PROPOSAL FOR G3 EXPLORATION OF VANADIUM AND GALLIUM-BEARING ALUMINIOUS LATERITE IN MUNDALLI BLOCK (5.08 SQ KM), UTTARA KANNADA DISTRICT, KARNATAKA

by

Geo Marine Solutions Pvt. Ltd., Mangalore

15-17-909/9, Leslie Haven, 5th Cross, Shivabagh

Mangalore-575005, Karnataka

October 2024

PROPOSAL FOR G3 EXPLORATION OF VANADIUM AND GALLIUM-BEARING ALUMINOUS LATERITE IN MUNDALLI BLOCK (5.08 SQ KM), UTTARA KANNADA DISTRICT, KARNATAKA

By

Geo Marine Solutions Pvt. Ltd., Mangalore

15-17-909/9, Leslie Haven, 5th Cross, Shivabagh

Mangalore-575005, Karnataka

Mangalore

15 Oct 2024

Summary of the Proposal for UNFC G3 Level prospecting for Aluminous laterite in Mundalli block, Uttara Kannada dist., Karnataka State.

	Features	**Details**
	Block ID	KAR-AL-LT-1
	Current Exploration Agency	Geo Marine Solutions Pvt. Ltd., Mangalore for Preliminary Mineral exploration G3 level
	Previous Exploration Agency	DMG, Karnataka
	G4 stage Geological Report (Previous Stage Geological Report)	Based on the report titled by "Aluminous Laterite deposits of Talgod & Mundalli in the neighborhood of Bhatkal, North Kanara District, Karnataka State." by G H Nagaraja and G L Nagarajachetty 1974
	Commodity	Aluminous laterite, Gallium and Vanadium
	Mineral Belt	Aluminous laterite in Mundalli block, Uttara Kannada dist., Karnataka.
	Completion Period with entire Time schedule to complete the project	**Mobilization:** Two months from issue of work order/LOA. **Field work :** 10 months **Analysis :** 7 months (overlapping with Drilling) **Report :** 3 months
	Objectives	To understand the surficial distribution and downward continuity of Gallium and vanadium-bearing Aluminous laterite by drilling at 100m x 100m grid over an area of 232Ha or 2.32 sq.km, where there is a thick laterite capping up to 7.0m below ground level.
	Whether the work will be carriedout by the proposed agency or through outsourcing and details thereof.	The NABET accredited exploration agency (Geo Marine Solutions Pvt Ltd., Mangalore) will be carrying out all the components of the proposed exploration. The chemical analysiswill be done at NABL accredited lab.
	Name/Number of Geoscientists	2 Geologists plus 1 Surveyor plus 1 driller
	Expected Field Months (Geology)	10 months including mapping and drilling

1.	**Location**	Mundalli, Bhatkal, Karnataka.
	Latitude	13°57'56.93"N
	Longitude	74°33'32.00"E
	Villages	Mundalli
	Tehsil/Taluk	Bhatkal Taluk
	District	Uttara Kannada District.
	State	Karnataka.
2.	**Area (hectares/square kilometers)**	
	Block Area	5.08 sq.km
	Forest Area	NIL
	Government Land Area	5.08 sq.km
	Private Land Area	NIL
3.	**Accessibility**	
	Nearest Rail Head	Bhatkal (1.5 Km)
	Road	Panvel-Kochi- Kanyakumari Highway (NH-66)
	Airport	Rashtrakavi Kuvempu Airport Shimoga (115 km)
4.	**Hydrology**	
	Local Surface Drainage Pattern (Channels)	Mundalli block is situated in the south of Chowtani river.
	Rivers/Streams	Chowtani river. Chowtani river flowing between Mundalli and Talgod area and flows into Arabian sea
5.	**Climate**	Humid tropical climate

	Mean Annual Rainfall	2887 mm in Uttara Kannada District.
	Temperatures (December)(Minimum) Temperatures (June)(Maximum)	Min. temp. is 16°C and max. 37°C
6.	**Topography**	
	Toposheet Number	Toposheet No. 48K/09
	Morphology of the area	The study area consist of low lying coastal plane and flat topped laterite plateau having an elevation of 60m to 150 m above mean sea level. The laterite covered ground is well dissected, leaving out linear patches of flat topped laterite plateau separated from each other by narrow valleys. This is followed by a high and mountainous terrain to the east which forms the western Ghats raising to heights of over 1050m above sea level. The climate is tropical and divided into a wet and dry seasons. The region receives abundant rainfall during the wet season between June and September, the annual precipitation being about 3800mm. The hills and mounds are cut up by numerous streams and streamlets which swell to form the major streams Bhatkal (Sharabi) and Venkatapur rivers. The low lying flat topped plateau are devoid of vegetation while the high and mountainous terrain further interior is covered with thick forest.

