Sangan Iron Ore Mines(SIOM)

Abstract

- *Iran has a long history and tradition activities in Mining and related industries .*
- It has the ninth largest minerals reserves in the world.
- Iran has about **4** billions t iron ore reserves and produced **40** mt iron ore **25** mt concentrate ,**25** mt pellet and **15** mt steel in **2013**.

- The Iranian Mines and Mining Industries Development & Renovation Organization (IMIDRO) was established in 1999 to determine overall strategies and policies and execute projects related to the construction, development, equipment and renovation projects in metallurgy production industries.
- One of the major project of IMIDRO is *development of the Sangan Iron Ore Mines.*


Yerevan
Azerbaijan
Baku
Sungun Copper Project
Caspian Sea
Garagum Desert
Turkmenistan
Ashgabat
Tehran
Sangan Iron Mine Project (SIMP)
Sangan, Iran
Afghanistan
Chadormaloo Iron Mine
Choghart Iron Mine
Zagros Mountains
Sarcheshmeh Copper Mine
Kuwait City
Gol-e-Gohar Iron Mine
location
Manama
Persian Golf
Qushm Island
Riyadh
Doha
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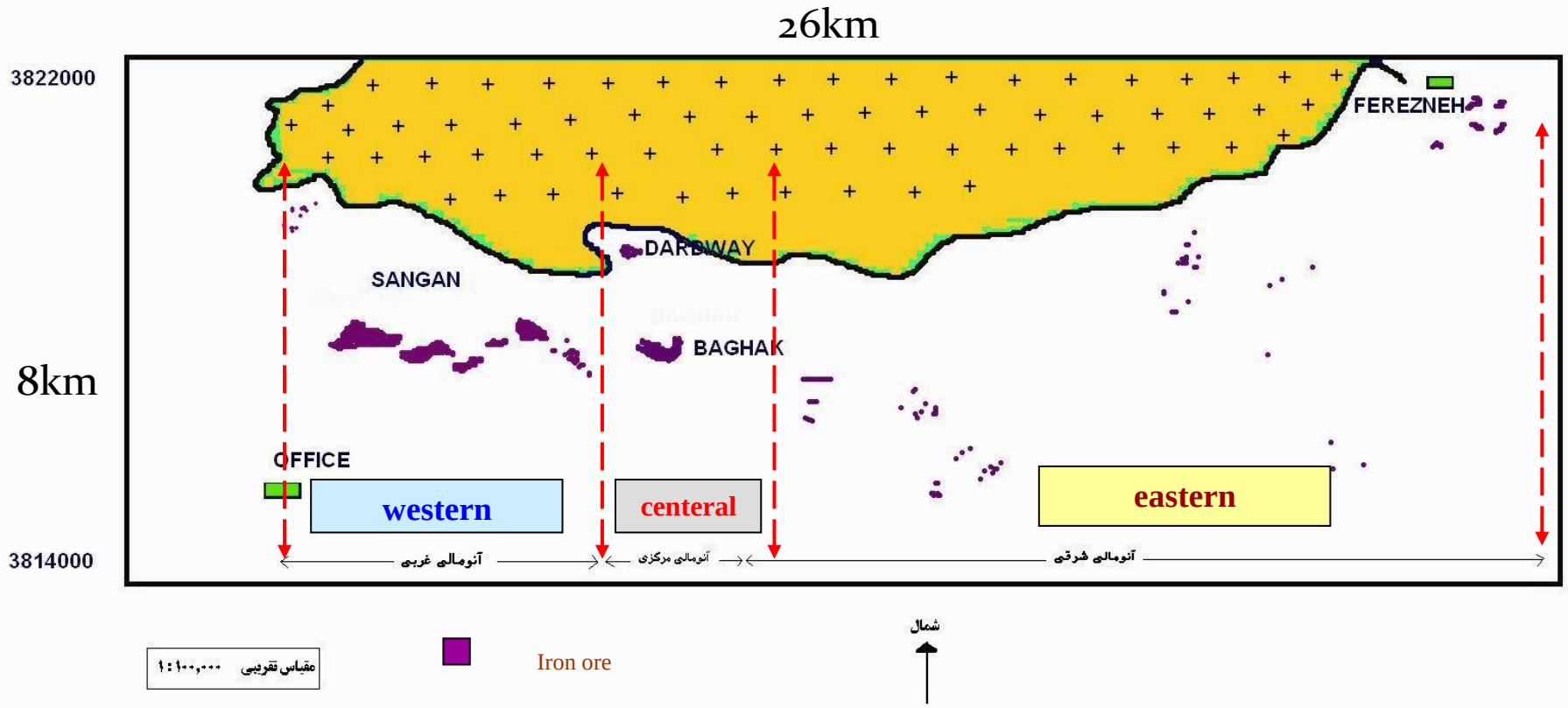
history

