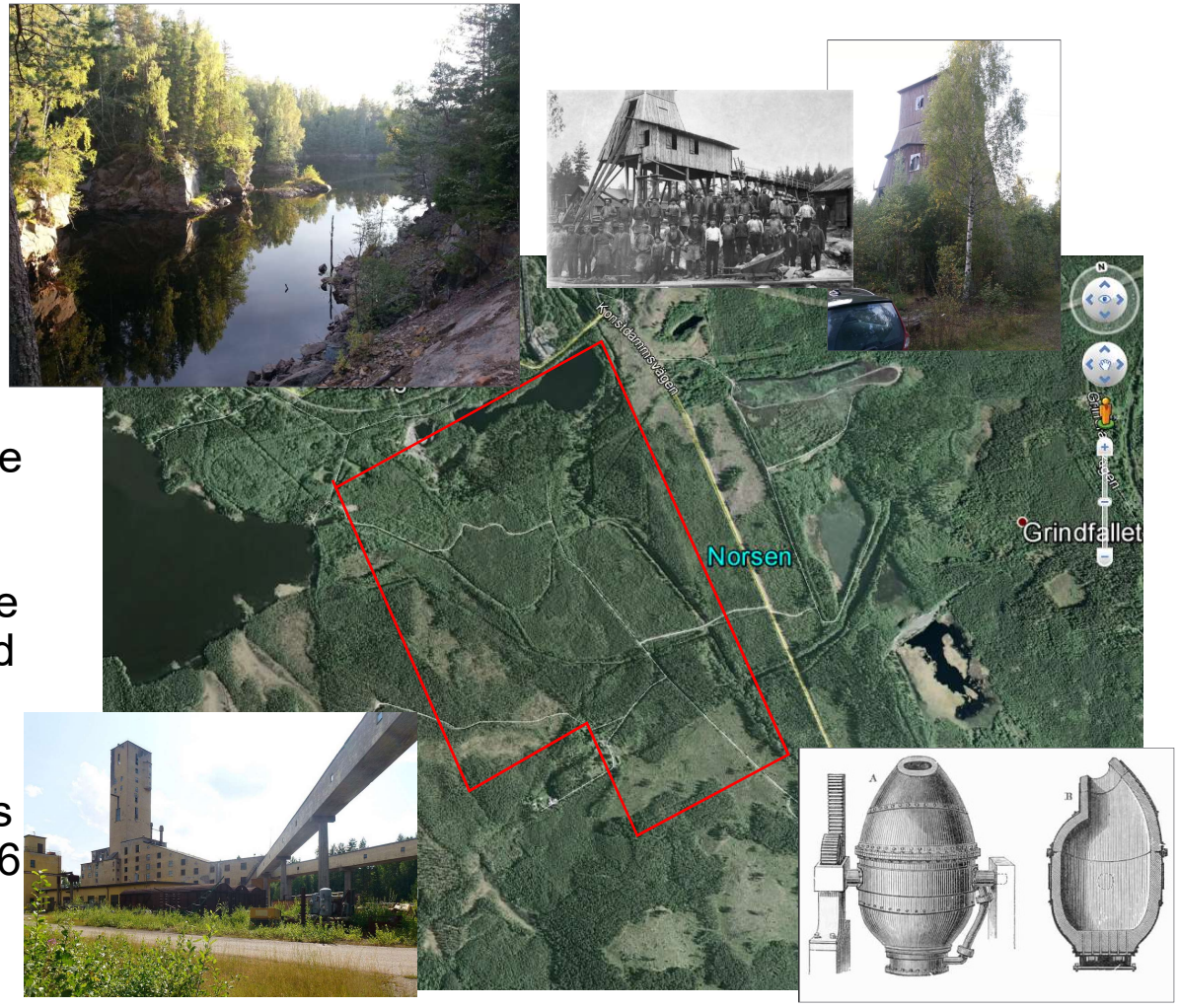


Blötberget Iron Ore Project
History of Iron Ore Mining in Blötberget

Mining History in Blötberget

Summary

- Mining in Ludvika area since 1600's
- Blötberget originally operated as two separate mines from the early 1900s, the German owned Vulcanus "original" mine and the Swedish owned Blötberget "new" mine.
- Each operated with separate hoisting shafts between 1950 and 1966

