PROPOSAL FOR G-2 STAGE GENERAL EXPLORATION FOR MANGANESE ORE IN PIMPERKUNTA BLOCK, BHEEMPUR MANDAL, DISTRICT- ADILABAD, TELANGANA STATE

(For NMET)

(Ferrous metal)

By

Telangana State Mineral Development Corporation

Place: Hyderabad
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SYNOPSIS

Sl, No	Feature	Details
1	Block ID	Pimperkunta Manganese Block
2	Current Exploration agency	Telangana Mineral Development Corporation Limited (TSMDC)
3	Previous Exploration agency	Geological Survey of India
4	G4/G3 (Previous stage Geological Report)	Geological Survey of India
5	Commodity	Manganese
6	Mineral Belt/ Basin	Penganga Basin
7	Completion Period with entire Time schedule to complete the project	12 months
8	Objective	1. To carry out Geological Mapping on 1:1000 scale 2.To Assess the quantity & quality of Manganese Resource in the block
9	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	Exploration to be carried out by officers of TSMDC with outsourcing of survey, geophysical survey, drilling & chemical analysis components. Outsourcing of components for identifying agencies will be done through e-tendering.
10	Name/ Number of Geoscientists	One (1)
11	Expected Field days (Geology, Geophysics, Surveyor)	Geology = 210 days (Geological mapping, core logging & sampling) Surveyor = 60 days (Establishing block coordinates, Topographic mapping, & locating boreholes) Geophysics = 60 days
12	Location	Pimperkunta block is approx. 1.21 km east of Pimperkunta village and 2.45 Km north west of Ghotkuri village.
	Tehsil/ Taluk/ Mandal	Bheempur Mandal (or Tamsi Mandal)

	District	Adilabad District
	State	Telangana State
13	Toposheet	56I/5 & 56I/6
14	C ordinates	
15	Total Block Area	43.0 hectares
	Forest area	
	Govt land area	
	Private land area	43.0 hectare
16	Accessibility	
	Nearest Rail Head	Mudkhed Jn on the Secunderabad-Manmad line
	Road	Block is 20 km from National Highway number 7
	Airport	Nagpur
17	Hydrography	
	Local Surface Drainage Pattern (Channels)	Dendritic
	Rivers/ Streams	Penganga River is perenial river which flows from west to east in northern oart of area.
18	Climate	
	Rainfall	Ranges from 700 mm to 1000 mm
	Temperature	~ 7^0 C in winter to ~ 46^0 C in summer
19	Topography / Morphology	Area forms gently undulating plain
20	Availibility of baseline geoscience data	
	Geological Maps	1:50K map availbale
	Geochemical Map	Not availble
	Geophysical Maps	Not availble
21	Justification for taking	Geological Survey of India carried out G4/G3 investigation for

Station	Longitude	Latitude
A	19°44' 40.9"	78°29'03.9"
B	19°44' 44.9"	78°29'02.1"
C	19°44' 48.4"	78°28'58.8"
D	19°44' 45.5"	78°28'57.7"
E	19°44' 33.6"	78°28'56.1"
F	19°44' 32.1"	78°28'50.1"
G	19°44' 25.7"	78°28'47.8"
H	19°44' 23.2"	78°28'58.9"
I	19°44' 27.0"	78°29'04.7"
J	19°44' 18.6"	78°29'22.2"
K	19°44' 26.9"	78°29'24.3"
L	19°44' 29.1"	78°29'19.1"
M	19°44' 34.9"	78°29'14.2"
N	19°44' 44.8"	78°29'09.7"

	up G3 or G2 stage mineral exploration	manganese deposits in the area/ block during 1973-74 field season and assessed mined manganese as 375 tonnes and indicated manganese reserve as 3750 tonnes over 500 m strike length. M/s Aditya Minerals Pvt Ltd is mining in the adjoining area. The proposed area falls in the vicinity of nearby old Manganese Mining areas and has mining information in the block. With the available geological and exploration information for the block and surrounding area the stage for exploration so far in the block can be put as of G-4 to G-3 stage. Only drawback for not putting exploration data in G3 stage is non availability of drilling and geophysical data. In view of above information, as still 3750 tonnes of manganese ore in the area is availble & possibility of getting manganese ore at depth along dip direction cannot be ruled out, it is proposed to carry out G-2 stage exploration in the block area to gather all necessary information required in G2 stage and reassess the quantity & quality of manganese resources in the area and classify the resources as per UNFC and Minerals (Evidence and Mineral Contents) Rule, 2015 norms.The exploration will be carried out with the help of geological & topographical mapping on 1:1000 scale, geophysical surveys & drilling. The TSMDC shall carry out manganese ore mining in the area or will request State Govt for putting it for auction if G-2 stage exploration could give positive results.