7	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	The proposal is based on the published literature mentioned in the reference. Geological inputs pertaining to the area falling in 48K/09 are available and referred while preparing the write up.
	Geochemical Map	**N.A.**
	Geophysical Map (Aero-geophysical, Ground geophysical, Regional as well as local scale GP maps)	**N.A.**
8.	**Justification for taking up G3 level Mineral Exploration** The detailed investigation of the Mundalli block was carried out by DMG, Karnataka during the FS 1963-64 and 17.16 lakh tons of Aluminous laterite having 40- 50% Al2O3 reserve has been estimated. SiO2 values vary between 1 t o19%. The average SiO2 ranges 8-10% Based on the report titled by "Aluminous Laterite deposits of Talgod & Mundalli in the neighborhood of Bhatkal, North Kanara District, Karnataka State." by G H Nagaraja and G L Nagaraja chetty, DMG Karnataka recommended this block for G3 exploration. After joint field inspection by DMG and GSI officials, it was decided to carve out bigger area and take up G3 stage exploration under NMET to put up this block for auction as ML. And with this objective, DMG Karnataka has allotted this block to Geo Marine Solutions Pvt Ltd (NPEA) for exploration through NMET funding. A reconnaissance field work was conducted in Mundalli Block by Geo Marine Solutions Pvt Ltd in October 2024 and three grab samples were collected. The three samples from Mundalli Blocks shows Al2O3 ranging between 22% to 30%; **Gallium values ranged between 51 to 75 ppm and V2O5 values between 1100 ppm to 1500 ppm. The values of Gallium and Vanadium (Critical Minerals) are significant.** It is also pointed out that two Stream Sediments samples data from the NGCM database of GSI within the proposed Mundalli block boundary, reported Gallium content of 31ppm and 34 ppm.	

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

1. Block Summary:

Physiography: Physiography of the state of Karnataka comprises three distinct zones; Western Ghat, Coastal plain and Deccan Plateau. The area falls under the coastal plain to mid land region

Background Information:

The Aluminous laterites of Talgod and Mundalli areas in the neighbourhood of Bhatkal town were examined in detail by DMG Karnataka during the field season 1963-64. The investigations reported about 3.3 million tonnes of alumina rich laterite from both Mundalli and Talgod block put together, analysing between 40 to 55% Al2O3. The silica content was high, ranging from 8% to 10%.

A reconnaissance field work conducted in Mundalli Block by Geo Marine Solutions Pvt Ltd in October 2024 and three grab samples were collected. The three samples from Mundalli Blocks shows Al2O3 ranging between 22% to 30%; Gallium values ranging between 51 to 75 ppm and V2O5 ranging between 1100 ppm to 1500 ppm. The values of Gallium and Vanadium (Critical Minerals) are significant. Two Stream Sediments sample data from the NGCM database of GSI within the proposed Mundalli block boundary, shows Gallium content of 31ppm and 34 ppm. Gallium has high strategic significance today, due to its requirement in semi-conductor chips used in electronic industry. Currently, Gallium is produced as a byproduct from Bauxite ore processing.

It is pertinent that the entire global supply chain of Gallium monopolized by China, which controls 96% of the global supply chain of Gallium. Due to its immense application in Semiconductors, LEDs, Photo-voltaics and medical imaging technologies, the projected global annual growth rate of Gallium market from 2024 to 2030 is pegged at 24.8%. Given this scenario, presently, 30 ppm of Gallium is considered as a recoverable quantity in laterite/ bauxite.

Background Geology (regional and geology of the block):

The coastal area near Bhatkal comprises Alluvium, Laterite, Migmatite schists and Granite (Shirali Granite)

The migmatites are restricted to a thin zone abutting the sea. Exposures are seen near Murdeshwar, Bailur, Talgod, Mundalli, Jali and Gorta along the coast. The migmatite displays good banding and many schleirens of amphibolites a represent. It also occurs as caught up patches in the granite. Ptygmatic folding is common. A large number of quartz and pegmatite veins

intrude the migmatites in a haphazard fashion. The quartz veins intrude the migmatites in a haphazard fashion. The quartz veins and barren but the pegmatites carry books of biotite mica. The trend of foliation varies from N.N.W. to N.W. and W.N.W. and the dips are either easterly or westerly, at high angles, Strike and dip joints having steep angles are common.. Megascopically the migmatite is a grey colored, medium to coarse grained rock. Alternate bands of mafic and felsic assemblages are well seen. Basic xenoliths are essentially amphibolitic but those rich in biotite are also noted.

