STATE UNIT: ANDHRA PRADESH
PROJECT: FERROUS MINERALS
SUPERVISORY OFFICER:

Mission-II A	**Mineral Resource Assessment**			Item No.	NEW ITEM
Field Season Year	FSP Number				
2018-19	**ME**		**SR**	**AP**	**2018**	
	Type Code	Com/IGC code	Region Code	State Unit code/Mission	Year of Initiation	Sl. No.

Participating Unit(s)/ Region (s)						
FM	**SR**	**AP**	**Geophysics**	**SR**		
Division/Project	Region	State Unit	Division/Project	Region/ SU	Division/Project	Region/ SU

Geographic Information				
State (Code)	District (s)	Degree Sheet (s)	Toposheet (s)	Mineral/ Tectonic Belt, Basin etc.
AP	**Anantapur**	**57A**	**57A/16**	**Dharwar Supergroup, Sandur Schist Belt**

Personnel:	6G
Name of item in-charge	1G
Name of other officers	5G
Title	**General exploration for iron ore around Obulapuram, Ananthapur district, Andhra Pradesh.**
Stage	**G2**
Key words	Iron ore,
Objective (s)/ Projected Outcome	To assess the grade and resource of iron ore.

Total duration of item	One Year (FS 2018-19)
Item linked with	NA
Whether GCM has been done in the area	NA
Whether GPM has been done in the area	NA
Whether the item is aspinoff of any otheritem	No
Whether item is collaborative	No
Whether the item is sponsored	Yes
If yes, Name of the sponsor	As per the request of DMG, Andhra Pradesh
Outsourced work component, if any (specify)	NA

Nature and Quantum of work and time schedule

Nature ofwork	**Total Workload envisaged**	**a) Expected Year of completion b)Circulation of final report**	**Work already completed**	**Work proposed for 2018-19**
(1)Geological Survey LSM 1:12,500 (sq km)	50	a) March,2019 b) Sept.,2019	**New item**	50
01. Geological Survey ^^DM (Sq.Km) 1:4000	6.0			6.0
(2) Technological Survey (**a) Sub-surface exploration** Drilling (m)	5000			5000

(4)SMPL: BRS*(Nos.) Core sample PS** (Nos) PCS* ORM Ore beneficiation studies (Bulk sample)	 250 3000 10 10 30 02			 250 3000 10 10 30 02
(5)Chemical Analysis* (FeO,Fe_2O_3,CaO,MgO, SiO_2, MnO,TiO_2,Al_2O_3, P_2O_5 Selected samples for trace elements (Au, Ag, As, Mo , REE etc)	3260			3260

*Chemical Division, Hyderabad, **Petrology Division, SR, Hyderabad

Timeline proposed for each work component

Field Studies			
Name of the officer	Expected field stay (number of days)	Expected period of fieldwork	
		From	To
1.	120	May. 2018	March.2019
2.	120	May. 2018	March.2019
3	120	May. 2018	March.2019
4	120	May. 2018	March.2019
5	120	May. 2018	March.2019
6	120	May. 2018	March.2019
Supervisory Officer	30	May. 2018	March.2019

Laboratory Studies:		
Activity	**From**	**To**
Pre-field laboratory component and reconnaissance for the assignment under consideration, finalization of report of the previous field season and planning for new programmes	April,2018	Sept. 2018
Geological study (fieldwork and collection, processing of samples and their submission)	May, 2018	April, 2019
Geophysical study (acquisition of interpreted geophysical data)	April, 2018	Sept., 2018
Chemical Study (last date of sample submission)*	May., 2018	April, 2019

Report Submission	
Submission of the first draft of report	30th June 2019
Scrutiny of the report by Supervisory officer	1st July to 31st July 2019
Scrutiny of the report by RMH	1st August to 31st August2019
Finalization of the report	September 2019
Circulation of the report	30th September 2019

Operational Expenses		
Heads	**Geology**	**Drilling**
POL	Rs. 2,00,000/-	
WAGES	Rs. 10,00,000/-	
OC	Rs. 3,00,000/-	Rs. 500,00,000/-

BACKGROUND INFORMATION:

Dharwarian sequence of the Sandur Schist Belt hosts huge reserves of Iron and Manganese Ores. A thick pile of volcanic rocks and meta-sediments surrounded by PGC and Closepet granite characterizes the Sandur Schist Belt. The volcano-sedimentary package consists dominantly of metavolcanic (70% approx.) and subordinate metasedimentary units. Roy and Biswas (1983) worked out the stratigraphy of the belt and proposed a Lower Yeshwantnagar Formation comprising of amphibolite interbanded with quartzite, which is overlain by the Deogiri Formtion consisting of manganiferous phyllite, chert, dolomite with minor volcanic sequence. Donimalai Formation consisting of BIF associated with volcanic, both mafic and felisic, and meta-sedimentary sequence overlies Deogiri Formation. Nandihalli Formation, which constitute the uppermost unit, comprises of metabasalt, meta-acid volcanic argillite and greywacke. Roy and Biswas (1983) recognized two distinct phases of fold deformation of which the earlier one is the most pronounced, resulting in the NW-SW trending regional structure of the Belt. Three major F1 folds traced from west to east of the belt are, Sandur-Donimalai syncline, Vaddu Syncline and the Copper mountain syncline. The second deformation is associated with development of broad warps (F2) with axial traces along ENE-WSW direction. The volcano-sedimentary package of the Belt have attained lower greenschist to amphibolite facies of regional metamorphism increasing towards the periphery of the belt irrespective of its contact with either the intrusive Closepet granite or the PGC.

Several distinct lateritic surface have developed upon the volcano-sedimentary sequence. World-class iron ore deposits have resulted due to deep weathering of the BIF of Donimalai Formation. Primarily the BIF is magnetite quartzite but due to deep weathering during the process of lateritisation, magnetite is completely martitised in the weathering profile. Manganese mineralization is confined to the litho-units of Deogiri Formation. Manganiferous beds in the sedimentary sequence have often been source for rich pockets of manganese ores in the weathering profile by the process of residual concentration.

Workable iron ore deposits are noticed at Mallammakonda (15°04'20": 76°47'20"), west of Vibhuthigudda - Δ901 (15°05'35": 76°49'00"), south and east of Ingulammadevi Konda - Δ997 (15°04'40": 76°50’00") and north of 676 hill (15°0455": 76°51’50"). Minor occurrences of iron ore are also reported from Δ820 (15°06'40": 76°4700") and Δ971 - Timmappanagudda (15°04'40": 76°46'30"). Gold occurrence in Vibhuti Gudda is recorded in metabasalt. Granite, BIF and basic dykes are quarried for use as construction material

M/s M.S. Venkataram and N.V.B.S. Dutt (1949) of the Geological Survey of India, at the behest of the then State of Kandur, geologically surveyed the area with a map prepared in a scale of 1 inch : 1 mile. They published a stratigraphic column as well as the first estimates of the rangewise reserves of iron ores, which totalled at 129.58 million tons. Dr. M.S. Krishnan (1954) of Geological Survey of India subsequently classed these 130 million tons as proved indicated, while publishing a total reserve figure of 430 million tons of ore for the entire Bellary district.

Dr. B.P. Radhakrishna published a reserve figure of 1,000 million tons for Bellary-Hospet region. The Department of Mines and Geology, Mysore, took up systematic mapping in scale of 4 inches: 1 mile in each range, with occasional drilling and estimated iron ore reserves of the Sandur Schist Belt in various ranges and sectors.

The Obulapuram area lies in the south eastern part of the Sandur schist belt exposing primarily metabasalt and BIF belonging to the Donimalai Formation. The NW-SE trending Copper mountain synclinal trace (F_1) bifurcates in to an N-S trending synclinal and complementary anticlinal axial trace in the eastern parts of the Obulapuram area. The sequence represents western limb of the upright Copper mountain F1 syncline. Two major BIF horizons are present in the block in addition to several other smaller bands. Large- scale mapping will bring out prospective zones for further exploration by detailed mapping and drilling. The area has been subjected to intense mining activities and an insitu resource of 105 million tons of hematitic ore exists in six suspended leases present in the Obulapuram block (communication received from DMG AP). Resource evaluation carried out in the suspended leases indicate an average grade in the range of 58-68%Fe.

The area proposed by DMG AP has three major BIF horizons having width varying from 50 to 250m. Structurally they constitute the western limb of the major Copper mountain F1 syncline. A higher order synclinal (F1) N-S trending synclinal axial trace with a complementary anticlinal axial trace is recorded in the southern part of the Obulapuram block where the schist belt protrude southward. The southern, central and northern BIF have a cumulative strike length of 19km, 12km and 1.5km respectively in the block area. In general they show north- easterly to northerly dips at 50^0 -60^0. In the higher order N-S trending F_1 syncline, they dip towards each other. Obulapuram block has three existing leases covering a total area of 114.5 hectares.