PROPOSAL FOR GENERAL EXPLORATION STAGE (G-2) EXPLORATION FOR MANGANESE ORE IN PIMPERKUNTA BLOCK, BHEEMPUR MANDAL, ADILABAD DISTRICT, TELANGANA STATE

1. Details of the Area/ Block Summary

1.1 Background

In order to meet the needs of manganese ore which is also critical mineral for India, the exploration of Manganese ore and that too low phosphorus is the need of the hour. The Amended MMDR Amendment Act, 2015 requires that for getting mining license through auction by mining entities or by reserving the area for government mining entitiesit is essential to establish presence of Mineral contents in the area as per Minerals (Evidence of Mineral Contents) Rule 2015.In view of this requirement TSMDC which is also NEA is proposing to undertake G2 (General Exploration) stage exploration in Pimperkunta Block (43.0 Hectare) in Adilabad district of Telangana with NMET fund for establishing manganese ore resources in the block as per Minerals (Evidence of Mineral Contents) Rule 2015.

1.2 Location & accessibility

Proposed area Pimperkunta block is approximately 1.21 km east of Pimperkunta village and 2.45 Km north west of Ghotkuri village in the Bheempur Mandal of Adilabad District, Telangana State. The block can be approached from District Headquarter Adilabad through Pimperkunta and Ghotkuri located in the west and south east of the study block. Adilabad is about20 km from Pimperkunta. Adilabad is connected from Hyderabad by National Highway number 7 and distance is about 310 km.The nearest railway station is Mudkhed Junction located on the Secunderabad-Manmad line of South Central Railway. The area falls in Survey of India Toposheet No. 56 I/6.

1.3 Topography &Physiography

The area forms gently undulating plain. On regional scale area is drained by number of small seasonal streams representing a dendritic pattern. All these streams joins the main stream which flows towards east direction and finally meets the Penganga River.

1.4 Background Geology (Regional Geology & Geology of the Block).

Regional Geology: Regionally the area is Covered by Meso to Neo Proterozoic sedimentary rocks belonging to Penganga Group. The Penganga succession mainly occurs in the northwestern part of the Pranhita Godavari Valley. The stratigraphy of Pre-Cambrian sedimentary formation in the area and their precise correlation with their equivalents in the Godavari valley has been worked by many workers. Houghes.T.W.H (1877) grouped limestone & shale in the Adilabad district under Vindhyans, King.W (1881) correlated it with Pakhals, Heron.A.M. (1949) referred to them as Penganga series and proved that the Pengangas are the unaltered &unfolded equivalents of Pakhals, Deshmeukh.D.S. (1952) grouped the formations under ‘Pengangas’. Later

several workers carried out stratigraphic analysis of the Penganga Group. Johnson (1965) and Srinivas Rao (1987) worked on southern part around Mancherial. Choudhary et.al. (1989), Bndopadhyay (1996), Mukopadhyay (1997) and others worked on the northern part around Adilabad district. SreenivasaRao.T (1987) subdivided the Penganga Group into the Taklapalli Arkose and Putnur limestone. To avoid the multiple nomenclature problems, Chaudhari et al, 1989 suggested a tripartite classification for Penganga Group.

Table:2 Stratigraphic Classification of Penganga Group in Adilabad (after Chaudhari et,al, 1989)

Age	Group	Formation	Rock type
Recent			Soil & Alluvium
Quaternary			Conglomerates
Eocene to Cretaceous	Deccan Trap/ Sullavai Group		
Neo Poterozoic to Meso Proterozoic	Penganga Group	Satnala Shale (>200m)	Thinly laminated red to brown Shale
		Chanda limestone (300m) [Goatkur Limestone]	Grey to brown & pink micritic limestone with interbedded chert manganese beds. Limestone (2) Shale (1) Limestone (1)
		Pranhita Sandstone (25 to 400m)	Well sorted quartzose sandstone grading upward to mudstone & shale
	Uncomformity		
Archaean	Basement complex		