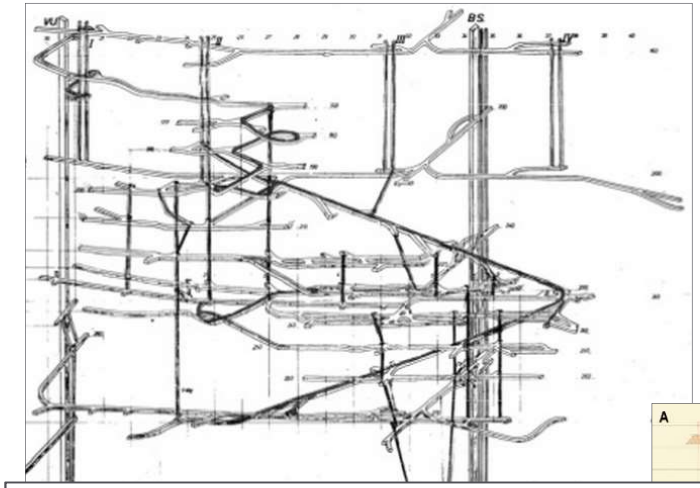


Blötberget Iron Ore Project
History of Iron Ore Mining in Blötberget

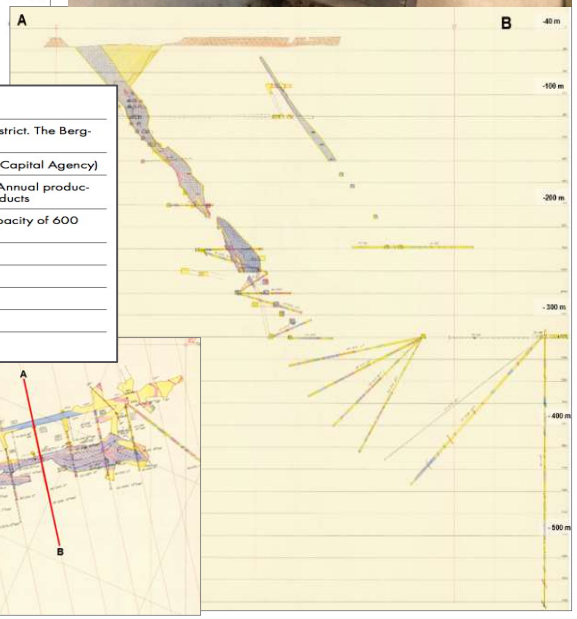
Mining History in Blötberget

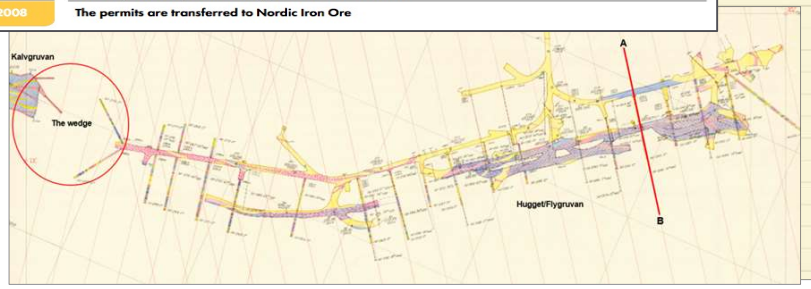
Vulcanus Mine / Bergslags Mine

- Exploration and grade control drilling during operation
- Mining operation ends up in 1979
- NIO; mining permits 2008



1900	Bergverks AB Vulcanus starts large-scale mining operations
1944	Stora Kopparberg Bergslags AB begins preparations for mining in the nearby mining district. The Bergslag shaft (BS) is sunk and the modern industrial site is established
1949	SStora Kopparberg Bergslags AB buys the Vulcanus mine from Flyktkapitalbyrån (Flight Capital Agency)
1950–1966	The mining area is integrated, both the Vulcanus mine and Bergslag shafts are utilised. Annual production reaches about 400 kilo tonnes of crude ore and 220 kilo tonnes of dressed ore products
1968–1975	The BS shaft is sunk to the 570 metre level, the BS ore skip is upgraded to an annual capacity of 600 kilo tonnes and the new plant comes into operation in December 1975
1978	SSAB is formed and Stora Kopparberg Bergslags AB hands over the Blötberget mine
1979	Mining operations cease
1980	Permits and mining rights are returned to the state
2007	New exploration permits are applied for and awarded
2008	**The permits are transferred to Nordic Iron Ore**



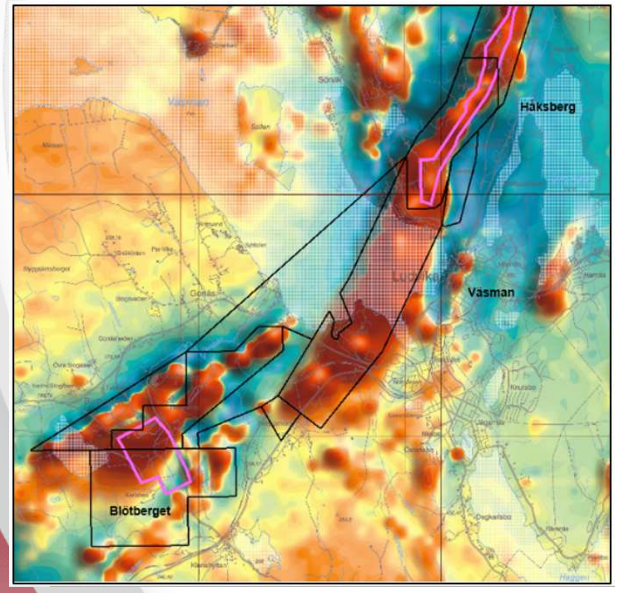


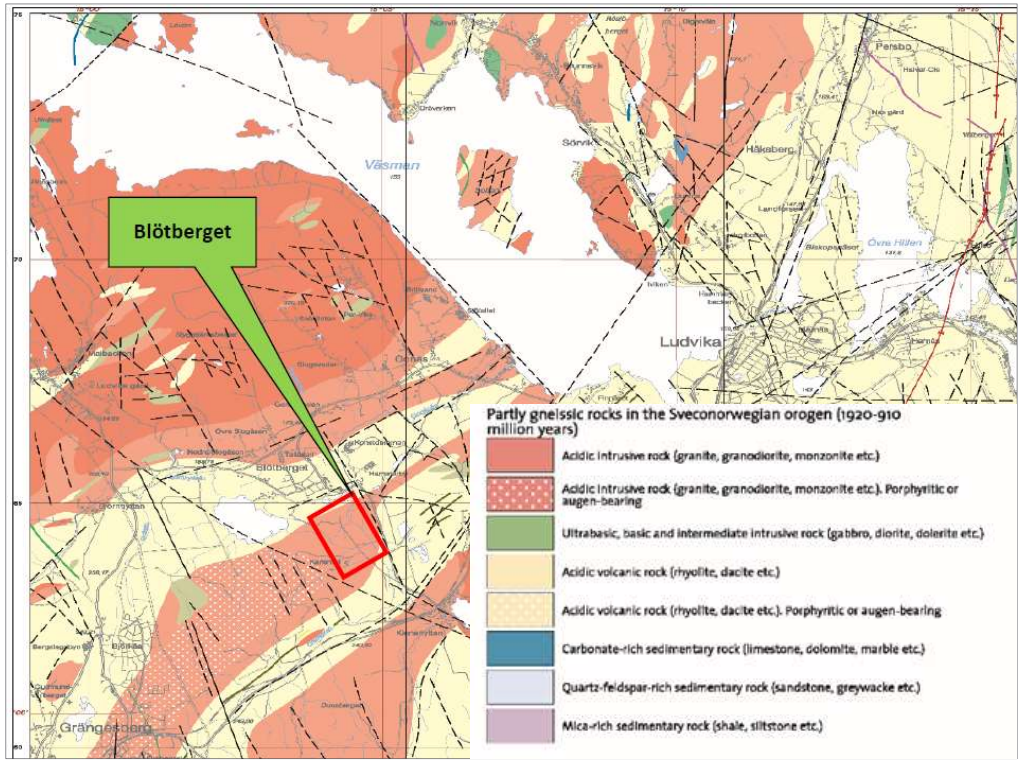
Blötberget Iron Ore Project
Project Geology

