Proposal for Assessment of Manganese around Kandhal area of Rairakhol Tahasil of Sambalpur District, Odisha State for Reconnaissance (G4 Stage) under NMET.

By

Directorate of Mines & Geology,Odisha,Bhubaneswar

Place: Bhubaneswar

Date: 13.08.2024

Summary of the Block for Reconnaissance Survey (G4Stage) GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	
	Exploration Agency	Directorate of Mines & Geology, Odisha,Bhubaneswar
	Commodity	Manganese
	Mineral Belt	Eastern Ghat Supper Group
	Completion Period with entire Time schedule to complete the project	12 month
	Objectives	Demarcation & assess the potentiality of Manganese
	Whether the work will be carried out by the proposed agency or through Outsourcing and details thereof. Components to be outsourced and name of the outsource agency.	Directorate of Mines & Geology, Odisha
	Name/ Number of Geoscientists	2 Geologists
	Expected Field days (Geology) Geological Party Days	180 days
1.	**Location**	
	Latitude	A:-21°04'38.646" B:- 21°04'42.713", C:-21°0'55.373" D:-21°0'49.655"
	Longitude	A:-84°8'41.474", B:-84°12'48.855" C:-84°12'52.070" D:- 84°8'46.943"
	Villages	Kandhal
	Tehsil/ Taluk	Rairakhol
	District	Sambalpur
	State	Odisha
2.	**Area (hectares/ square kilometres)**	
	Block Area	50 sq km
	Forest Area	70%
	Government Land Area	
	Private Land Area	
3.	**Accessibility**	
	Nearest Rail Head	Rairakhol
	Road	The Manganese block connects NH-135B at Rairakholat a distance of 15km.
	Airport	Veer Surendra Sai Airport, Jharsuguda (129 km)

4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Dendritic to Sub dendritic pattern of drainage is prevalent in the area
	Rivers/ **Streams**	Surubali jor
5.	**Climate**	
	Mean Annual Rainfall	153.94 millimeters (6.06 inches)
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	14.7^0C 40.2^0C
6.	**Topography**	
	Toposheet Number	F45M4 (73C/4)
	Morphology of the Area	The Block area in general is highly undulated terrain. The highest peak of 578 m from mean sea level is at western part of the block.
7	**Availability of baseline geoscience data**	
	Geological Map (1:50K/ 25K)	Geological Map (1:50K)
	Geochemical Map	Available in NGDR Portal
	Geophysical Map (Magnetic & Gravity)	Available in NGDR Portal
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	• At about 750m SW of Kandhal village, floats of manganese were found in the nala flowing in E-W direction from Sangamalia R.F as well as in the flanks of the hill. • There is no information or any previous exploration activity in the area relating to MnO_2. • During the pre-field visit five manganese samples (grab) were collected which were analysed in the office of the analytical chemist, Zonal Laboratory, Sambalpur. The analysis result shows MnO_2 varies from 45.87 % to 62.64%. • Based on this background information the area is proposed to take up for Mn exploration in G4 stage. • The exploration will be helpful in estimation of reconnaissance resources (334) of manganese and other associated minerals in the area. • The Reconnaissance Survey will be helpful in planning of detailed exploration programme which in turn will facilitate the state Government for auction of block.

Detailed description on the following titles to be made in the proposal.

1. Block Summary

Physiography: Maximum part of the area is covered by Sagamalia Reserve forest. The Surubali Jor nala passes through the north eastern part of the proposed block. The Block area in general is highly undulated terrain. The highest peak of 578 m from mean sea level is at western part of the block.

Regional Geology:

Geologically the area form part of the Proterozoic Eastern Ghat Belt. It comprises dominantly high grade quartzofeldspathic gneisses (charnockite and migmatite gneisses), sillimanite quartzite, khondalite (garnet-sillimanite-graphite-quartz-feldspar gneiss), calc-granulite and minor metabasic rocks. The metamorphosed sedimentary rocks (khondalite,quartzite and calc-granulite) are generally associated with graphite and manganese mineralisation. The general foliation trend of the litho units is NE-SW dipping northwesterly at 65°- 70°. Occasional variation in dip direction is also noticed.