The Penganga Group is considered to be a stratigraphic equivalent of the Kurnool Group. The Penganga Group is essentially an arkose limestone sequence which is divisible broadly into two formations, namely (i) Takkallapalli Arkose and (ii) Putnur Limestone. The Penganga Group in Adilabad district is represented by Pranahita Sandstone, Devalamari Limestone (equivalent to Chanda Limestone), Upper shale/siltstone (equvivalent to Satnala Shale) and Upper dolomite. The Devalmari Limestone extending for a strike length of 3 km and width of about 300 m is of cement grade with CaO content ranging from 30% to 53%. The manganese ores identified in the

Penganga Formation is found west of Ravalpalli, in a zone extending for 250m length and 3 to 5m width. The Takkallapalli Arkose is a 400 m thick sequence of heavy arkose with interbeds and lenses of pebbly sandstone and conglomerate whose incidence is more in the basal part. Sporadic interbeds of shaly and micaceous sandstone are common throughout the thickness of the formation. The arkose is overlain by a 100 m thick sequence of Putnur Limestone, which is characterised by an overwhelming predominance of limestone and argillaceous limestone with interbeds of shale and manganiferous chert. The limestone is flaggy to thick bedded, grey, dark-grey, buff and light pink and is mostly of cement grade with subordinate flux grade bands. The well-known manganese ores of Adilabad District are hosted in this limestone.

Local Geology of the Pimperkunta block:

The geology and Stratigraphic Succession in the Pimperkunta block is given below:

Siliceous limestone and interbedded Manganese ore belonging to Chanda limestone Formation of Penganga Group are the only lithounits encountered in the area. In the western part of area, the general strike of the limestone is NNE-SSW & the dip of the beds are varying from 5 degrees to 10 degrees due north west. In the eastern part of area the strike of limestone is change in NNW- SSE and the dip of the beds are varying from 5 to 15 degree due NNE. In the area the changes in the strike is due to synformal rolls in the bed.The geological succession is as follows:

1. Soil
2. Shale (2)
3. Limestone (2) with jasper/ chert thin Manganese Ore
4. Shale (1)
5. Limestone (1)
6. Quartzite (?)

Limestone (2) of this area is light grey to buff colored, fine grained, massive, and compact in nature. The limestone is highly siliceous and as such may be called siliceous limestone. The manganese ore within limestone occurs in the lower part of limestone formation and is characterized by jasper-chert-manganese interbands traceable over considerable strike length. Total cumulative strike length of manganese bearing bed in the two limbs of synform is ~ 600 to 700m.

The Manganese ore occurs as manganese ore-jasper horizon within the limestone member of the Penganga Group of rocks. It is mostly pyrolusite but mineralogical study of the ore revealed the presence of ‘Ramsdellite’ “Todorokite” and “Ranceite”. The thickness of the ore zone is varying from 55 cm to 65 cm averaging about 60cm. The manganese ore in the area bears evidences of syngenetic origin and mostly contains 24% to 36% Mn, 15%

to 30% silica, 2%-3% Fe & less than 0.15% phosphorous. The persistently low phosphorous & Iron content is important and characteristic of this deposit.

1.5 Mineral potentiality based on geology, geophysics, ground geochemistry etc. Scope for proposed exploration Recommendations of G4 Stage Mineral Exploration Rep+ort. Objectives

The Adilabad district of Telangana State is well known for low phosphorus manganese ore deposits. This ore is in great demand due to its low phosphorus content. Another peculiarity of these deposits is their limited width of 70 cms to 80 cms. It is associated with siliceous limestone with sub-horizontal dip of 5^{o} to 15^{o}. At present the manganese ore deposit occurs within siliceous limestone at a depth of 3 to 5 meters and the depth increases along the dip direction of the deposit.

Manganese Ore Occurrences/ deposits of Adilabad are distributed in a 40 km linear belt from Gullughat 19°48' : 78°27' in the WNW to Mesala Khurd 19°40':76°45' in the ENE in Adilabad district of Telangana. Geologically, the area is occupied by granite and gneiss traversed by quartz/pegmatite veins belonging to Peninsular Gneissic Complex-II (PGCII), arenite, argillite with interbedded carbonate sequence comprising of Penganga Group and basalt flows with infratrappearns of Deccan Trap. The Penganga Group non conformably overlies the PGCII. The infratrappean conglomerate and sandstone separates the basalt flows of Deccan Trap from the underlying PGC-II and Penganga Group.