Regional Exploration

Geology

- SGU airborne geophysical survey in 1960‘s
- Acidic Intrusive rock



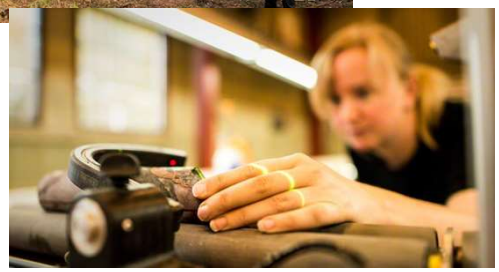


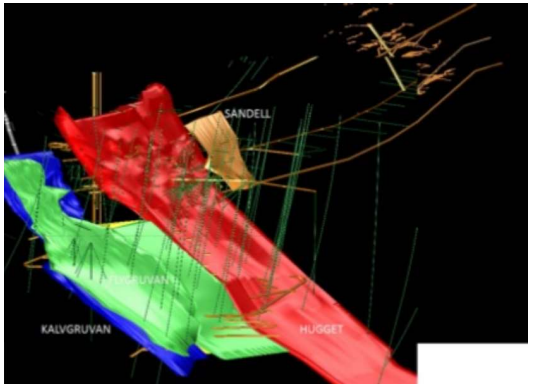
Blötberget Iron Ore Project
Re-Start of Exploration in Blötberget in 2012

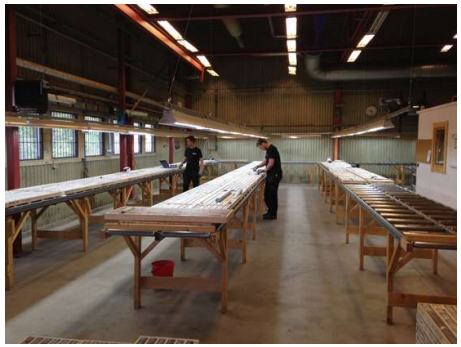
Work done and Results

Drilling

- 16 drill holes cored NQ (7400 m); twinned, in-fill and step-out drilling
- Relogging, re-sampling and re-assaying of historic drill core
- **1 drill hole** cored HQ for **metallurgical** and geotechnical testing
- GeoVista prepared Resource Estimate for NIO in 2014; TFe and P







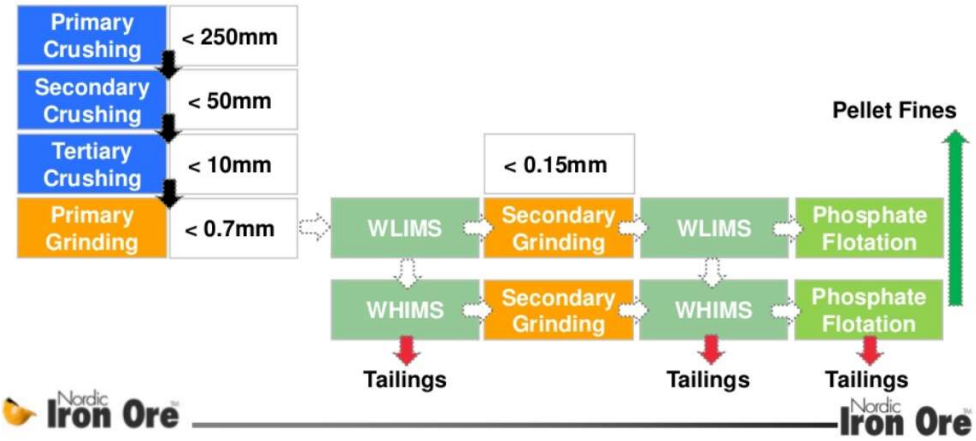
Blötberget Iron Ore Project
2012 Exploration Program

Metallurgical Testing

Tata Steel Consulting

- Flow-sheet for processing magnetite-hematite ore
- Main Finding: No homogeneous magnetite-hematite ratio; Davis Tube Recovery (DTR)
- Consequence: Detailed mineralogical analysis for hematite and magnetite was required

Products	size	Total Iron	Phosphorous	Silica	Alumina	Lime	Sulphur	Magnesia	Vanadium oxide	Titanium oxide
	mm	Fet	P	SiO_2	Al_2O_3	CaO	S	MgO	V_2O_5	TiO_2
Magnetite concentrate	<0.1	71,70	0,004	0,95	0,31	0,03	0,02	0,17	0,16	0,09