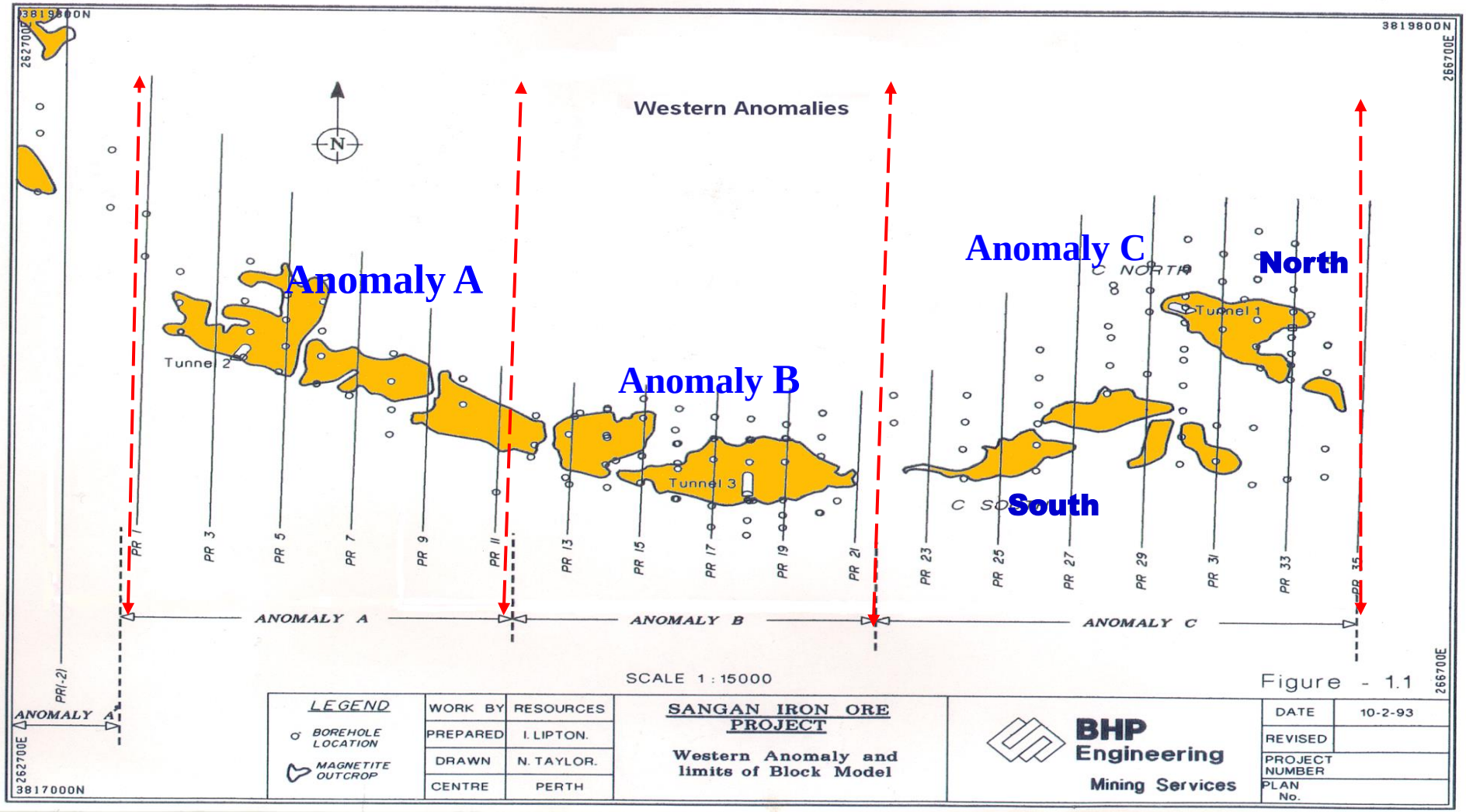
1. Remnants of caves and holes show that this mine has been excavated for a long time and in historical book indicate that mining in the Sangan region back to the 15th century and name of the *village "Sangan" goes back to the great mass of iron ore* .
2. First official exploration study of Sangan mine down in 1975.
3. New explorations and pre-feasibility studies including geological, mineral and metallurgical surveying down by the National Iranian Steel Company From 1983 to 1993
4. Project was stopped from 1993 to 2004.
5. From 2004 exploring in details is in progress.
6. It has been proved that this mine is one of the major iron ore deposits in Iran.
7. Today it is owned by the IMIDRO.

