WORKSHOP ON
THRESHOLD VALUE OF CHROMITE

INDIAN METALS & FERRO ALLOYS LIMITED
ODISHA

23.08.2017
BHUBANESWAR

Presented by

Indian Metals & Ferro Alloys Limited

INDIAN METALS & FERRO ALLOYS LIMITED

Established in 1961 In the Eastern State of Odisha, IMFA is India's largest, fully integrated producer of ferro alloys with 187 MVA installed furnace capacity backed up by 258 MW captive power generation and extensive chrome ore mining tracts.

imfa

ABOUT THE COMPANY

The manufacturing cycle comprising of chrome ore mining, power generation and ferro alloys smelting.

Ferro Alloys

Six furnaces adding up to 187 MVA have been set up at Therubali (Rayagada District) and Choudwar (Cuttack District) in Odisha thus making IMFA the largest producer of ferro chrome in India.

Mining

A mix of open cast and underground mining operations in Odisha's Jajpur and Keonjhar Districts cater to IMFA's requirement of chrome ore. It is the first to initiate underground mining in Sukinda Valley.

Power

Captive power generation capacity stands at 258 MW comprising of a 108 MW coal-based unit, a 30 MW dual-fuel unit and a 120 MW coal-based unit.

imfa

CHROMITE

Chromite is an important strategic metallic mineral.

The mineral is widely used in:

Metallurgical Industries

Refractory Industries

Chemical Industries

India is one of the leading producers and exporters of chromite in the world and Odisha has been the major producer of chromite mineral both in terms of quality as well as quantity contributing more than 90% of total production in the country.

imfa

UTILISATION OF CHROME ORE IN FURNACES

Utilisation of chrome ore in furnaces for manufacturing of HCFC.

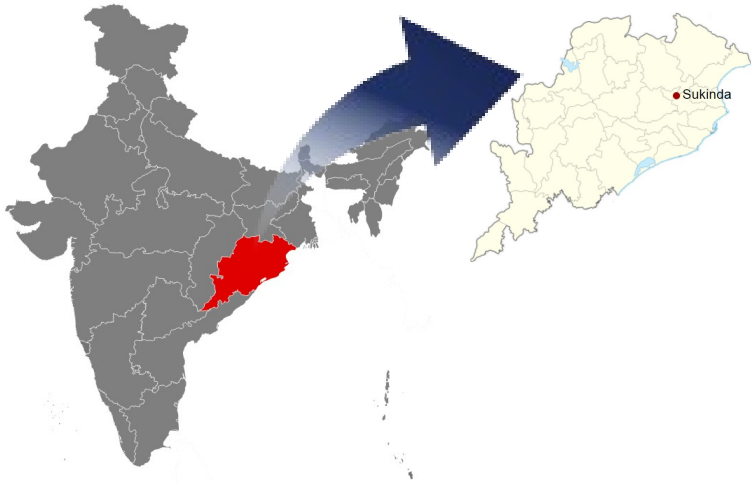
Ferro Alloys furnaces are designed to utilise chrome ore having average grade of 44 ~ 46% Cr_2O_3 with Cr:Fe ratio around 2.4.

Minimum grades of chromite ore being utilised in the furnaces are 30% Cr_2O_3 .

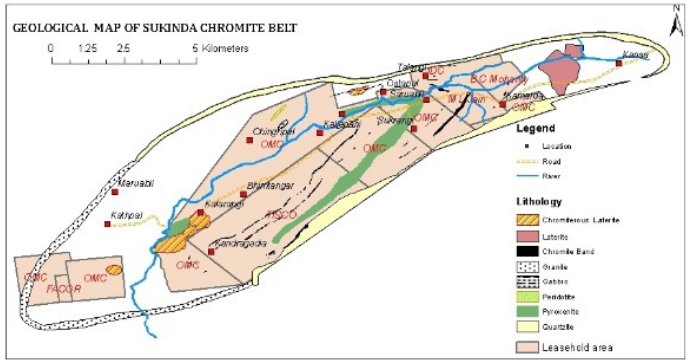
Other major considerations are
Cr : Fe ratio > 2.4
MgO : Al2O3 ratio = 1, and
Average Phos. content < 0.01 %.