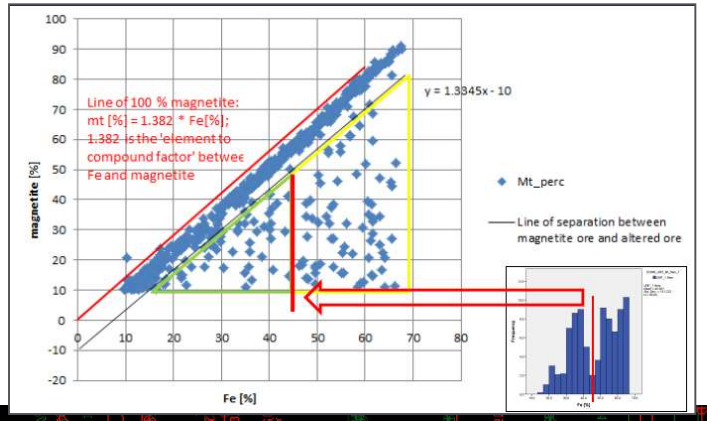


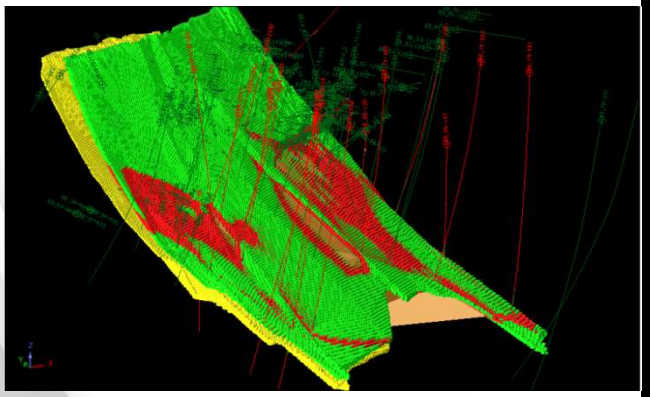
Blötberget Iron Ore Project
2014 Exploration Program

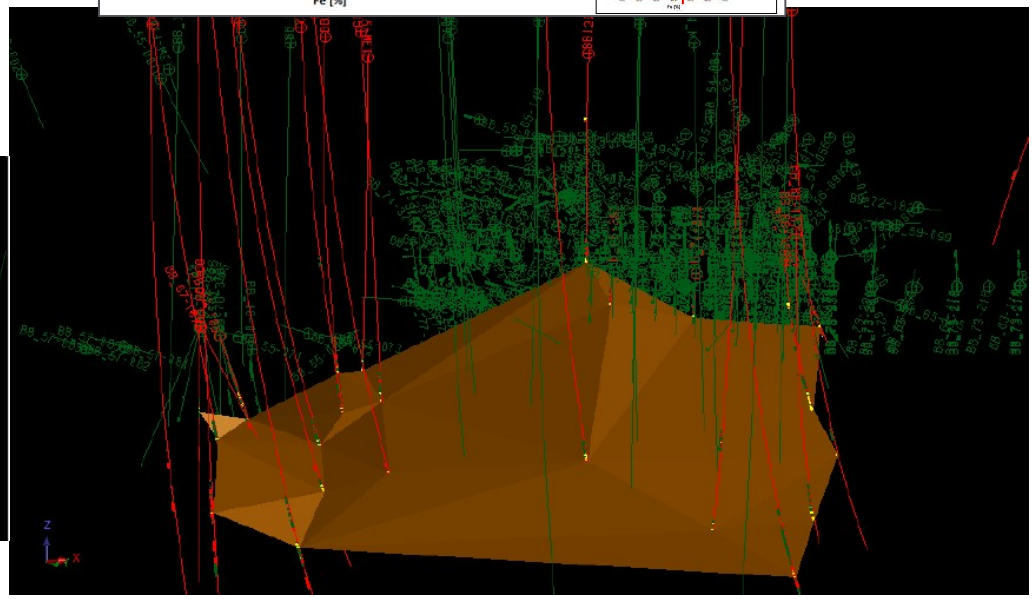
Work done

Data from Satmagan

- Domain with homogeneous mag-hem composition
- Domain with inhomogeneous mag-hem composition (first idea: alteration at fault zone)