Exploration activities will exclude the existing leases. Large-scale mapping in the entire Obulapuram block area will bring out the detail structural disposition of BIF. Systematic channel samples across the BIF, with each sample over a surface width of over 5-10m is to be collected to assess the area, which has not been subjected to mining earlier. Based on the results of large-scale mapping and analysis of bedrock samples blocks are to be identified for further exploration by detailed mapping and drilling. Drilling of the BIF will be carried out in the designated detailed mapping blocks at a systematic traverse interval of 200m. Since the surface width of BIF often exceeds 100m, staggering of boreholes along a traverse line is to be done to assess the entire width. Initially the BIF is to be assessed up to a vertical depth of 30m followed by deeper level boreholes to asses it at vertical depths of 60 and 100m. Considering the moderate to steep dipping nature of BIF, largely inclined boreholes is to planned to optimize drilling and for proper sampling of the resources. Bulk samples of sub-economic resources is to be subjected to ore beneficiation. The data generated form the exploration will be synthesized with the exploration data of expired leases to give a holistic picture about the resource of the Obulapuram block.

Coordinates point of given Obulapuram block, Ananthapur district, Andhra Pradesh

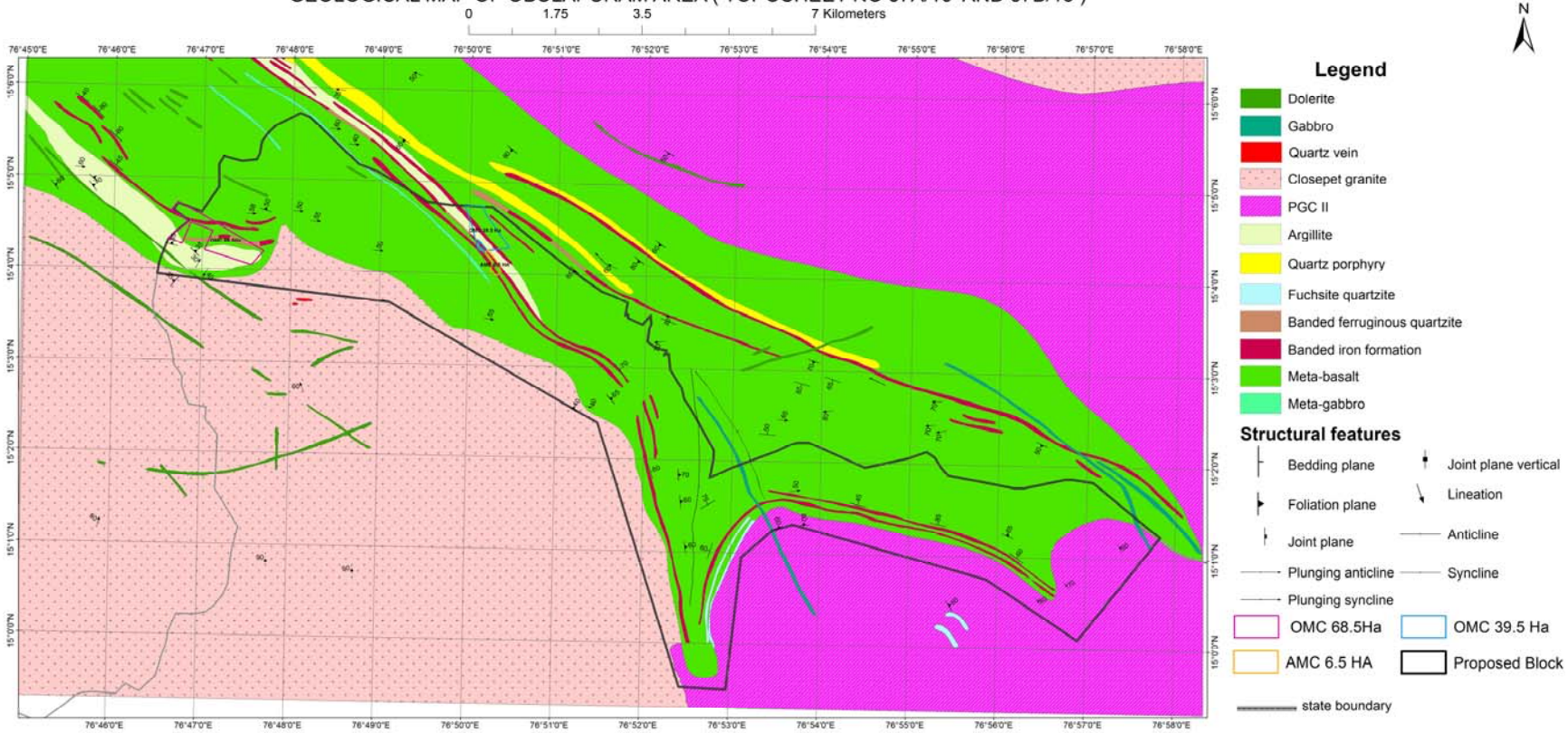
S.No.	Longitude	Latitude	S.No.	Longitude	Latitude