OCCURANCE OF CHROMITE IN SUKINDA VALLEY

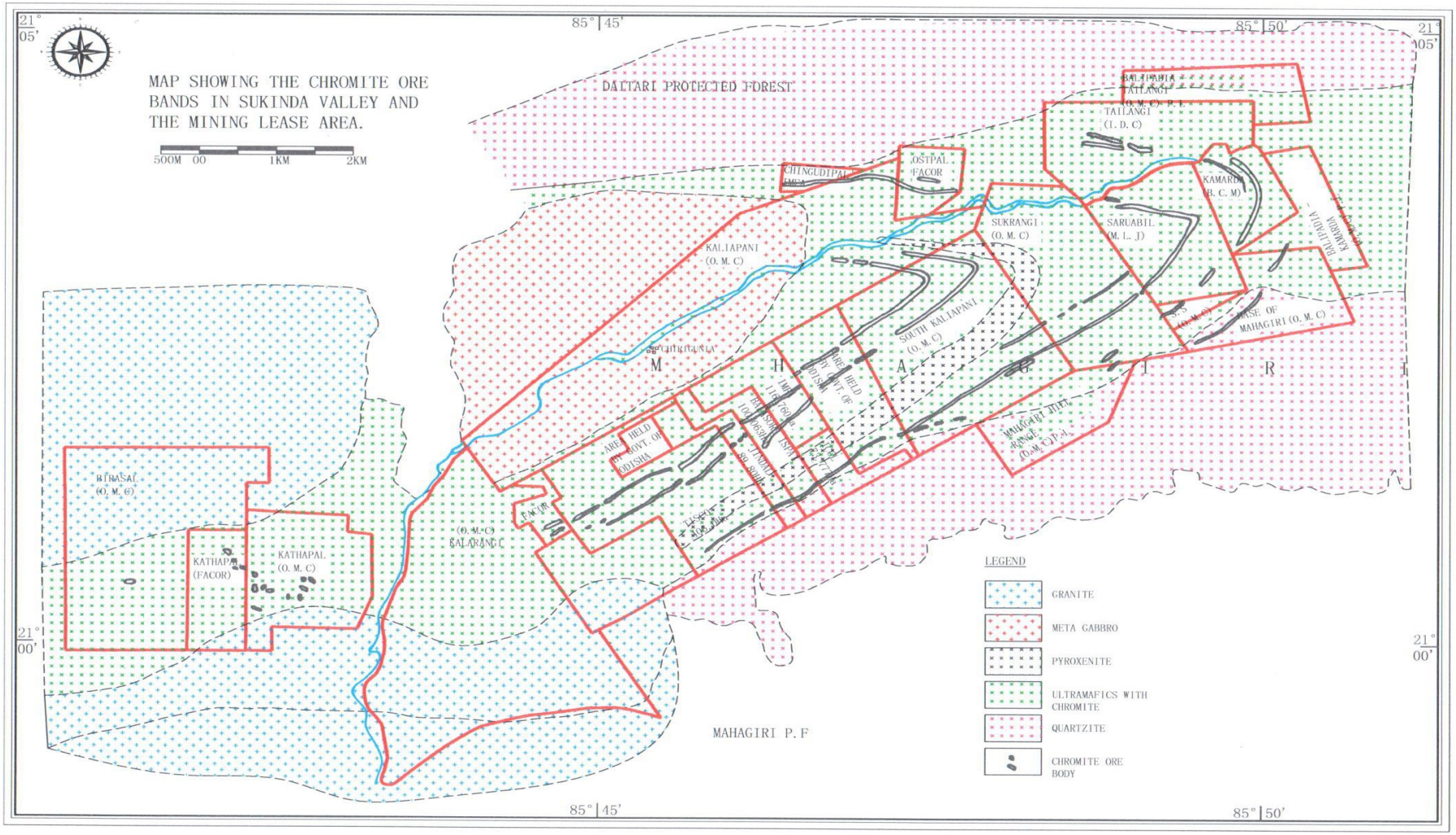
Sukinda valley in the Jajpur district, Odisha, accounts for about **98%** of the total proved **chromite reserves** of the country.



The chrome deposits in Sukinda appear to occur in **six distinct sub parallel stratiform loads,** in confirmity with the regional structure which is a folded westerly plunging syncline.



CHROMITE MINING LEASES IN SUKINDA VALLEY



imfa

AERIAL VIEW OF MINES IN SUKINDA VALLEY

Opencast Mine

Overburden Dump

OPENCAST MINING IN SUKINDA VALLEY BY M/s IMFA LTD.

Mining Lease Area:	116.76 Ha.
Area under Mining:	39.54 Ha. (Conceptual)
OB & SG Dump:	52.44 Ha. (Conceptual)
Lease period:	30 years, upto 03.09.2029
Production Capacity:	3.51 LTPA
Av Stripping Ratio:	2 CuM/Tonne
Bench Height:	8 mtrs
Existing Top RL:	136mRL (H/W) & 148mRL (F/W)
Existing Quarry Floor:	46 mRL
Existing Pit Slope Angle:	25 degree in H/W & 21 degree in F/W
Ultimate Pit Bottom:	30mRL
Permissible Pit Slope Angle:	30 degree

Sukinda Mines (Chromite) is a mechanised Opencast Mine using HEMMs along with deep hole drilling & blasting and is operative since 1999.