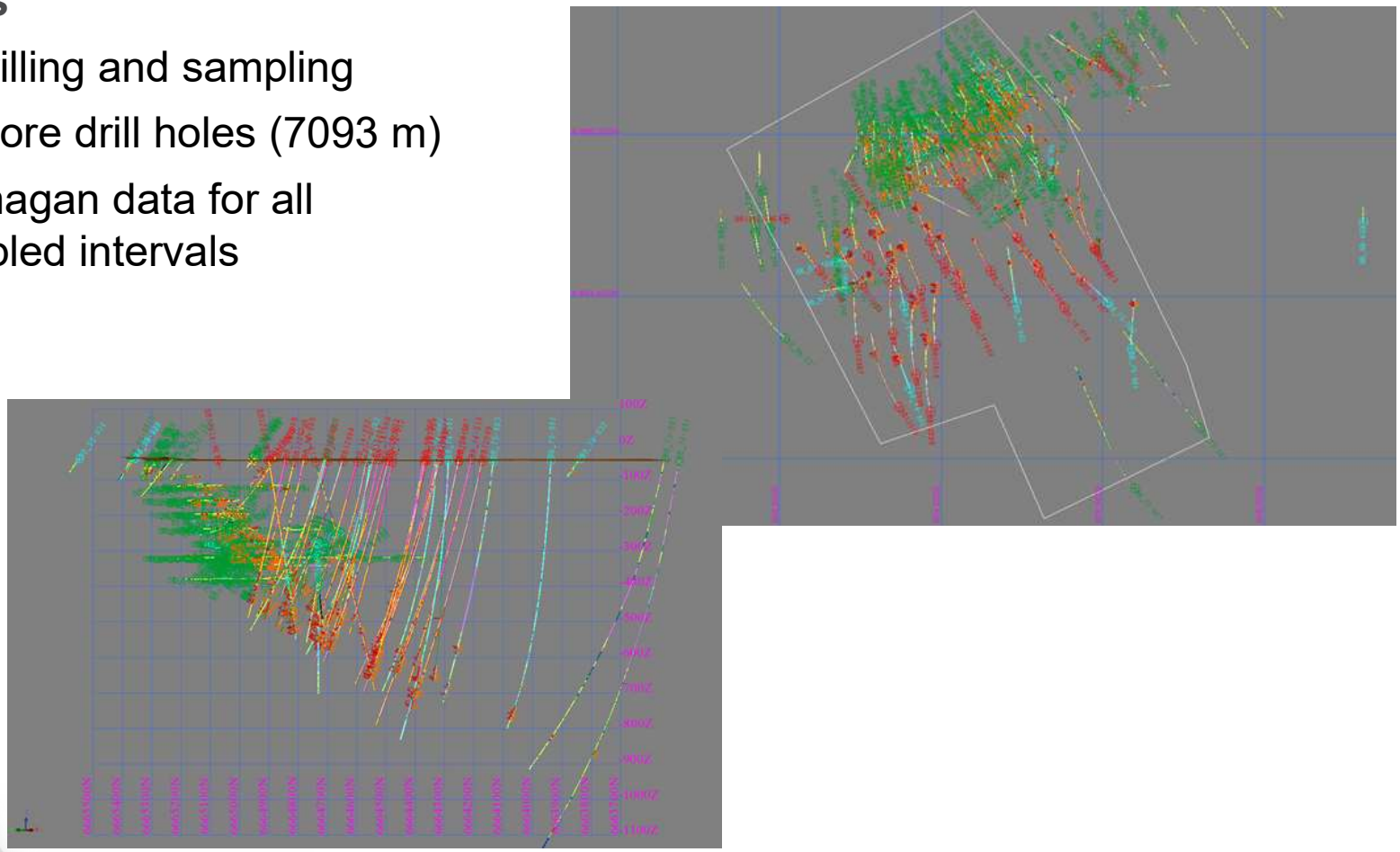


Blötberget Iron Ore Project
2014 Resource Definition Program

Results

2014 drilling and sampling

- 13 more drill holes (7093 m)
- Satmagan data for all sampled intervals



Data Verification

2012/2014 and historic data

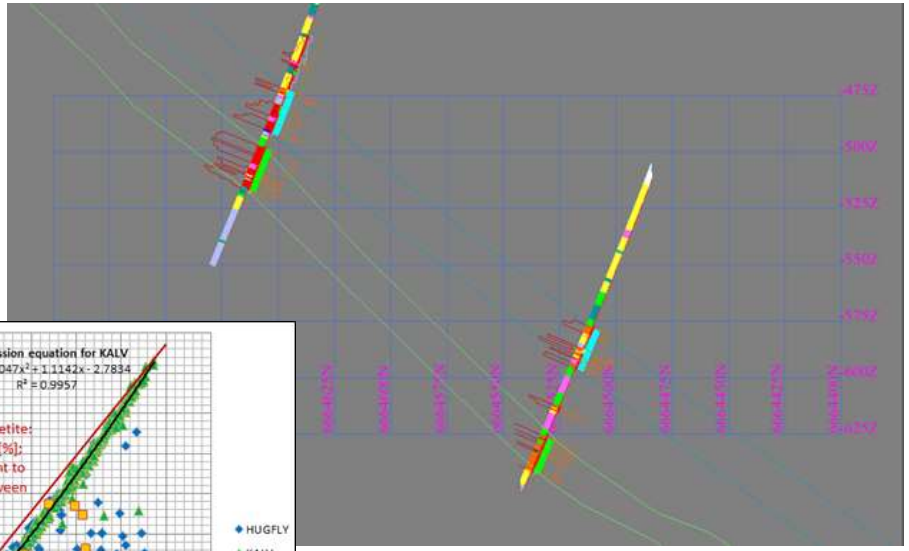
- **Drilling location and orientation** in order to verify the correct position of samples.
- **Drilling and sample recovery** in order to verify unbiased analysis results.
- QA/QC sample set (Certified Reference Material, Blanks and Duplicates) implemented in each sample batch in order to verify the representativeness of results produced by sample preparation, digestion and **chemical analysis**.
- Davis tube recoveries in order to verify the magnetite data of in-house Satmagan measurement (mineralogical analysis).
- Density determination
- Re-sampling and re-assaying historic drill holes in order to confirm **historic data**.

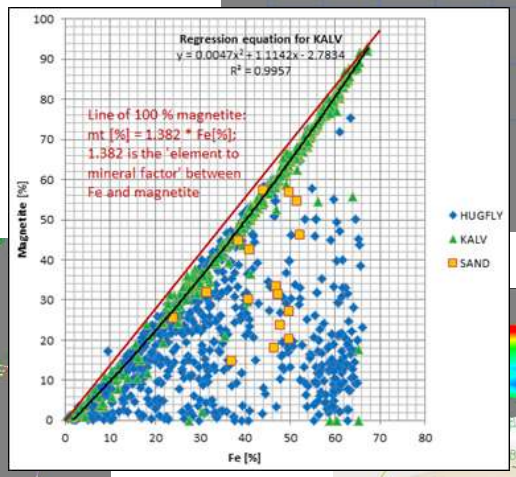
Blötberget Iron Ore Project
2014 Resource Definition Program