1	76°48'4.904"E	15°5'42.97"N	26	76°56'17.239"E	15°1'45.818"N
2	76°48'45.141"E	15°5'11.155"N	27	76°56'49.76"E	15°1'52.482"N
3	76°48'57.698"E	15°5'6.532"N	28	76°57'5.221"E	15°1'49.816"N
4	76°49'31.495"E	15°4'46.999"N	29	76°57'49.931"E	15°1'16.338"N
5	76°50'15.964"E	15°4'44.342"N	30	76°56'54.318"E	15°0'5.358"N
6	76°51'30.678"E	15°3'49.713"N	31	76°55'54.314"E	15°0'47.068"N
7	76°51'38.748"E	15°3'46.817"N	32	76°53'28.33"E	15°1'15.607"N
8	76°51'48.305"E	15°3'42.586"N	33	76°52'58.328"E	14°59'29.502"N
9	76°51'46.598"E	15°3'34.217"N	34	76°52'27.594"E	14°59'31.698"N
10	76°51'48.615"E	15°3'34.889"N	35	76°51'29.054"E	15°2'23.66"N
11	76°51'49.018"E	15°3'32.603"N	36	76°49'6.362"E	15°3'38.298"N
12	76°51'58.296"E	15°3'28.704"N	37	76°46'29.767"E	15°3'55.86"N
13	76°52'4.078"E	15°3'34.351"N	38	76°46'32.252"E	15°4'7.711"N
14	76°52'4.482"E	15°3'29.376"N	39	76°46'36.694"E	15°4'19.186"N
15	76°52'3.33"E	15°3'26.705"N	40	76°46'50.76"E	15°4'31.402"N
16	76°52'2.388"E	15°3'17.752"N	41	76°46'42.246"E	15°4'39.175"N
17	76°52'6.864"E	15°3'14.101"N	42	76°46'43.727"E	15°4'43.987"N
18	76°52'15.345"E	15°3'12.334"N	43	76°46'59.644"E	15°4'38.435"N
19	76°52'13.461"E	15°3'8.8"N	44	76°47'10.749"E	15°4'54.352"N
20	76°52'16.523"E	15°3'10.096"N	45	76°47'13.71"E	15°5'13.971"N
21	76°52'17.819"E	15°2'59.023"N	46	76°47'36.29"E	15°5'13.601"N
22	76°52'17.595"E	15°2'59.923"N	47	76°47'43.324"E	15°5'29.518"N
23	76°54'30.612"E	15°1'57.546"N			
24	76°55'11.664"E	15°2'8.476"N			
25	76°55'27.391"E	15°1'53.015"N			