Important deposits are located in the areas of Tamsi, GoatkurGuda (19°46':78°29'35'') Pipparikunta (19°44'40''78°28'25''), Goatkur, Jamadapur (19°43' 48'': 79°31'20''), Metguda-Kanpa (19°38'30'' 78°39'50'') and Mesala Khurd. The manganese ore admixed with chert/jasper occurs associated with the middle part of Goatkur Limestone belonging to Penganga Group. The ore mineral assemblage comprising mainly oxides and hydroxides of manganese intercalated with jasper chert, is unmetamorphosed and unaltered retaining its original syngenetic characters. The ore minerals include wad, pyrolusite, manganite and minor psilomalene. The various types of manganese ores include i)banded, brownish black, dull, earthy, light and porous type with thin jasper/chert films forming the major proportion of the ore in all occurrences; (ii) black/brownish black, compact heavy ore with metallic lustre, devoid of banding occurs in association with the porous type eg.Goatkur-Guda, Tamsi and Pipparikunta areas; (iii) Steelgrey ore with metallic lustre in Pipparikunta mine and iv) Steel grey granular ore with metallic lustre in the form of thin minor veins traversing the above three types of ore in all the occurrences.

Pimperkunta Mine: The cumulative strike length in the two limbs of the synformal ore body is nearly 0.5km and it has been worked for an average distance of 5m along the dip direction. The ore extracted so far in the mine is:

500 x 5 x 0.10 x1.5 = 375 tonnes (Mined)

Based on the geological factors, the ore body can be assumed to extend for an average distance of 50m along the dip, over its strike length, and the reserve indicated is:

500 x 50 x 0.10 x 1.5 = 3750 tonnes (indicated)

Scope for proposed Exploration

Geological Survey of India carried out G4/G3 investigation for manganese deposits in the area/ block during 1973-74 field season and assessed mined manganese as 375 tonnes and indicated manganese reserve as 3750 tonnes over 500 m strike length. M/s Balaji Minerals Pvt Ltd mined in the area in the past. The proposed area falls in the vicinity of nearby old Manganese Mining areas and has mining information in the block. With the available geological and exploration information for the block and surrounding area the stage for exploration so far in the block can be put as of G-4 to G-3 stage. Only drawback for not putting exploration data in G3 stage is non availability of drilling and geophysical data.

In view of above positive information, as still 3750 tonnes of manganese ore in the proposed block area is availble & possibility of getting manganese ore at depth along dip direction cannot be ruled out and as the area is small are (0.45 sq km), it is proposed to carry out G-2 stage exploration in the area to gather all necessary information required in G2 stage and reassess the quantity & quality of manganese resources in the area and classify the resources as per UNFC and Minerals (Evidence and Mineral Contents) Rule, 2015 norms. The exploration will be carried out with the help of geological & topographical mapping on 1:1000 scale, geophysical surveys & drilling. The TSMDC shall carry out manganese ore mining in the area if G-2 stage exploration could give positive results.

G-4 Stage recommendation:

1. Geophysical surveys to establish continuity of the deposits in soil cover area.
2. Beneficiation studies to recover manganese from the ore-jasper interbedded zone overlying the ore zone. At present such inferior ore is being discarded as rejects and are available in dumps in considerable quantity.

Objective

1. To carry out Geological Mapping on 1:1000 scale
2. To Assess the quantity & quality of Manganese Resource in the block
3. Beneficiation Test to recover manganese from the inferior jasper interbedded ore

2. Previous Work

T.W.H.Hughes (1877), W.King (1881), A.M.Heron (1949), P.V.Rao (1951) and D.S.Deshmukh (1952) surveyed parts of the area. Their study mainly dealt with regional geology and correlation of rock formations in the area. No reference to the occurrence of manganese ore is found in their work. Mining activity by private entrepreneurs in the area started in 1962 which brought to light manganese occurrences near Goatkur, Guda, Jamadpur and Pimperkunta (Pitarikunta). Subsequently, J.S.R.Krishna Rao (1967), C.N.Rao&M.G.Rao (1969) examined some of the occurrences during course of investigation for flux grade limestone in