Age	Supergroup		Lithology
Proterozoic			Quartz vein
			Biotite Syenite
Archean to Proterozoic	Eastern Ghat Supergroup	Migmatite Group	Granite Gneiss
		Charnockite Group	Acid Charnockite
			Basic Charnockite
		Khondalite Group	Leptynite
			Calc granulite
			Quartzite
			Sillimanite Gneiss; Quartzo felspathic Gneiss (Garnet, Graphite)/Khondalite

GEOLOGY OF THE BLOCK:

The area is mainly covered by khondalite, Charnockite group of rocks and granite gneiss/migmatites of Eastern Ghats Supergroup.

Khondalite:

Khondalite Group of rocks are the predominant rock units in the area and the hills are composed of quartz-feldspar sillimanite schist/gneiss and quartzites. The garnet-quartz-feldspar sillimanite schist/gneiss exhibits a very well defined schistosity defined by compositional layering. Alternation of quartzo felspathic light colour bands with darker bands rich in garnet and occasional biotite and streaks of graphite are common. It has been migmatised to various extent and sometimes grades into garnetiferous granite gneiss. Calc-

granulite occur in the form of bands in association with khondalite and is exposed in the southern part of the area.

Charnockite:

The charnockites of acid to intermediate variety are well developed in the hills of the field area. The rock is coarse grained, massive and imparts a grey to brownish grey greasy colour. The rock is essentially composed of microcline perthite and hypersthene with a few green hornblende and garnet. In intermediate variety of charnockite, oligoclase predominant over perthite feldspar.

Quartzite:

During the course of traverse, the floats of quartzite are noticed in the flank of the hill.

Mineral potentiality based on geology, geophysics, ground geochemistry etc.:

High gravity and magnetic anomaly signatures were recorded through Geophysical data.

Scope for proposed exploration: -

The area appears promising for Mn exploration based on pre-field visit to the area. In the E-W trending stream rolled irregular boulders ranging in size (5cmX7 cm) to 10 cm X 8 cm) were observed (Photo-4 a & d). Closure scrutiny of these samples reveal that the dark coloured minerals show botryoidal nature and often soil the fingers. This suggest the presence of psillomelane and minor pyrolusite in it. Since the exposure density is low due to lateralization and of thick alluviaum cover, the exact control of the possible Manganese mineralisation could not be ascertained. Few mine dumps of these minerals (Photo -4 c & d) are also noticed. Five samples were collected and analysed for their Mn content.

2. Previous Work

No information on any previous work was found.

During the pre-field visit five manganese (grab) samples were collected which were analysed in the office of the analytical chemist, Zonal Laboratory, Sambalpur. The analysis result shows 45.87% to 62.64 % of MnO_2. The analysis result is given below.

Chemical analysis result of manganese sample:

Sl.No	Laboratory reference no	Sender's identity marks on the sample	Name of the mineral	% LOI	%SiO_2	%Fe_2O_3	%MnO_2
01	P-01/24-25	Index No-RM-1	Manganese	11.96	02.42	25.62	56.49
02	P-02/24-25	Index No-RM-2	Manganese	-	-	-	45.87
03	P-03/24-25	Index No-RM-3	Manganese	-	-	-	62.64
04	P-04/24-25	Index No-RM-4	Manganese	-	-	-	55.05
05	P-05/24-25	Index No-RM-5	Manganese	-	-	-	48.40

3. Block description

Block Corner points	Latitude	Longitude
A	21°04'38.646" N	84°8'41.474" E
B	21°04'42.713" N	84°12'48.855" E
C	21°0'55.373" N	84°12'52.070" E
D	21°0'49.655"N	84°8'46.943"E

4. Planned Methodology

Work will start with detailed mapping of the block on 1:12,500 scale. Simultaneously, topographical survey will be done in the block. Surface sampling along with groove sampling (at 250m interval) will be done during the course of detailed mapping. Chemical analysis of all the samples will be done from Departmental laboratory as well as NABL accredited laboratories. These activities will be followed by data interpretation and report writing work.