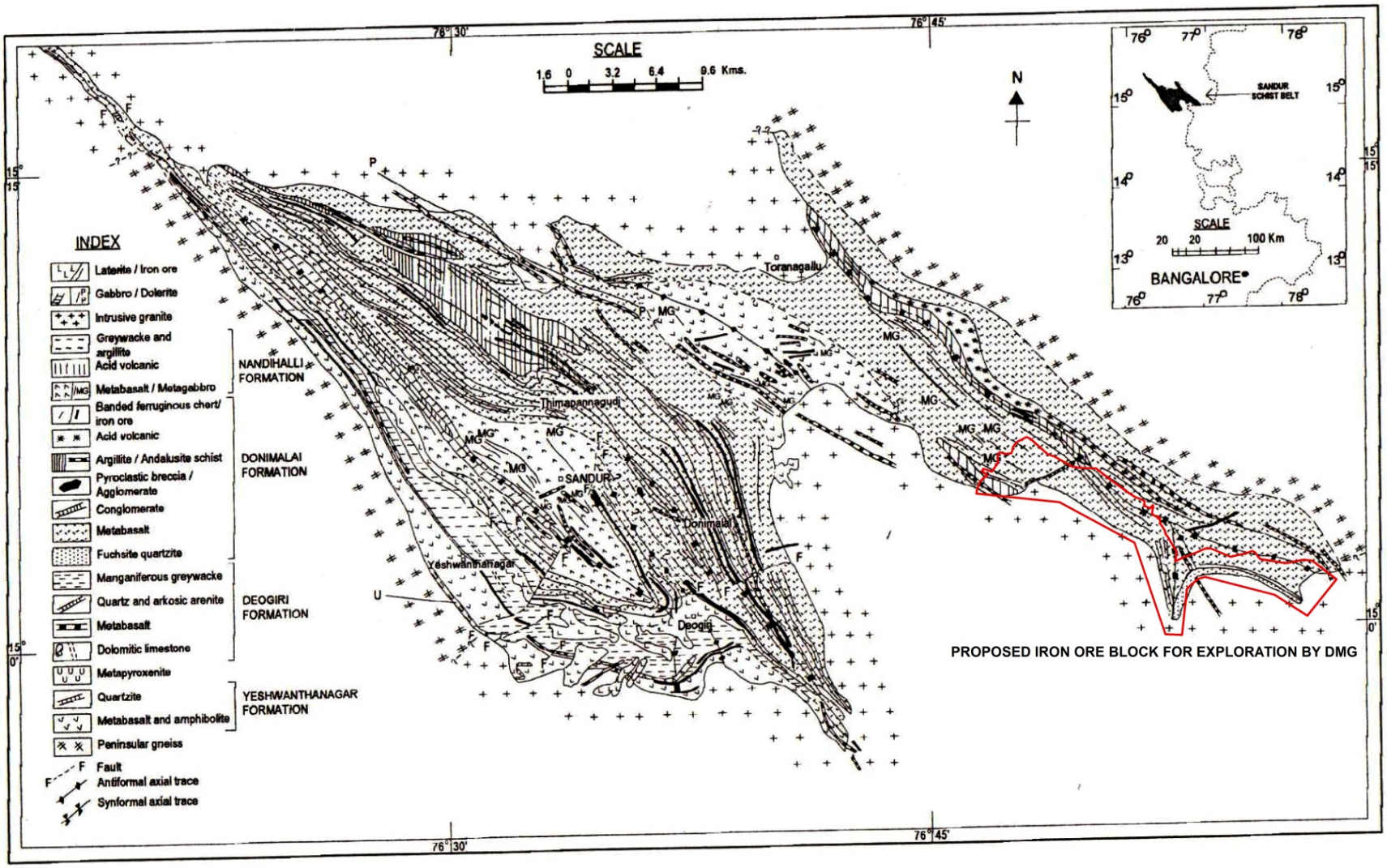
Northern portion of the given block is following the Andhra Pradesh and Karnataka state boundary

Bibliography:

1. Venkatram, M.S., & Dutt, N.V.B.S., 1949 Report on the Geological Survey of Sandur State, Madras Presidency. Publication of the Development. Department, Govt, of Madras.
2. Ganeshan K., Vidhardhi, R.C., 1964 Preliminary appraisal of the Bellary Hospet Iron Ore Deposits, Bellary District, Mysore. Unpublished report Indi. Bur. Mines.
3. Mishra, R.N., 1972 Geology of Sandur Schist Belt. Unpublished report, Geol. Surv. Ind.
4. Roy, A and Biswas, S K., 1979; Metamorphic history of Sandur schist belt, Karnataka; Jou.Geol.Soc.Ind., 20,pp.179-187
5. Roy, A and Biswas, S K., 1983; Stratigraphy and structure of Sandur schist belt, Karnataka; Jou.Geol.Soc.Ind., 24,pp.19-29.
6. Geology and mineral resource of Andhra Pradesh Miscellaneous Publication No. 30 part-VIII B, first Edition year 2015.
7. Geological note of toposheet no. 57A/16 from compiled unpublished geological map.

GEOLOGICAL MAP OF OBULAPURAM AREA (TOPOSHEET NO 57A/16 AND 57B/13)





Roy and Biswas 1983.