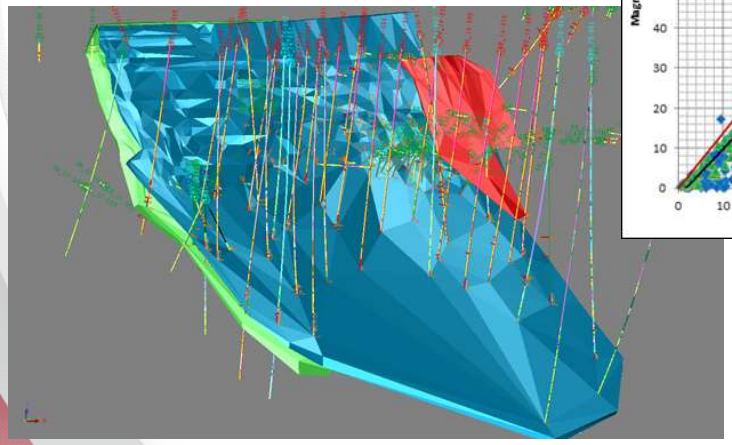
Data Interpretation and Analysis

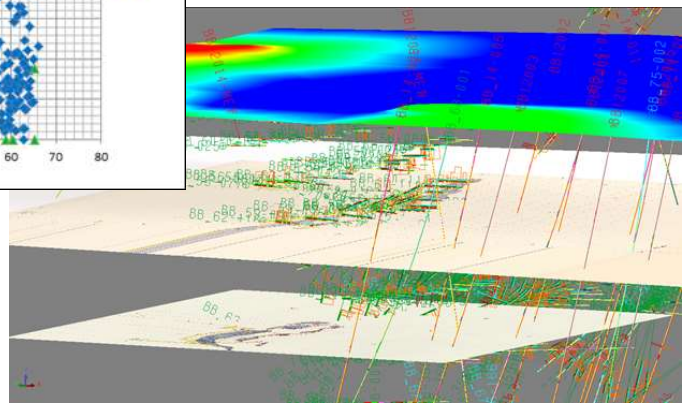
Concept of Geological Interpretation / Type and Shape of Mineralisation

- Kiruna Type: Iron rich lava flow with high P content
- Seam-like geometry









Data Acquisition

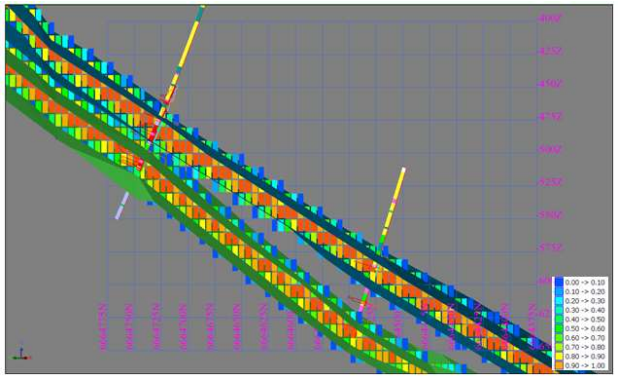
Bulk Sample for Test Processing

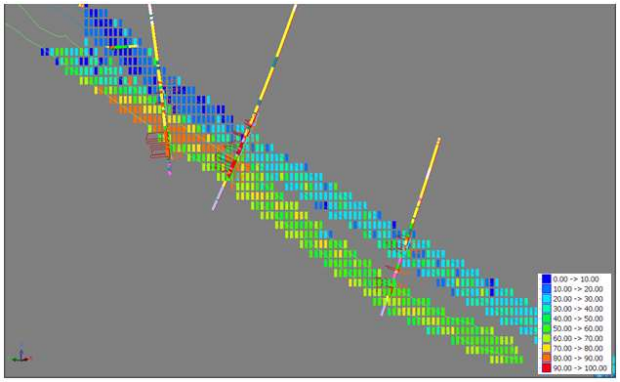
- Separated by Domain; each 20 t

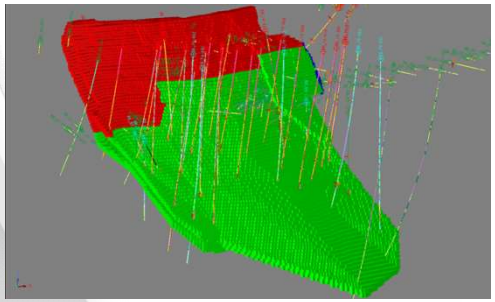
Grade Interpolation

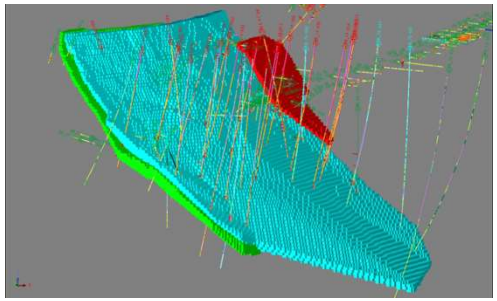
Block Model in Geovia Surpac

- Ore Percentage as volume correction
- Interpolation of block values for mag, hem and P
- Geometrical attributes, e.g. ore body or mined out blocks