5. Nature Quantum and Target

Work Components

Quantum of work for **Assessment of Manganese around Kandhal area of Rairakhol Tahasil of Sambalpur District, Odisha State for Reconnaissance (G4 Stage)**			
Sl. No.	**Item of Work**	**Unit**	**Quantity**
A	**GEOLOGICAL WORK**		
1	Geological Mapping (1:12,500)	Sq. km	50
2	Core Logging	m	500
3	Demarcation of lease boundary, fixation of boreholes and determination of coordinates & Reduced Level (RL)of the boreholesby DGPS	Point	10
B	**DRILLING**		
1	Surface Drilling	m	500
2	Tender preparation, publishing & finalisation	No.	1
3	Land/Crop compensation	Bore hole	5
4	Construction of concrete pillar(12"x12"x30")	Bore hole/Boundary Pillar	5
5	Camp setting	drill	1
6	Camp winding	drill	1

7	Approach road making	km	5
8	Drill core preservation	m	500
C	**PITTING**		
1	Pitting	Cu.m	80
2	Trenching	Cu.m	40
E	**LABORATORY STUDIES**		
1	**Chemical Analysis**		
	i) Primary samples and Check samples for Graphite (Core Samples)		
	a) Primary samples for 5 radicals (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI)	Nos	400
	b) Check sample external(MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI) 10%	Nos	40
	c) Check sample internal (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI) 10%	Nos	40
	d) Composite sample (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI) 10%	Nos	10
2	**Physical Analysis**		
i)	a) XRF of major oxide	Nos	10
ii)	b) X-RD Studies	Nos	10
iii)	c) ICP –MS studies (34 trace elements)	Nos	10
iv)	Preparation of thin section	Nos	10
v)	Petrographic studies	Nos	10
vi)	Preparation of polished section	Nos	10
vii)	Mineralographic studies	Nos	10
viii)	Specific gravity	Nos	5
ix)	Bulk density	Nos	5

x)	Rock powdering	Nos	480
F	**GEOLOGICAL REPORT PREPARATION**	Nos	1
G	**PEER REVIEW**	Nos	1
H	**PREPARATION OF EXPLORATIONPROPOSAL**	Nos	1

6. Man power employment

a. Geologist: 2
b. Technical Supervising Officer (DDG): 1
c. Supervisor: 1
d. Surveyor: 1
e. Driver: 1 (with vehicle

7. Summary of Cost Estimate

Sl. No.	**Item**	**Total Estimated Cost (Rs.)**
1	Geological mapping & Pitting	39,47,200
2	Survey & Drilling (Outsourcing)	76,43,000
3	Geophysical survey	-
4	Laboratory Studies	55,15,225
	Sub Total	**1,71,05,425**
5	Proposal Preparation	3,42,109
6	Geological Report	7,50,000
7	Peer Review	10,000
8	Miscellaneous Charges	3,42,109
	Total Cost Estimate	1,85,49,643
	GST (18%)	33,38,936
Total cost including 18% GST		**2,18,88,579**
Say, in Lakhs		**218.88579 Lakhs**

8. Break-up of expenditure

Cost has been estimated based on actual schedule of charges mandated in the circular OM No. 61/1/2018-NMET dated 31st March2020 for promotional projects of MOM.

The total estimated cost is Rs. **218.88579 Lakhs**. The cost estimates for reconnaissance survey (G4 Level) are given in Table below.