Shirali granite occupies the area between the migmatite and the schists along the coast, in toposheet No.48 J/8+12 and K/9. Exposures are well seen around Belke, Shirali, Bailur, Murukere, Konar and east of Kaikini. Lot of quarry sections exists on the flanks of the hills to the north o f Shirali. The granite occurs as sheeted and highly jointed out crops. It is grey in colour medium out course grained. It carries rafts of migmatite. It is homogenous and devoid of banding.

Mineral potentiality within the proposed block based on geology:

The Aluminous laterites of Talgod and Mundalli areas in the neighbourhood of Bhatkal town were examined in detail by DMG Karnataka during the field season 1963-64. The investigations reported about 3.3 million tonnes of alumina rich laterite from both Mundalli and Talgod block put together, analysing between 40 to 55% Al2O3. The silica content was high, ranging from 8% to 10%.

Scope for proposed exploration:

The proposed work for G3 Exploration comprises detailed topographic and geologic mapping in 1: 4000 scale and drilling within the aluminous laterite (about 7 m depth for each borehole) over an area of 2.32 sq km at 100 by 100m grid as per the MEMC guidelines for G3 level for bodies of irregular habit.

Recommendations of G4 Stage Mineral Prospecting Report: The available information in the GSI literature and the related published literature suggest to carry out exploratory mining and drilling to prove the quality and quantity in these area in view of the nearness of these deposits to Mangalore port.

Objectives: The proposed G3 level mineral prospecting is planned for carrying out exploration of aluminous laterite occurring as irregular pockets and also for critical minerals viz. Gallium and Vanadium.

2. Previous Work:

Attach Complete Previous Geological Report (G4 Stage); The DGM Karnataka Report (1974) entitled "Aluminous Laterite deposits of Talgod & Mundalli in the neighborhood of Bhatkal, North Kanara District, Karnataka State." by G H Nagaraja and G L Nagarajachetty, is attached.

3. a. Block description (Mundalli Block): Boundary Coordinates of Mundalli Block are given below.

Table-1. Boundary coordinates of Mundalli block, Karnataka

Sl no.	Longitude	Latitude
1	74.54758	13.96347
2	74.5547	13.9579
3	74.5662	13.9578
4	74.5730	13.9667
5	74.57293	13.97662
6	74.54747	13.97649

b. Coordinates of Proposed Pit /Trench and Borehole Locations: Geographical coordinates of the proposed pit/trench and borehole locations are given in the Annexure-2.

4. Planned Methodology:

a. **Geological and geomorphological Mapping in 1:4000 scale**: Reference points will be established within the mapping area by level transferring of SoI (Survey of India) benchmark point. The total area of 5.20 sq.km will be mapped on 1:4000 scale using DGPS survey method to bring out different geological and geomorphological units

b. All the mapped units will be linked (geo-referenced) to the toposheet (48K/09) pertaining to the area.

c. **RC Drilling with Airflush for Sub surface mineral content**: the collection of sub-samples at 1.0 m interval in 212 borehole locations at 100 by 100m grid pattern within the area having laterite capping.

5. Feasibility Studies:

a. **Geology:** Geological mapping on 1:4000 scale and 212 borehole locations up to 7.0m depth at 100mx100m grid size in laterite capping areas will bring out the mineral potential of the area.

6. Nature, Quantum, and Target:

a. Mapping in 1:4,000 scale incorporating all geomorphological units, manmade structures, streams etc. falling within and around the area. (Total area of 5.08 sq km.)

Table 3: Nature, Quantum, and Targets

Sl. No.	Description of Work	Quantum (SqKm/ Number)	Time required
1			
	Geological & Geomorphological mapping in 1: 4000 scale with DGPS Survey (Total 5.08 sq km)	5.08 sq km	60 days
2	Bore hole up to 7.0m depth	212 BH	240 days
3	XRF, ICP AES and ICP-MS, fire assay analysis and Bulk density determination ,	1075 nos.	210 days
4	Report Writing		90 days

7. Break-up of expenditure and Time schedule:

Attached as separate sheet: Attached as Excel

References:

1. G H Nagaraja and G L Nagarajachetty, Aluminous Laterite deposits of Talgod & Mundalli in the neighbourhood of Bhatkal, North Kanara District, Karnataka State.

2. GSI Report for the field season 1968-69: Systematic Mapping In Parts of Sirsi, Siddapur and Bhatkal Taluks, North Kanara District, Mysore State By B. Gopal Rao, Geologist, Geological Survey of India.