the northern part of Adilabad district. T.S.S.Sarma (1973-74) during mapping brought to light few more occurrences of manganese near Masela, Buzurg, Gaulighat etc. V.Natarajan&B.S.R.Reddy (1975) carried out geological mapping on 1:63360 scale in the area & along with it also carried out detailed mapping on 1:2500 & 1:1000 scale in manganese occurring area of Goatkur-Guda area &Pittarikunta (Pimperkunta) area respectively and established that most of the occurrences belong to a regionally persistent manganese ore jasper horizon within the second limestone bed of the Penganga Group of rocks that rest over the Peninsular Gneisses. They also assessed the available indicated reserves of 1,50,000 tonnes of manganese ore up to a limit of 100m along the dip direction, in the occurrence of Goatkur-Guda, Tamsi, Gaulighat and Pimperkunta mines. They also indicated that in addition of 14000 tonnes of manganese float ore are also inferred to be available in the area. The reserves of manganese estimated are summarized below in Table- :

Table-3: Reserves of Manganese ore (after V.Natarajan&B.S,R.Reddy, 1975)

Sl.No	**Manganese Occurrences**	**Reserves (tonnes)**		
		Mined	**Indicated**	**Inferred**
1.	Goatkur-Guda Mine	18,750	45,000	-
2.	Strike extension of the above up to south of Tamsi	-	72,000	2,000
3.	Pitarikunta Mine (Pimperikunta mine)	375	3,750	-
4.	Deposit South & southwest of Gaulighat	-	30,000	2,000
5.	Metguda-Kanpa area	-	-	10,000

On the basis of recommendation of V,Natarajan&B.S.R.Reddy (1975) G-4 stage investigation was taken up by C.Raghupati et al (2018) to examine the lateral continuity of manganese mineralization in Guda-Rampur (30 Sq km) and Kanpa-Junapani (70 Sq km) blocks. Reconnaissance resource of a total of 2.154 million tonnes of manganese & 77.16 million tonnes of cement grade limestone was assessed in Guda-Rampur block whereas in Kanpa-Junapani block no manganese horizon of significance could be traced but has reconnaissance resource of 33.76 million tonnes of cement grade limestone.

3. PimperkuntaBlock description (Total area 48.8 Hectare)

Block corner points / Cardinal Points	**Latitude**	**Longitude**
A	$19^0$44’ 40.9’’	78^0 29’ 03.9’’
B	$19^0$44’ 44.9’’	78^0 29’ 02.1’’
C	$19^0$44’ 48.4’’	78^0 28’ 58.8’’
D	$19^0$44’ 45.5’’	78^0 28’ 57.7’’
E	$19^0$44’ 33.6’’	78^0 28’ 56.1’’
F	$19^0$44’ 32.1’’	78^0 28’ 50.1’’

G	$19^0$44’ 25.7’’	78^0 28’ 47.8’’
H	$19^0$44’ 23.2’’	78^0 28’ 58.9’’
I	$19^0$44’ 27.0’’	78^0 29’ 04.7’’
J	$19^0$44’ 18.6’’	78^0 29’ 22.2’’
K	$19^0$44’ 26.9’’	78^0 29’ 24.3’’
L	$19^0$44’ 29.1’’	78^0 29’ 19.1’’
M	$19^0$44’ 34.9’’	78^0 29’ 14.2’’
N	$19^0$44’ 44.8’’	78^0 29’ 09.7’’

4. Planned Methodology

The manganese ore deposit occurs within siliceous limestone at a depth of 3 to 5 meters and the depth increases along the dip direction of the deposit. The main objective of the present investigation is to identify the resources of the study block as well as to test the existence of any new manganese ore band below the depth. Following present exploration programme has been formulated to fulfil the set objectives:-