Estimated cost for reconnaissance survey (G4) for Manganese around Kandhal area of Rairakhol Tahasil of Sambalpur District, Odisha State (Proposed G4 Area: 50 sq,km, Nos. of Borehole - 5 Nos., Borehole depth range - 100 m, schedule timeline - 16 months)							
Sl. No.	**Item of Work**	**Unit**	**Rate as per NMET SoC 2020-21**		**Estimated cost of proposal**		**Remarks**
			SoC itemSl. No.	**Rate as per SoC (in Rs)**	**Quantumof Work**	**Total Amount (Rs.)**	
1	**GEOLOGICAL WORK**						
i)	Charges for One Geologist - Field	per day	1.3	11,000	180	19,80,000	
ii)	Charges for One Geologist - HQ	per day	1.3	9,000	60	5,40,000	
iii)	Labours (2 Nos.) Base rate- As per rates of state labour commission Rs. 450*2=900/-	per day	5.7	900	180	162,000	(Amount will be reimbursed as per notified rates by central labour Commission rates or respective State Govt. Whichever is higher)
iv)	Charges for one Sampler	per day	1.5.2	5,100	120	6,12,000	
v)	Labours (4 Nos.) Base rate- As per rates of state labour commission Rs. 450*4=1800/-	day	5.7	1,800	120	2,16,000	(Amount will be reimbursed as per notified rates by central labour Commission rates or respective State Govt. Whichever is higher)
Sub Total-A						**35,10,000**	
2	**Survey (Outsourcing)**						
i)	Survey Party days (One Surveyor Charges)	day	1.6.1a	8,300	30	249,000	
ii)	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes by DGPS	Per Point of observation	1.6.2	19,200	10	1,92,000	
iii)	Labours (4 Nos) Base Rate- As per rates of state labour commission Rs. 450*4=1800/-	day	5.7	1,800	30	54,000	(Amount will be reimbursed as per notified rates by central labour Commission rates or respective State Govt. Whichever is higher)
	Sub Total- B					**4,95,000**	

3	**DRILLING (Outsourcing)**						
i)	Surface Drilling	per m	2.2.1.4	11,500	500	57,50,000	
ii)	Land/Crop compensation	Per Borehole	5.6	20,000	5	1,00,000	As per actuals as certified by local authorities subject to a maximum of 20,000per borehole
iii)	Construction of concrete pillar(12"x12"x30")	Per Borehole	2.2.7a	2,000	5	10,000	
iv)	Monthly Accomodation chargesfor drilling camp (up to 2 rigs)	Per Months	2.2.9	50,000	3	1,50,000	
v)	Camp setting	Per drill	2.2.9a	2,50,000	1	2,50,000	
vi)	Camp winding	Per drill	2.2.9b	2,50,000	1	2,50,000	
vii)	Approach road making	Per km	2.2.10b	32,200	5	1,61,000	
viii)	Drill core preservation	Per m	5.3	1,590	300	4,77,000	
	Sub Total- C					**71,48,000**	
4	**PITTING**						
i)	Pitting	Cu.m	2.1.2	3,800	80	3,04,000	10 pits 2*2*2
ii)	Trenching	Cu.m	2.1.1	3,330	40	1,33,200	2 trenches 2*2*5
	Sub Total-D					**4,37,200**	
5	**LABORATORY STUDIES**						
1	**Chemical Analysis**						
i)	Primary samples for 5 radicals (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI)	Per Sample	4.1.1	8,157	400	32,62,800	60% of core sample (500m) + 50 grab sample + 30 pit sample + 20 trench sample
ii)	Check samples Internal for 5 radicals (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI)	Per Sample	4.1.1	8,157	40	3,26,280	
iii)	Check samples External for 5 radicals (MnO_2,Al_2O_3, SiO_2, Fe_2O_3, and LOI)	Per Sample	4.1.1	8,157	40	3,26,280	
iv)	Composite samples for 5 radicals (MnO_2,Al_2O_3, SiO_2, Fe_2O_3,and LOI)	Per Sample	4.1.1	8,157	10	81,570	
2	**Physical Analysis**						
i)	Estimation of major oxides by XRF technique	Per Sample	4.1.15a	4200	10	42,000	
ii)	X-RD Studies	Per Sample	4.5.1	4,000	10	40,000	