Exploration Detail:



- This mine is one of the largest mineral areas in Iran, also considered to be one of the Middle East's richest deposits.
- it is divided in three major zones; western, central and eastern.
- These iron ore deposits contain a total geological resource of **1.2** billion tons of mostly magnetite with a Fe grade from **27** to **61**%.

Western anomalies



Mainly ore deposits are located in the western and central zones. It contains 4 anomalies.

Exploration Details

Exploration Zone	Anomaly name	Resources & Reserves (Mt)					Total amount
		Proved	Probable	Measured	Identified	Inferred	
Western Zone	A	-	-	90	48	35	173
	B	109	22	57	35	12	235
	Cn	51	10	8	28	7	104
	Cs	-	-	108	14	35	157
	A'	-	-	-	14	25	39
Central Zone	Dardvey	99.4	4.2	-	-	31.4	135
	Baghak	139.4	5.7	-	-	39.9	185
Eastern Zone	I	-	-	-	-	1	1
	II	-	-	-	-	5	5
	III	-	-	-	-	10	10
	IV	-	-	-	-	10	10
	V	-	-	-	-	58	58
	VI	-	-	-	-	62	62
Total amount		398.8	41.9	263	139	331.3	1174

Resource of western and central and eastern zone and there anomalies

anomaly B

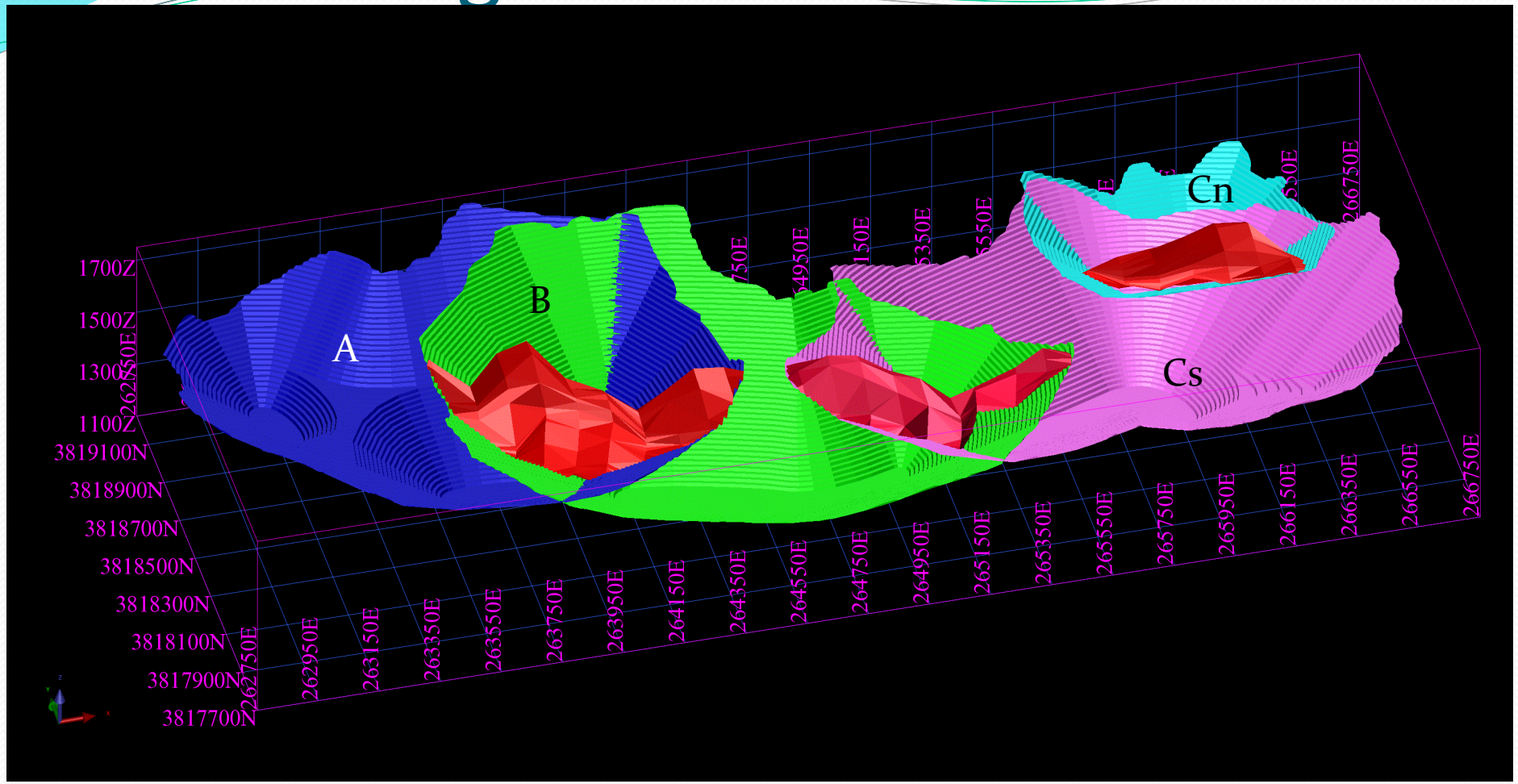
120 mt magnetite hematite ,fe average 54% ,from 1670 to 1410 s.l