- To delineate block corner coordinates with DGPS.
- To carry out topographical and detail Geological Mapping on 1:2000 Scale to demarcate the rock types of Manganese bearing Formation with the structural features
- To carry out Geophysical i.e. Electrical resistivity& Magnetic Survey in the Block which will help in demarcating the manganese ore in the host rock limestone and to facilitate in the planning of boreholes. Geophysical traverses will be laid over entire area of ~50 hectare which comes to about 20 line km. Traverse interval shall be 50 m with station spacing of 10-20 m in NNW-SSE direction across the Manganese ore body
- To drill boreholes for G-2 Level of exploration to delineate depth extension of manganese ore along dip direction and to see occurrence of any new manganese horizons at depth. Based on the outcome of geological mapping, analytical results of surface channel samples and delineation of Manganese ore body on the basis of surface Geophysical Survey by using Gravity & Magnetic methods, it is proposed to drill boreholes in a grid of 200 m along strike direction of the manganese ore deposit for proving the resources in G2 stage of UNFC/ Minerals (Evidence and Mineral Contents) Rule, 2015 norms.The bore holes are proposed to be drilled vertically as the beds are dipping at a shallow angle of 5 to 15 degrees. The exact location of the boreholes will be decided after completion of geological mapping, channel sampling and surface geophysical studies in the area. In the field cumulative strike length in both the limbs of the mined portion is around 600 m and the extension of the mined area based on the surface indication of the manganese mineralization is coming to around 1000m, thus total cumulative strike length is 1600m. Approximately 21 boreholes are proposed to intersect mineralized zones at 10m, 30m & 50m vertical depth along dip direction

accounting for a total of **600.0 m** of core drilling. The exploration of the deposit to G-2 level will facilitate the State Govt. of Telangana for mining or auctioning of the Pimperkunta block.

- To estimate Manganese resources (Reserves / Resource, in G-2 level) in the Pimperkunta block& classify the estimated resources as per UNFC norms & Minerals (Evidence of Mineral Contents) Rules, 2015.
- Beneficiation Test to recover manganese from the inferior jasper interbedded ore

5. Nature, Quantum & Target

Nature and Quantum of work proposed in G2 Stage in the Pimperkunta Block

Nature of work	**Work detail**	**Quantum**
Aerial reconnaissance	Not required	-
Block corner coordinates	To establish block corner coordinates with the help of DGPS	~ 45 Hectare
Topographical Survey on 1:1000 scale		45 Hectare
Geological Mapping on 1:1000 scale		45 Hectare
Geochemical Survey	Not required	
Geophysical Survey (Magnetic & Electrical Resistivity)	Geophysical traverses will be laid over entire area of ~50 hectare which comes to about 20 line km. Traverse interval shall be 50 m with station spacing of 10-20 m in NNW-SSE direction across the Manganese ore body.	Electrical Resistivity survey=20 line km Magnetic Survey = 40 station
Pitting/ Trenching		100 Cu. M
Systematic Drilling	The bore holes are proposed to be drilled vertically as the beds are dipping at a very angle of 5 to 15 degrees. The exact location of the boreholes will be decided after completion of geological mapping, channel sampling and surface geophysical studies in the area.	Approximately 21 boreholes to intersect mineralized zone at 10/30/50 meters depth are proposed along dip accounting for a total of 600 **m** of core drilling.
Systematic Sampling		
Core Logging	The borehole cores would be logged systematically. Details of the litho units viz. colour, structural feature, texture, mineralization, besides the recovery would be recorded. The	600 m

	details of Manganese ore will also be recorded.	
Core Sampling	The mineralized drill core will be split into two equal halves and one part will be preserved in the core box for future reference. The other half will be powdered to (-) 200 mesh size by grinding and stage wise coning and quartering. One part around 100 gm sample will be sent to chemical laboratory for analysis, second part will be preserved as duplicate sample. The length of each sample will be kept ~ 0.50m within the ore zone depending upon the width of particular type of Manganese ore and its physical character.	~ 50 m for manganese ore.
Chemical analysis	All the primary, check samples including external check and composite samples would be analysed for 6 radicals i.e. Mn, SiO_2, P_2O_5 Fe_2O_3, MnO_2 and Insolubles	Primary Samples: Surface: for Mn P/T: 60 Core: 90 Check: 5 Composite:5 External Check: 5
ICP-MS	A total of 5 nos composite samples would be analyzed by ICP-MS method to ascertain the presence of 14 no trace elements associated with the Manganese deposit. i.e. Cd, Sn, W, Sb, Ce, Nb, Ba, La, Bi, Co, Ni, Sr, Mo, V.	5 nos
Petrographic and mineragraphic studies	Thin and polished section studies on drill cores as well as out-crop samples would be done for detailed petrographic and mineragraphic characteristics. These samples would be drawn from ore zones and host rocks.	Petrological: 5 nos (core: 5) Mineralogical: 5 nos (XRD)
Specific gravity determination	The sample to be drawn from ore zones/ mineralised zones considering the limited width of the manganese ore body which is	Specific Gravity – 20 nos

	restricted to 0.70 to 0.80 meters in Adilabad district.	
Beneficiation Studies	To recover manganese from the inferior jasper interbedded ore in view of the low phosphorous content and, as large amount of such ore are thrown as waste / rejects by earlier miner's in the area which can be now assessed if found suitable.	Bulk 2 number samples
Preparation of Geological Report	In Digital form	

6. Time schedule and Cost estimates

Time schedule:

The proposed exploration programme is planned for 12 months from the date of commencement of the project.