There are two Ore Bands in the lease area, i.e. Band I & Band II.

imfa

UNDERGROUND MINING IN SUKINDA VALLEY BY M/s IMFA LTD.

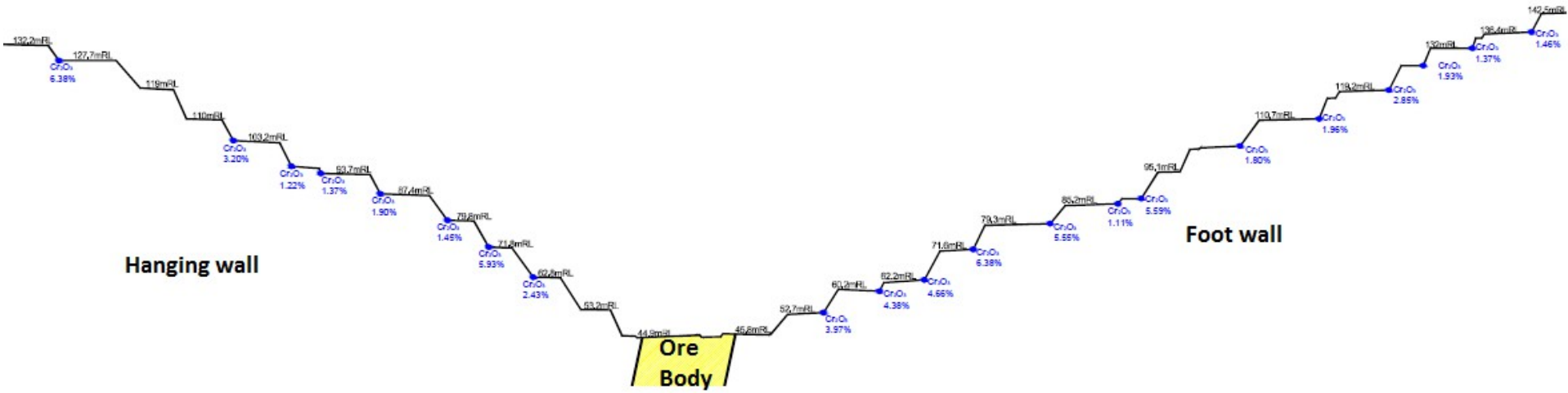
Mining Lease Area:	73.777 Ha.
Lease period:	30 years, upto 19.09.2035
Production Capacity:	3 LTPA
Ultimate Pit Bottom:	185 mRL
Mode of Access to U/G:	Decline & Shaft
Stoping Method:	Blast Hole Stoping with Post Filling
Mining Method:	Trackless Mining using LHD & LPDT.

Mahagiri Mines (Chromite) is being operated mainly by Underground Mining.

There is one Ore Band in the lease area, i.e. Band VI (Lumpy).

OCCURANCE OF CHROMITE – OPENCAST MINES

- Chrome concentration within the Chromite orebody is varying from **above 10% Cr_2O_3 to 55% Cr_2O_3.**
- The variations in the grade is heterogenious in all the 3 dimensions, i.e. strike, dip and width of the ore body.
- The chrome concentration within host rock, i.e. serpentinite is varying from **Minimum 1.0 Cr_2O_3 to Maximum 6.3 % Cr_2O_3** within the opencast workings of Band I quarry of our Sukinda Mines (Chromite).