Plate-1: **Map showing Mundalli block on Toposheet no. 48K/09**

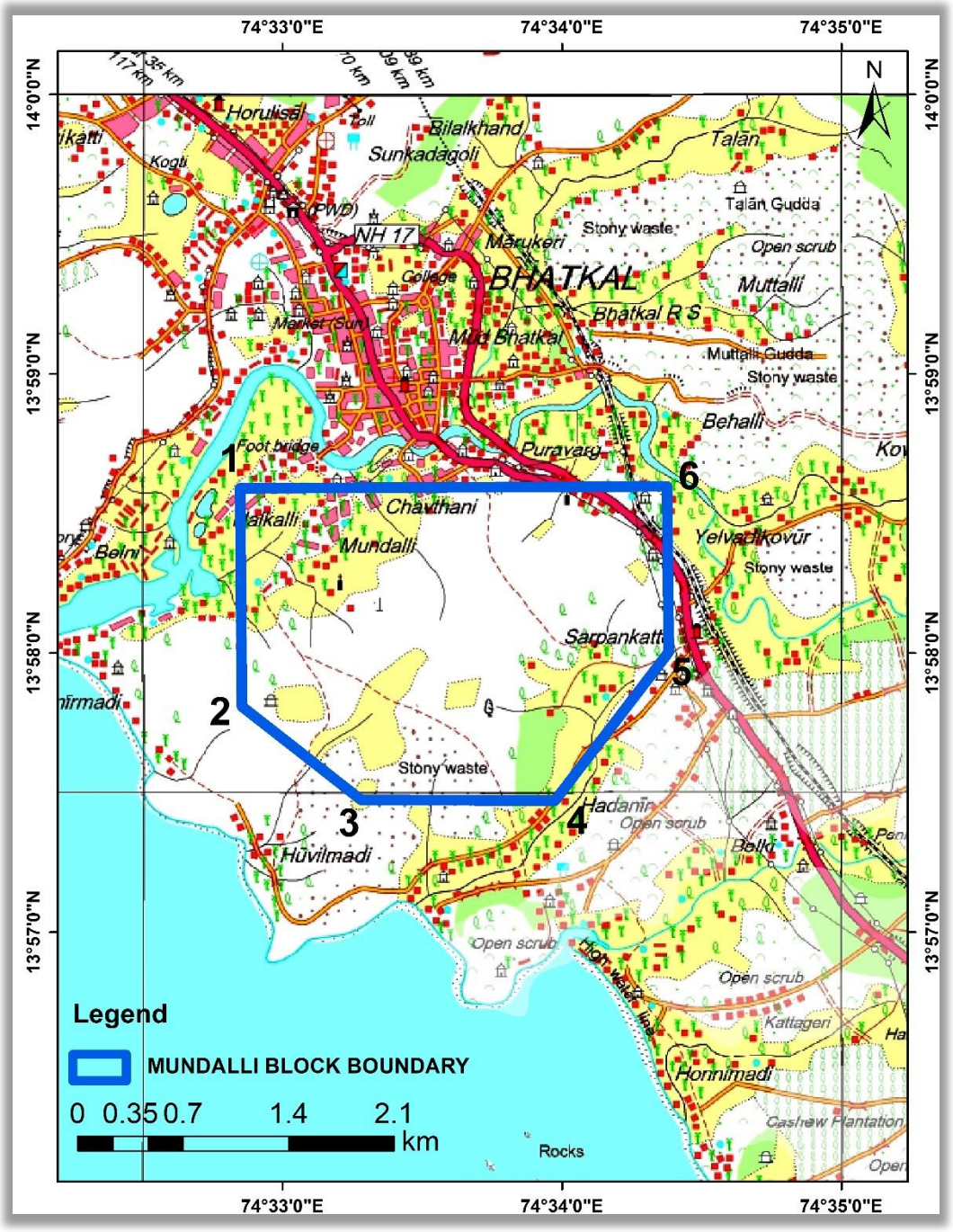
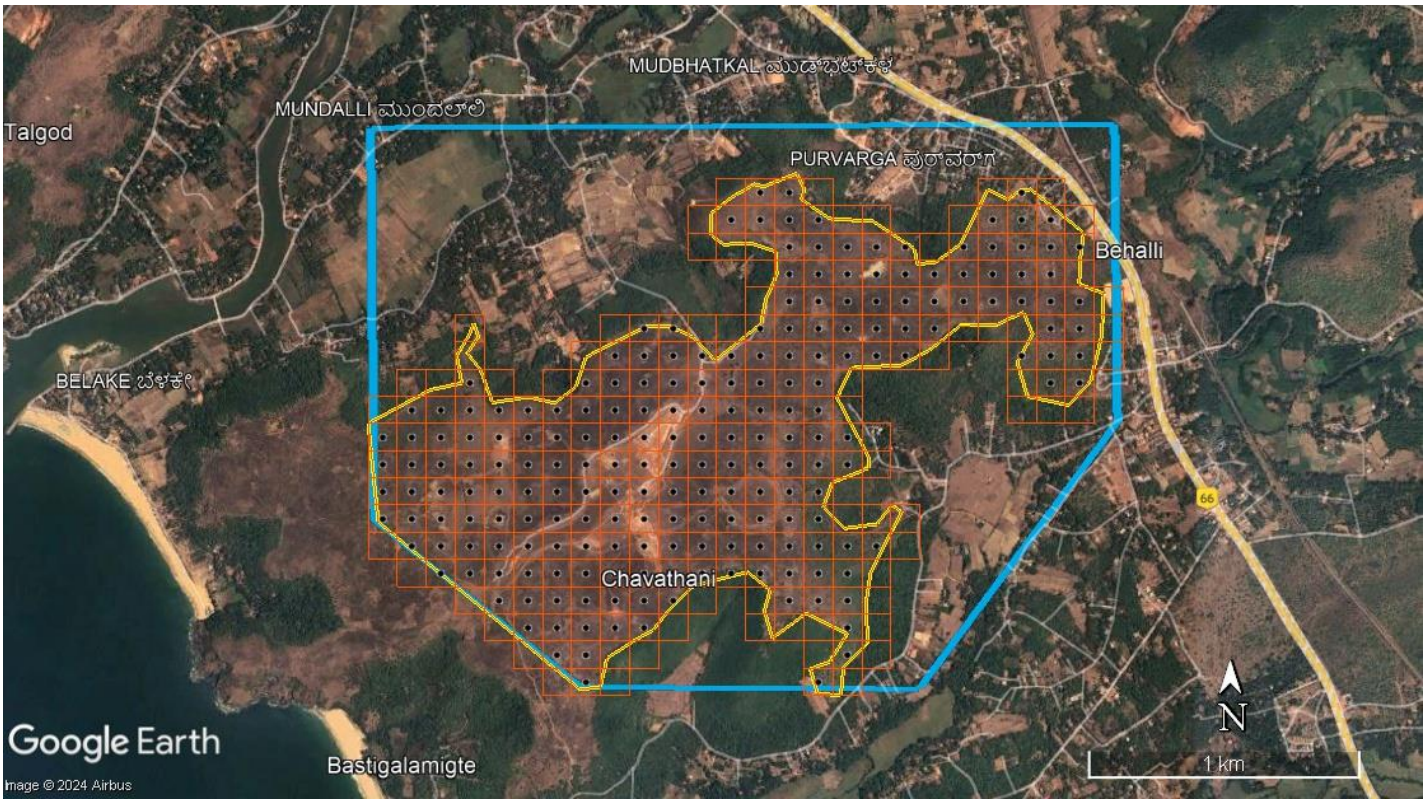