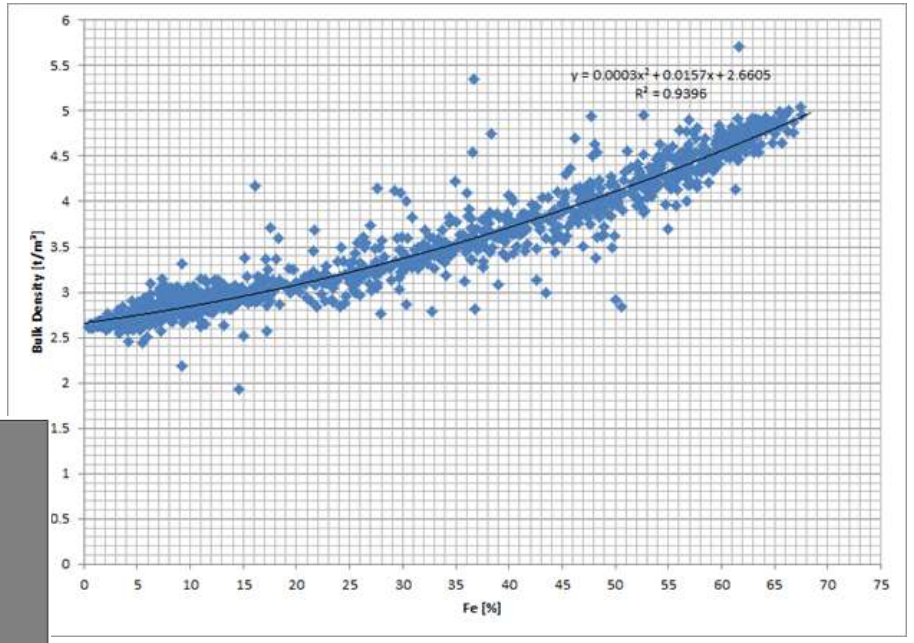


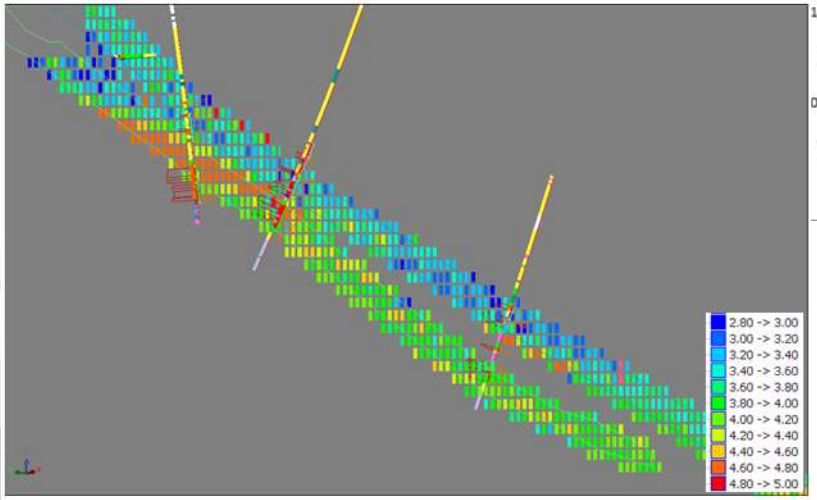


Bulk Density Attribution

Based on correlation of Fe and density

- regression equation



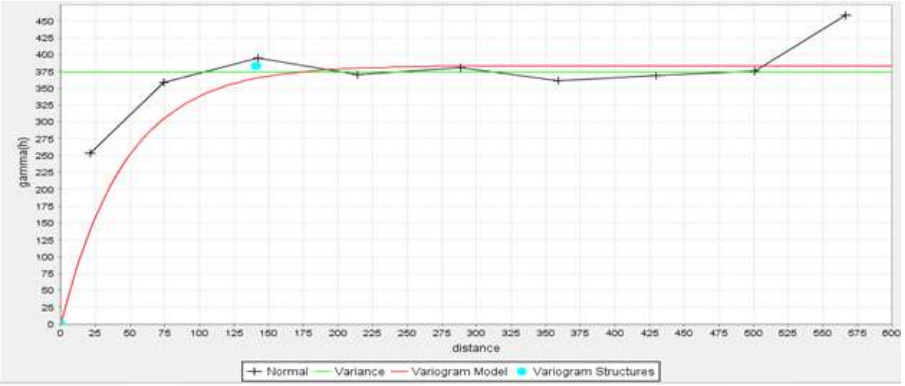


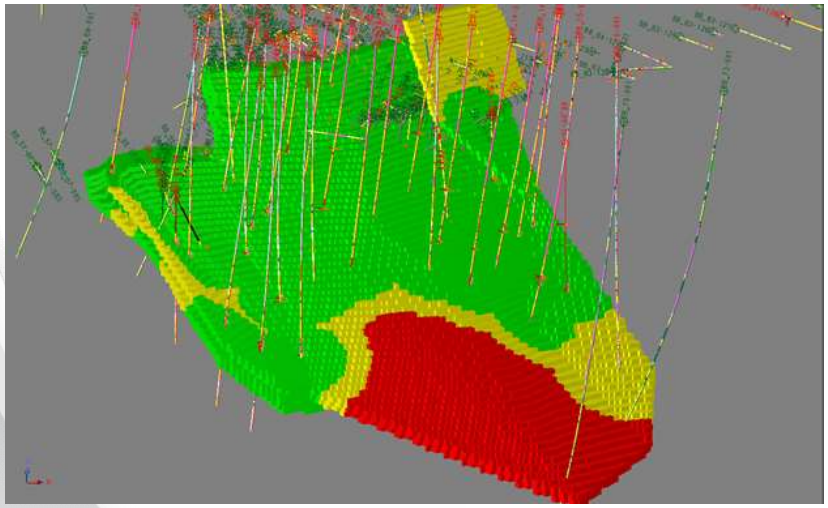
Blötberget Iron Ore Project
2014 Resource Definition Program

Resource Classification

Based on geostatistics

- Variogram analysis





Cut-off grade Assumptions

Using preliminary economic input parameters:

- Costs of the proposed mining method
- Costs of processing
- Revenues of product

$$\frac{\text{Costs for mining plus processing [US\$/t ore]}}{\left(\frac{\text{Price of concentrate [US\$/t conc]}}{\text{Fe grade of concentrate [Fe[\%]/t conc]}}\right)} * \frac{1 + \text{Dilution [fraction]}}{\text{Processing recovery [fraction]}} = Fe\ Cutoff\ grade$$

Table 14-6: Preliminary economic estimations of mining, processing and selling-related costs.

Item	Cost/Revenue
Costs for mining plus processing [US$/t ore]	20
Price of concentrate [US$/t conc]	100
Fe grade of concentrate [Fe[%]/t conc]	63
Dilution [fraction]	0.1
Processing recovery [fraction]	0.9