Cost estimates:

The Project cost is estimated at **Say …**The details of item wise cost estimate as on 31.3.19 is given in Table No. 6 and the summary is given **in Table below.**

SUMMARY OF COST ESTIMATES

SUMMARY OF COST ESTIMATES		
Sr. NO.	**Item**	**Total Estimated cost (Rs)**
1	Geological, Survey, Sampling, Pitting & Trenching Work	**1880120**
2	Geophysical Study	**678760**
3	Drilling	**8006375**
4	Laboratory Studies	**575384**
5	Preservation of Core Boxes	**288500**
6	Preparation of Proposal	**200000**
7	Report 5% of Exploration Cost	**571457**
8	Sub Total (1 to 7)	**12200596**
9	GST @ 18%	**2196107**
	Total	**14396703**

DETAILS OF ITEM WISE COST ESTIMATES

COST ESTIMATE FOR EXPLORATION OF PIMPERKUNTA MANGANESE ORE BLOCK, ADILABAD DISTRICT, TELANGANA STATE

Sr. NO	Item of Work	Unit	Rate	Quantity	Amount
A	Drilling				
1	Surface drilling	m	10910	600	6546000
2	Transportation	Kms	35	700	24500
3	Accommodation	1 month	consolidated	1 Rig	733958
4	Camp setting / winding	1 Camp	One time cost	1 Camp	270829
5	Road making(cost of crop compensation to farmers)	crop compensation	20528	per each borehole	431088
SUB TOTAL A					**8006375**
B	Geological work& survey work				
1	Survey party days	Days	6445	60	386700
2	Geologist party working days during field work (Pitting &Trenching)	Days	8590	120	1030800
3	Pit /Trench logging sampling party days	Days	3078	30	92340
4	Core logging and sampling days	Days	3078	60	184680
SUB TOTAL B				**270**	**1694520**
C	Pitting &Trenching	Cu. M	1856	100	185600
SUB TOTAL C					**185600**
D	Geophysical studies				
1	Surface geophysical survey	Days	8590	40	343600
2	Fluxgate magnetic measurements	Per station	498	40	19920
3	Electrical resistivity (profiling with station interval of 200 mts)	Per Line km	15762	20 line km	315240
SUB TOTAL D					**678760**
E	Laboratory studies				
1	Chemical analysis				
	a) Primary & check samples for 6 radicals i.e. Mn, SiO2, P2O5 Fe2O3, MnO2 and Insolubles	Nos.	2832	155	438960
	b) External check samples (NABL LAB)	Nos.	2832	5	14160
	c) Composite samples	Nos.	2832	5	14160
2	Physical analysis				
	a) XRD studies	Nos.	6187	5	30935

	b) ICP-MS studies	Nos.	5989	5	29945
	c) Preparation of thin sections	Nos.	589	5	2945
	d) Petrographic studies	Nos.	1553	5	7765
	e) Preparation of polished sections	Nos.	589	10	5890
	f) Mineragraphic studies	Nos.	2210	10	22100
	g) Specific gravity determination	Nos.	410	20	8220
	h) Bulk density test	Nos.	152	2	304
3	Beneficiation study	Nos			
SUB TOTAL E					**575384**
F	Preservation of cores				
	i) GI core boxes	Nos.	2200	120	264000
	ii) Transportation of core boxes	Kms	35	700	24500
SUB TOTAL F					**288500**
G	Preparation of proposal				200000
SUB TOTAL G					**200000**
TOTAL (A+B+C+D+E+F)					**11429139**
H	Exploration report + (includes cost of maps, topo sheets field visit, digitations work preparation of proposal, etc) 5% of (A+B+C+D+E+F+G)				**571457**
TOTAL (A+B+C+D+F+G+H)					**12200596**
I	GST @ 18%				**2196107**
GRAND TOTAL					**14396703**