Main activities

1987

2010

Mine design:



- .In first phases ,mine design for anomalies B and Cn was done in 2008
- .by new exploration design of super pit for western anomalies was done in 2013.
- According to this designee : mine is Open pit, bench high 10 m , blasting holes diameter 250 mm , stripping ratio :Ore/Wast=1

Haul roads

After finishing the mine design, the haul roads (with 25 m width) for two anomalies (B and C North) with the total length of 9 kilometers have been constructed. The preparation and development of the mine has been completed in 2010

Tailing dam design

- According tailing design report, it is anticipated that approximately **75** million tons of tailings will be generated during the **36** years mine life only for the first Sangan iron ore concentrator plant with the capacity of **2.6** Mtpy.
- The stage 1 for Cell 1 has been constructed by a combination of excavation and embankment construction in **2011**.

Railway station

- Railway station has been completed for transporting **8** million tons per years in first phases.

Concentrator plant,crusher and belts

- From 2008 to 2012 the firs Sangan Iron ore concentrator plant ,crusher and overland belt conveyor has been designed and completed .

Development of Sangan Iron Ore Mines Project

- Since the Sangan iron ore mine has a good potential of iron ore IMIDRO is developing an open pit mine complex and supporting facilities for the production of iron oxide concentrate and pellets in **5** phases.
- The total planned production of this project is **20** million tons per year .
- The iron ore concentrate produced in the process will consist of mainly magnetite, with high iron content. It is suitable for the production of direct reduction grade oxide pellets.
- At the first phase , which is the biggest national project in the eastern part of Iran, **5** Mtpy iron ore concentrate and pellet will be produced. In this phase, the first Sangan iron ore concentrator plant with the capacity of 2.6 Mtpy have been completed **2012** and is producing now.
- The second concentrator plant by **2.4** Mtpy capacity and pelletizing plant with **5** Mtpy capacity are under construction and phase one will be with the total capacity of producing **5** Mt concentrate and pellet per year.

Phases 2,3 4 and 5

- The other developing phases are under construction by private companies.
- IMIDRO has signed four separate contracts by investor companies for planning, implementation and operation of concentrator and pelletizing plants.
- IMIDRO has guaranteed to sustain supply of iron ore(about 40 mtpy iron ore) with the average Fe grade of greater than 42 % for **20** years.