Blötberget Iron Ore Project
2014 Resource Definition Program

Resource Definition Program of 2014

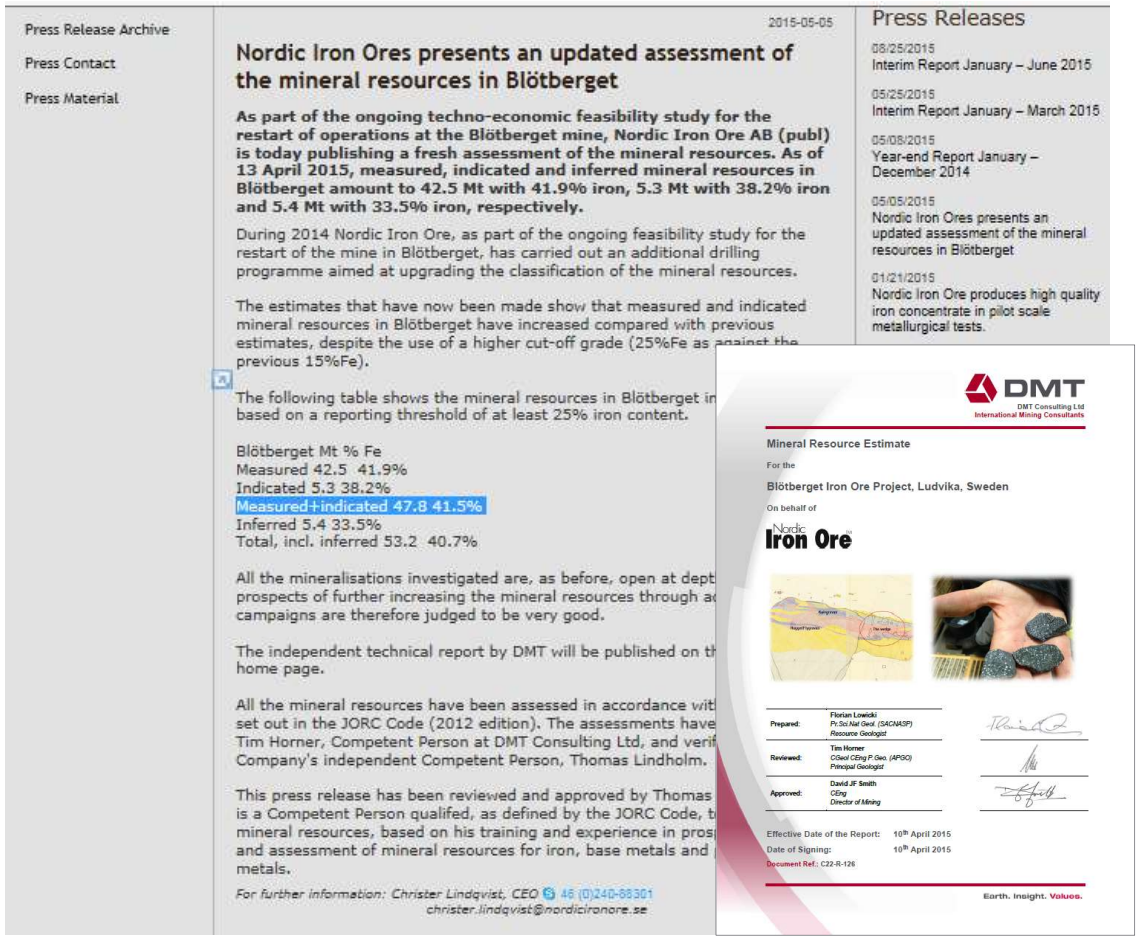
Target

- Annual production: 3 Mt
- Lifetime: 13 Years
- Mining Loss: 20 %
- 45 Mt required

Resource Estimate Report prepared by DMT in April 2015

Results at 25 % TFe cut-off grade:

- **47.8 Mt**
- **41.5 % Fe**
- **36.1 % mag and 22 % hem (mag-hem ratio of 62:38)**
- **0.5 % P**



Press Release Archive
Press Contact
Press Material

2015-05-05

Nordic Iron Ores presents an updated assessment of the mineral resources in Blötberget

As part of the ongoing techno-economic feasibility study for the restart of operations at the Blötberget mine, Nordic Iron Ore AB (publ) is today publishing a fresh assessment of the mineral resources. As of 13 April 2015, measured, indicated and inferred mineral resources in Blötberget amount to 42.5 Mt with 41.9% iron, 5.3 Mt with 38.2% iron and 5.4 Mt with 33.5% iron, respectively.

During 2014 Nordic Iron Ore, as part of the ongoing feasibility study for the restart of the mine in Blötberget, has carried out an additional drilling programme aimed at upgrading the classification of the mineral resources.

The estimates that have now been made show that measured and indicated mineral resources in Blötberget have increased compared with previous estimates, despite the use of a higher cut-off grade (25%Fe as against the previous 15%Fe).

The following table shows the mineral resources in Blötberget in based on a reporting threshold of at least 25% iron content.

Blötberget Mt % Fe
Measured 42.5 41.9%
Indicated 5.3 38.2%
Measured+indicated 47.8 41.5%
Inferred 5.4 33.5%
Total, incl. inferred 53.2 40.7%

All the mineralisations investigated are, as before, open at dept prospects of further increasing the mineral resources through a campaigns are therefore judged to be very good.

The independent technical report by DMT will be published on th home page.

All the mineral resources have been assessed in accordance wit set out in the JORC Code (2012 edition). The assessments have Tim Horner, Competent Person at DMT Consulting Ltd, and verif Company's independent Competent Person, Thomas Lindholm.

This press release has been reviewed and approved by Thomas is a Competent Person qualifed, as defined by the JORC Code, t mineral resources, based on his training and experience in pros and assessment of mineral resources for iron, base metals and metals.

For further information: Christer Lindqvist, CEO 46 (0)240-88301
christer.lindqvist@nordicironore.se

Press Releases

08/25/2015
Interim Report January – June 2015

05/25/2015
Interim Report January – March 2015

05/08/2015
Year-end Report January – December 2014

05/05/2015
Nordic Iron Ores presents an updated assessment of the mineral resources in Blötberget

01/21/2015
Nordic Iron Ore produces high quality iron concentrate in pilot scale metallurgical tests.

DMT
DMT Consulting Ltd
International Mining Consultants

Mineral Resource Estimate
For the
Blötberget Iron Ore Project, Ludvika, Sweden
On behalf of
Nordic Iron Ore

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Thank You for Your Attention!