iii)	ICP -MS studies (34 traceelements)	Per Sample	4.1.14	7,731	10	77,310	
iv)	Preparation of thin section	Per Sample	4.3.1	2,353	10	23,530	
v)	Petrographic studies	Per Sample	4.3.4	4,232	10	42,320	
vi)	Preparation of polished section	Per Sample	4.3.2	1,549	10	15,490	
vii)	Minerographic studies	Per Sample	4.3.4	4,232	10	42,320	
viii)	Specific gravity	Per Sample	4.8.1	1,605	5	8,025	
ix)	Bulk density	Per Sample	4.10	3,540	5	17,700	
x)	Rock powdering	Per Sample	4.3.12	2,520	480	12,09,600	
	Sub Total-E					**55,15,225**	
Total A+B+C+D+E						**1,71,05,425**	
F	Tender preparation, publishing& finalisation	one time	2.3			3,42,109	2% of the approved project cost or 5 lakhs whichever is lower will be paid one time to exploration agency.
G	GEOLOGICAL REPORT PREPARATION	One Number (5Hard copies) along withsoft copy	5.2			7,50,000	Project cost exceeding 150 Lakh but less than 300 Lakh: A minimum of Rs 7.5 lakhof 3% of the work whichever is more and Rs 3000/- per each additional copy
H	PEER REVIEW		As per EC decision			10,000	
I	PREPARATION OF EXPLORATION PROPOSAL	One Number (5Hard copies) along withsoft copy	5.1			3,42,109	2% of approved project cost or 3.8 lakh whichever is lower
Total F+G+H+I						**14,44,218**	
Total A+B+C+D+E+F+G+H+I						**1,85,49,643**	
GST 18%						**33,38,936**	
Grand Total (A+B+C+D+E+F +G+H+I+18% GST)						**2,18,88,579**	

9. TIME SCHEDULE

SCHEDULE OF CHARGES (SoC) FOR PROJECTS FUNDED THROUGH
NATIONAL MINERAL EXPLORATION TRUST (*w.e.f.* 01.04.2020)

Time Schedule of Assessment of Manganese around Kandhal area of Rairakhol Tahasil of Sambalpur District, Odisha State for Reconnaissance (G4 Stage) under NMET. : 12 months

Sl. No.	Work Components	Work Period in month												Time period Days
		1	2	3	4	5	6	7	8	9	10	11	12	
	Tender processing	3 months												
1	Camp Setting													7 Days
2	Geological Mapping on scale 1:12,5000													120 Days
3	Pitting (50 Cu m)													60 Days
4.	Trenching (50 Cu m)													
6	Drilling (5 BHs)													120 Days
7	Core Logging & Sampling													
8	Sample processing & Analysis													150 Days
9	Camp Winding													7 days
10	Data Analysis & Report Writing with Peer Review													90 Days
		Field Period								Preparation of Report and analysis				