Investor companies

These investor companies that are constructing concentrator and pelletizing plants in sangan are:

- Mobarakeh steel plant:

  5 mt. concentrate - **5** mt. pellet

- Khorasan steel plant:

  2.5 mt. concentrate **-2.5** mt. pellet

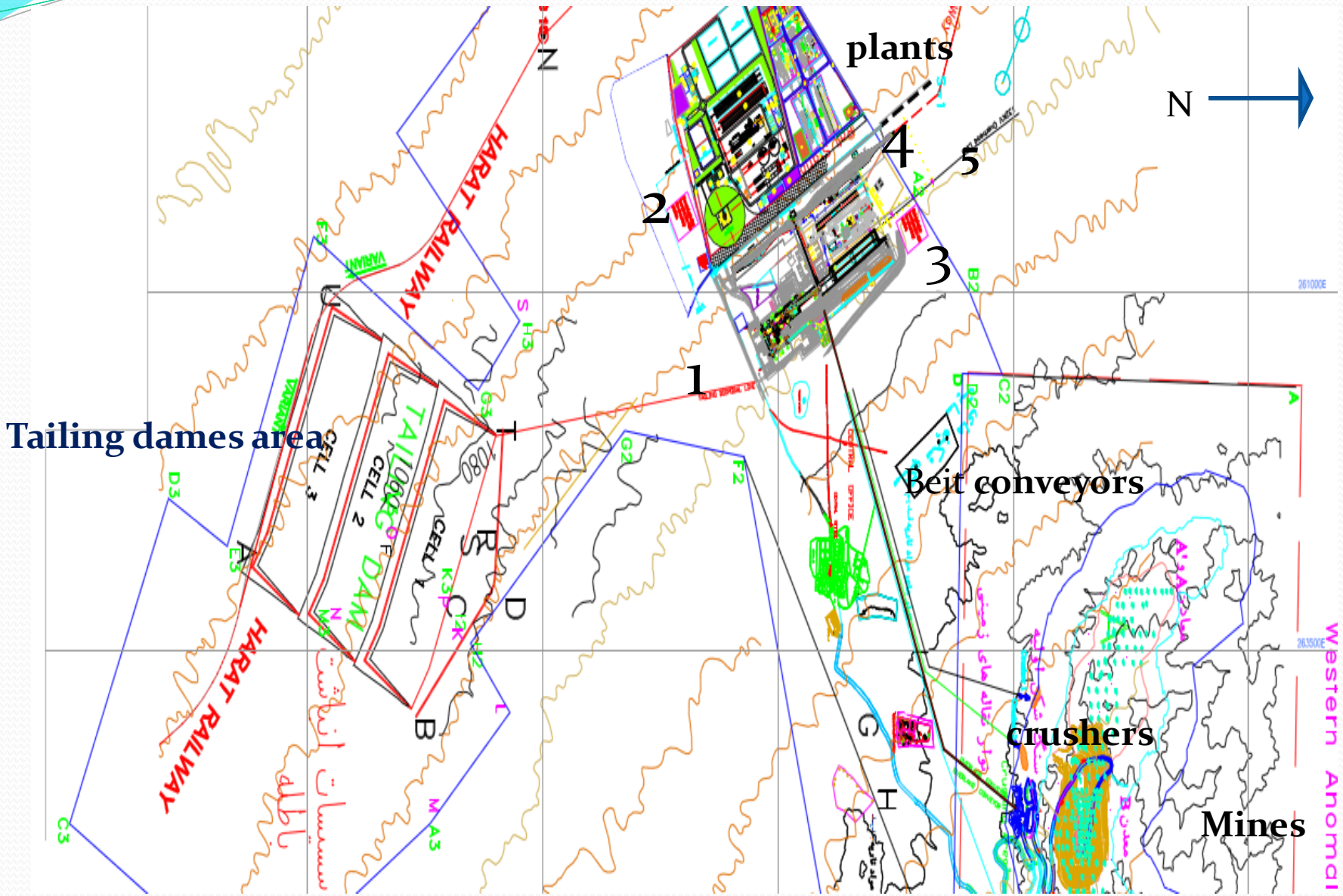
- Foolad shargh company:

  2.5 mt concentrate **-2.5** mt. pellet

- Tusee melli company:

  2.5 mt concentrate - **2.5** mt. pellet

Overall plan of all concentrator and pelletizing plants



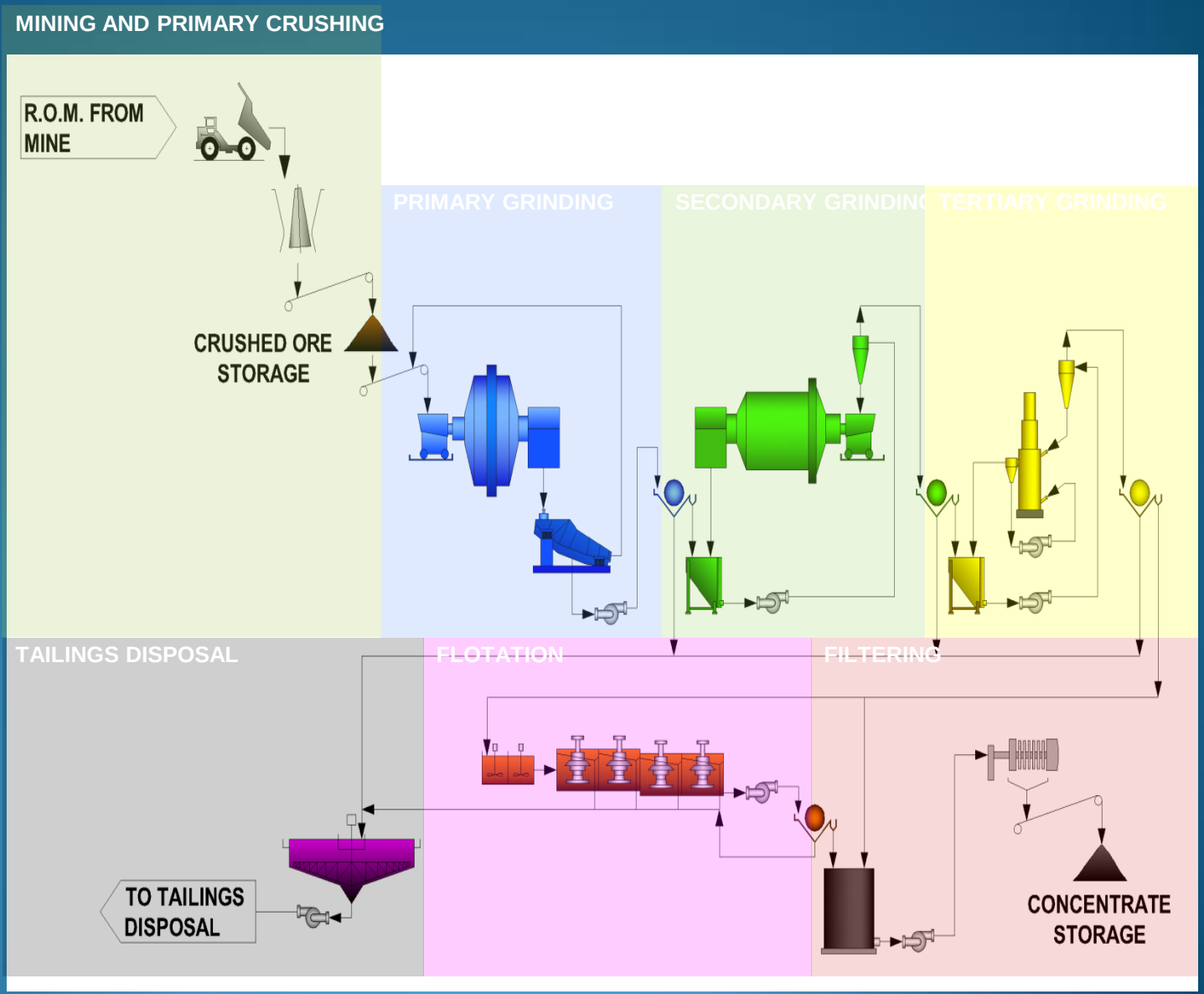
Sangan concentrator plant

SANGAN DESIGN BASIS

Concept	Unit	Value
Location		North-East of Iran, Khorasan Province
Technology		Grinding, LIMS & Sulphur Flotation
Operating Mode		Continuous
Lines		1
Type of Product		Iron ore Concentrate (pellet feed)
Iron Ore Type		Magnetite, Anomaly B & CN
Plant Capacity	mtpa	2,6
ROM Grade (Fe tot)	%	45 - 55