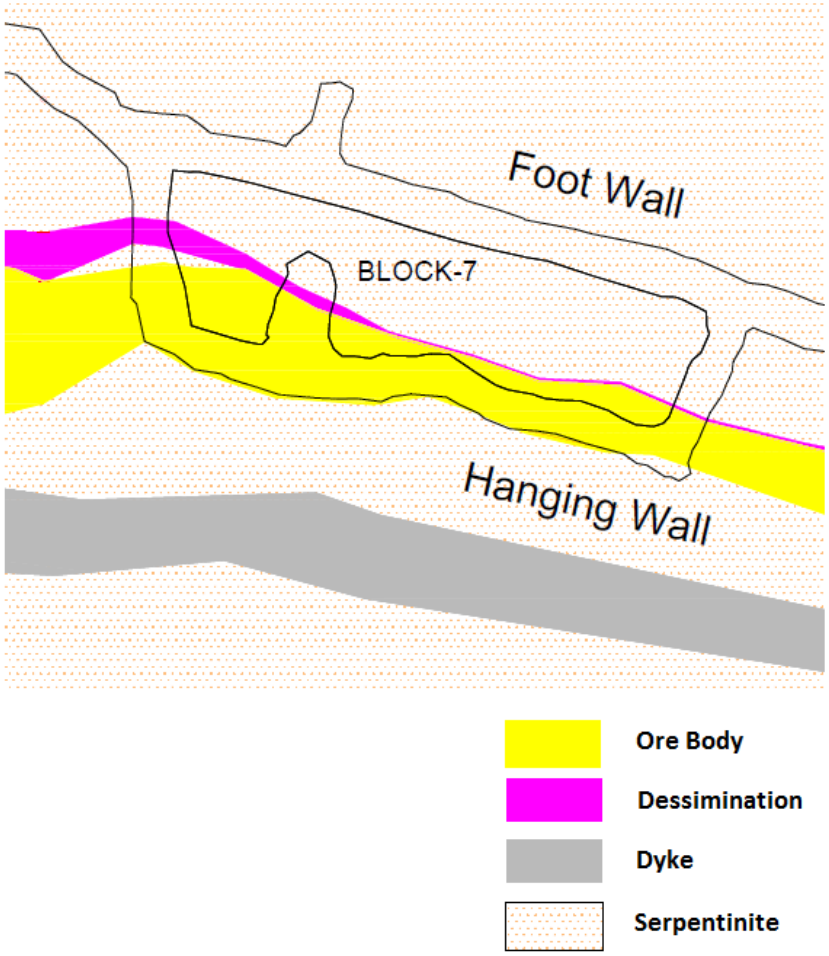


OCCURANCE OF CHROMITE – IN HANGING WALL & FOOTWALL

Rl in Meter	Hang Wall		Rl in Meter	Foot Wall	
	Distance From Ore Body	% Cr2O3		Distance From Ore Body	% Cr2O3
62.9mRL	32.5	2.4	53.2mRL	54.5	3.9
72.0mRL	45.9	5.9	59.6mRL	71.3	4.3
80.0mRL	58.2	1.4	63.0mRL	84.7	4.6
87.9mRL	78.2	1	72.1mRL	99.3	6.3
94.0mRL	96.1	1.3	79.8mRL	122.3	5.5
96.1mRL	104.8	1.2	85.7mRL	142.5	1.1
103.8mRL	122.1	3.2	87.3 mRL	149.5	5.6
127.6mRL	174.3	6.3	103.0 mRL	179.1	1.8
			111.1 mRL	202.7	1.9
			119.7 mRL	223.5	2.8
			127.0 mRL	233.8	1.9
			132.2 mRL	248.5	1.4
			137.0 mRL	266.1	1.5

imfa

OCCURANCE OF CHROMITE – UNDERGROUND MINES



Chrome concentration within the Chromite orebody is varying from **10% Cr_2O_3 to 50% Cr_2O_3.**

The variations in the grade is heterogenious in all the 3 dimensions, i.e. strike, dip and width of the ore body.

The chrome concentration within host rock, i.e. serpentinite is varying from **2% to 8% of Cr_2O_3** within the underground workings of Band VI of our Mahagiri Mines (Chromite).

OCCURANCE OF CHROMITE – OPENCAST DUMPS

Chrome concentration in the overburden material is varying from **1.1 % Cr_2O_3 to 6.7 % Cr_2O_3.**

CHALLENGES – MINING OF CHROME ORE BELOW 10% Cr_2O_3

Mining of chrome ore below 10% Cr_2O_3 – Opencast Mining

- The chrome ore having below 10% Cr_2O_3 is basically found within the host rock, i.e. footwall and hanging wall of ore body upto a distance of approximately 260 mtrs.
- The distribution of below 10% Cr_2O_3 is found in a irregular pattern within host rock. Therefore, it is practically impossible to go for selective mining of wall rocks.
- Both hanging wall and footwall host rock contains between 1.0 % to 6.3 % of Cr_2O_3. Overburden dump contains 1.1% to 6.7% Cr_2O_3. Therefore, further segregation is not practically feasible.

Mining of chrome ore below 10% Cr_2O_3 – Underground Mining

- The chrome ore having below 10% Cr_2O_3 is basically found within the host rock, i.e. footwall and hanging wall of ore body upto a distance of approximately 10 ~ 30 mtrs.
- In under ground mines, mining of below 10% Cr_2O_3 within the wall rocks will pose a challenge to the method of mining due to strata control and uneconomic conditions.

imfa

CONCLUSION AND RECOMMENDATION

Hence, it is recommended that the threshold value of Chromite should be continued as 10% Cr_2O_3.

Thank You