List of Plates

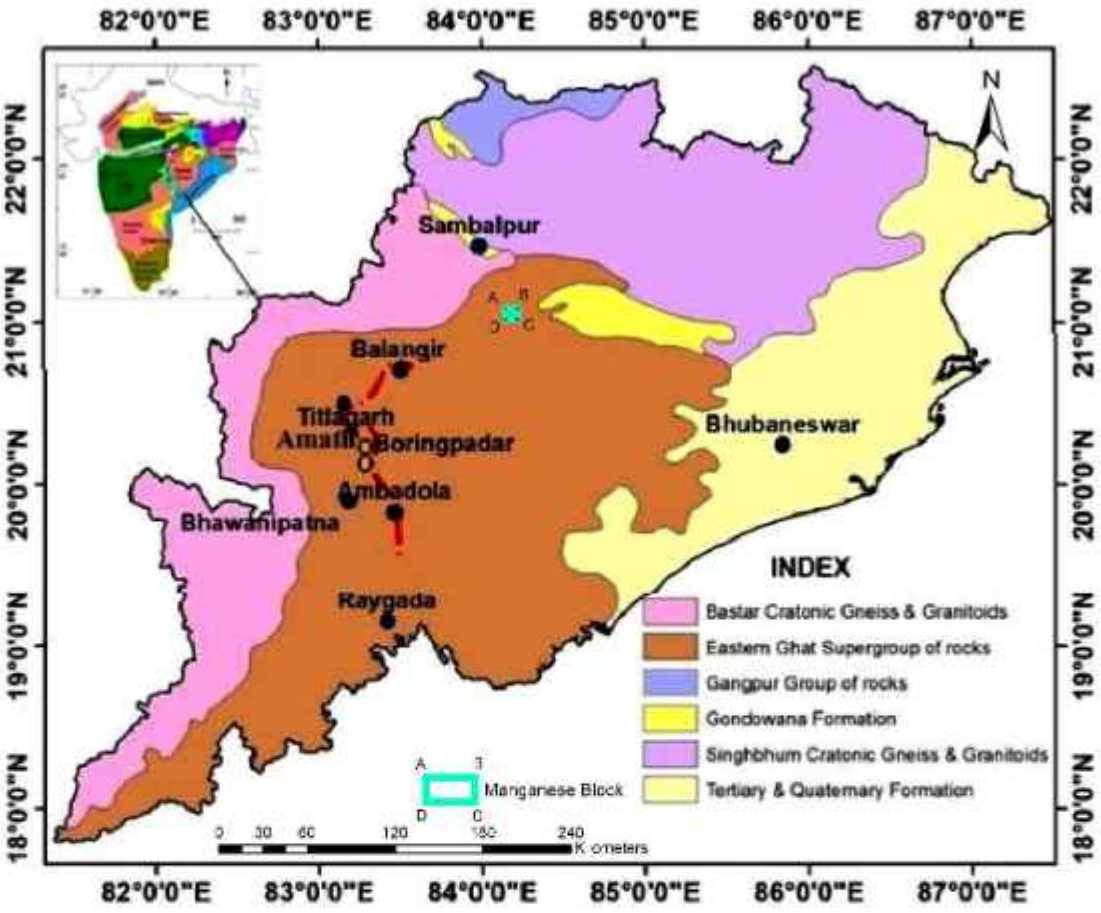
Plate 1: Location Map

Plate 2: Proposed block boundary over topographic map on 1:50,000.

Plate-3 Geological Map (Source: GSI Portal)

Plate- 4a, 4b, 4c & 4d: Manganese floats & dumps photos.