PRIMARY CRUSHER
Belt conveyor
BENEFICIATION PLANT
GENERAL WORKSHOP
TAILINGS DISPOSAL

PROCESS FLOW DIAGRAM



MINING OPERATIONS

DRILLING

BLASTING

EXCAVATINGAND, HAULING by 100 t trucks

- Crushing by gyratory crusher and 1800 t/h capacity

Belt Conveyor

Transporting crushed ore from crusher to plant by 5 km length belt ,2500t/h, down hill

Stock piles

Crushed ore Stacked by stacker and reclaim by plough feeder ,capacity:600000 t

Primary grinding :Autogenous grinding-Ag mill

Fresh Feed: up to 700 t/h

Secondary grinding:Ball mill

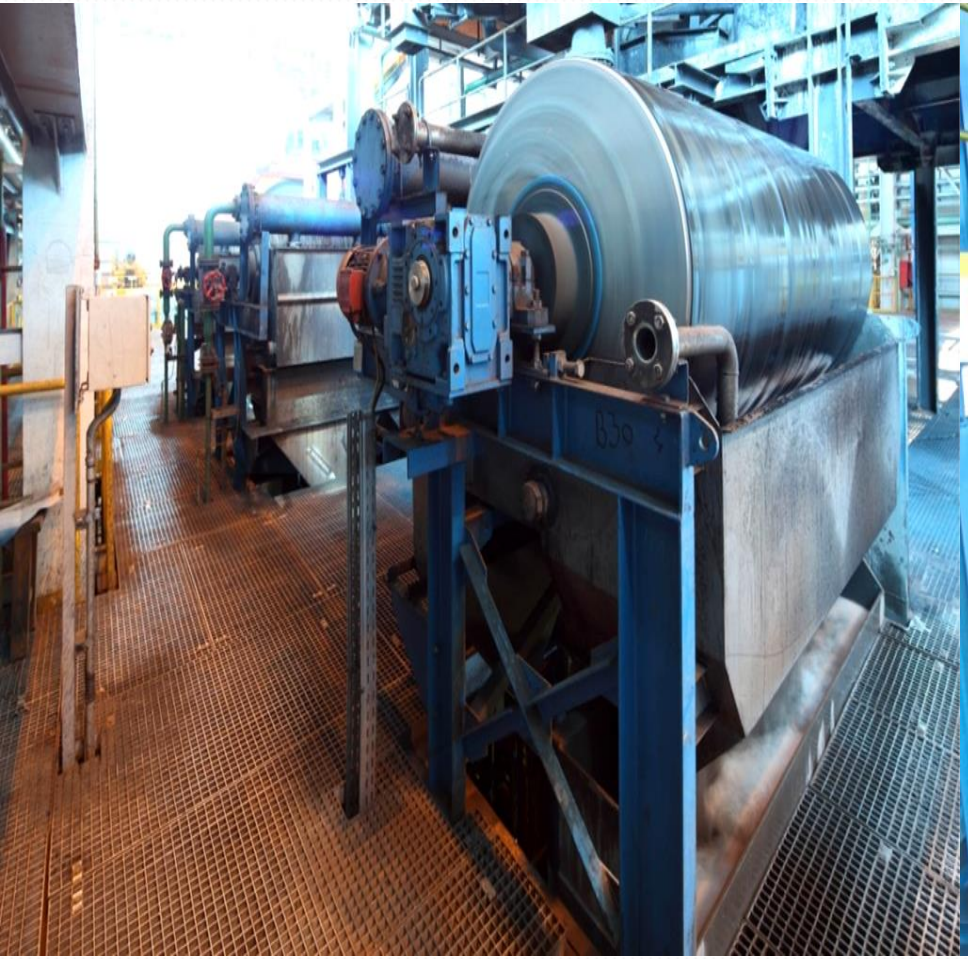
Circuit Product Size:80% <70μm

t/h

Tertiary Grinding:Tower mills(5)