Plate1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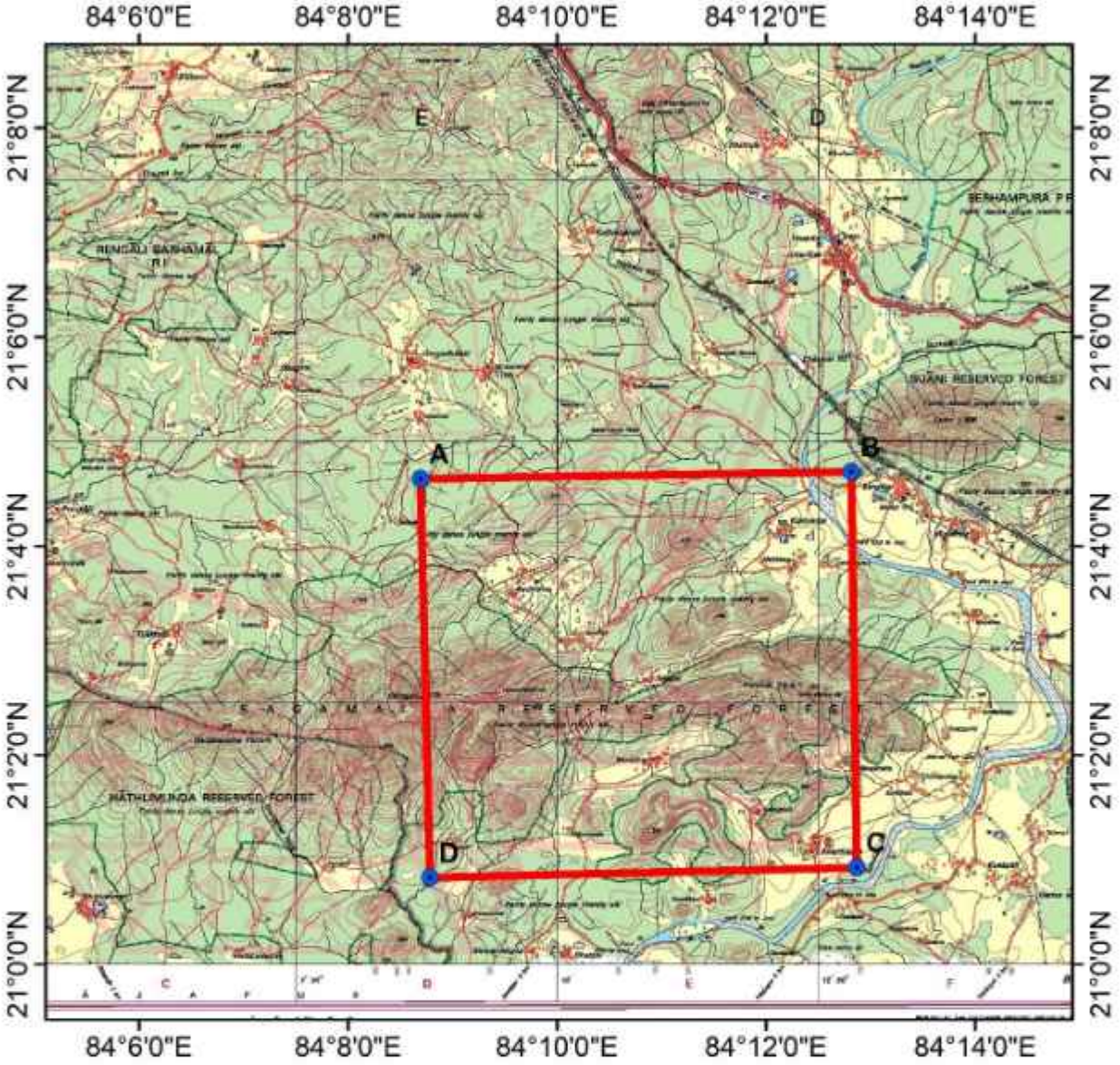
Sambalpur
Balangir
Titlagarh
Amatti
Boringpadar
Ambadola
Bhawanipatna
Raygada
Bhubaneswar
A
B
C
D
INDEX
Bastar Cratonic Gneiss & Granitoids
Eastern Ghat Supergroup of rocks
Gangpur Group of rocks
Gondowana Formation
Singhbhum Cratonic Gneiss & Granitoids
Tertiary & Quaternary Formation
Manganese Block
0 30 60 120 180 240
K ometers

Plate2

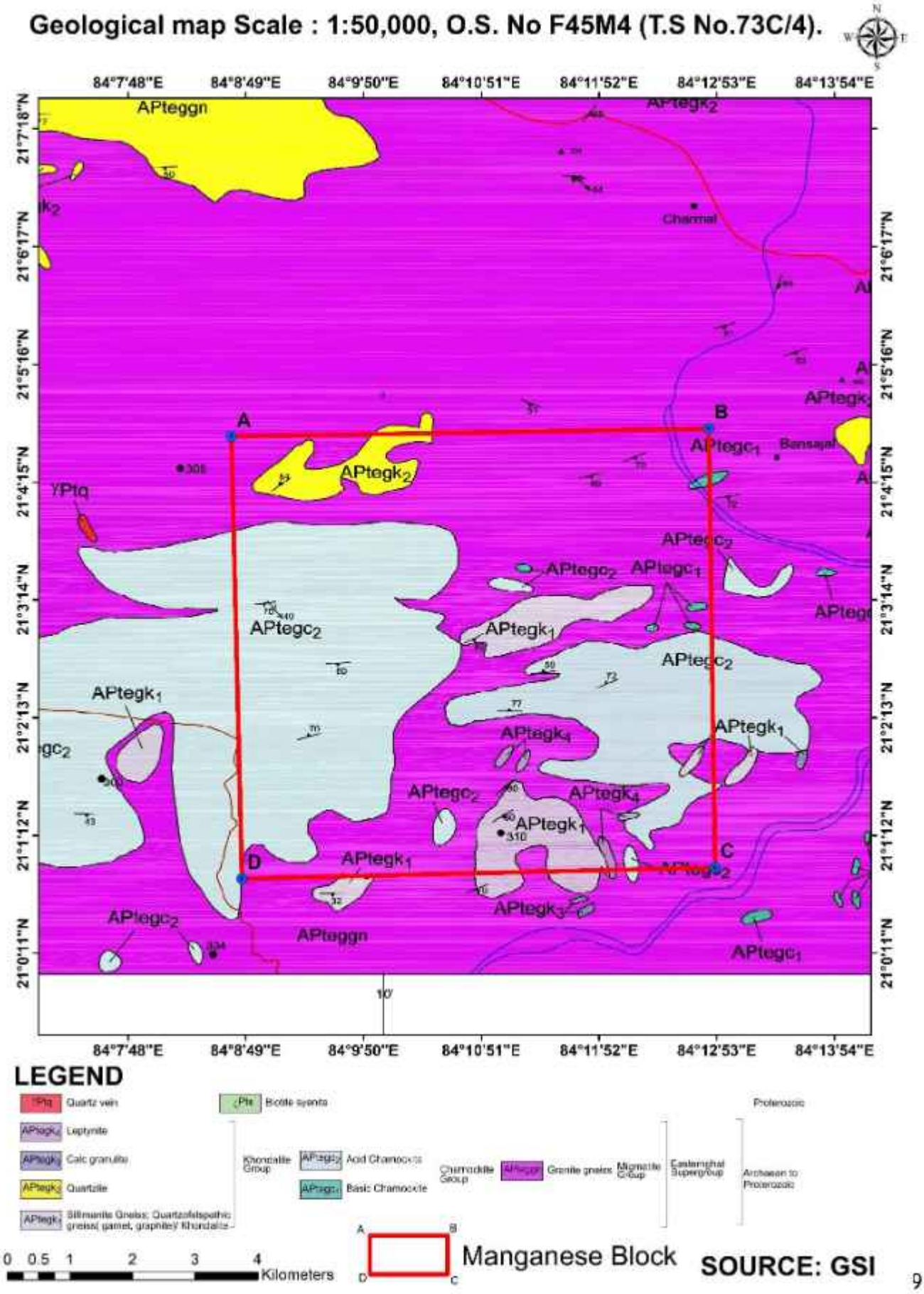
Index Map of Manganese around Kandhal area in Rairakhol Tahasil of Sambalpur District
Scale : 1:1,00,000, T.S: F45M4 (73 C/4)



Corner Point	LATITUDE	LONGITUDE
A	21° 4' 38.646"N	84° 8' 41.474"E
B	21° 4' 42.713"N	84° 12' 48.855"E
C	21° 0' 55.373"N	84° 12' 52.070"E
D	21° 0' 49.655"N	84° 8' 46.943"E

Plate 3

Geological map Scale : 1:50,000, O.S. No F45M4 (T.S No.73C/4).



SOURCE: GSI

Plate – 4 a Manganese floats

Plate – 4 b Manganese floats

Plate – 4 c Manganese dump

Plate – 4 d Manganese dump