Circuit Product Size:
80% ~38 µm

Magnetic separators

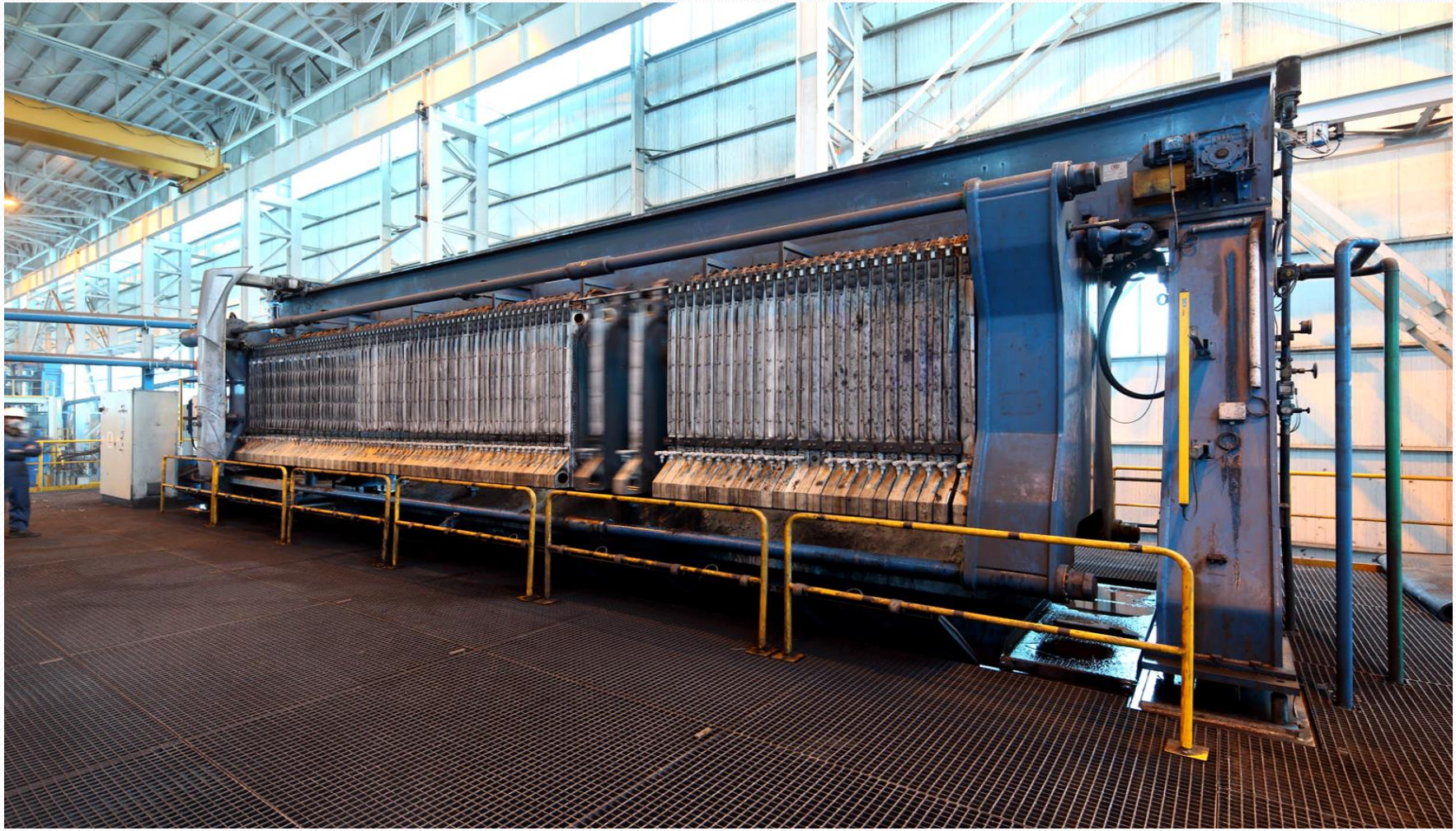


Magnetic Field: 1300 Gauss

Flotation cells

Reverse Flotation cells

Press filter



Final Product: Filter Cake, Hu: 8,5% to 9.5%
Size :38 mic

Storage

Product stacked by shuttle and reclaim by scraper,Capacity:180000t

Tailing Thickener

For recycling the process water used 2 Thickeners