Plate-1: **Map showing Sample locations (100x100m grid) in Mundalli block in 2.32 sq.km.**



Annexure -2. Coordinates of Borehole points

PointName	Longitude	Latitude
1	74.55484	13.95809
2	74.5628	13.95809
3	74.55385	13.95899
4	74.55484	13.95899
5	74.56379	13.95899
6	74.55286	13.9599
7	74.55385	13.9599
8	74.55484	13.9599
9	74.55584	13.9599
10	74.55683	13.9599
11	74.56379	13.9599
12	74.55186	13.9608
13	74.55286	13.9608
14	74.55385	13.9608
15	74.55484	13.9608
16	74.55584	13.9608

PointName	Longitude	Latitude
41	74.55286	13.9626
42	74.55385	13.9626
43	74.55484	13.9626
44	74.55584	13.9626
45	74.55683	13.9626
46	74.55782	13.9626
47	74.55882	13.9626
48	74.55981	13.9626
49	74.56081	13.9626
50	74.5618	13.9626
51	74.5628	13.9626
52	74.56379	13.9626
53	74.56478	13.9626
54	74.54788	13.9635
55	74.54887	13.9635
56	74.54987	13.9635

17	74.55683	13.9608
18	74.55782	13.9608
19	74.5618	13.9608
20	74.5628	13.9608
21	74.56379	13.9608
22	74.54987	13.96171
23	74.55087	13.96171
24	74.55186	13.96171
25	74.55286	13.96171
26	74.55385	13.96171
27	74.55484	13.96171
28	74.55584	13.96171
29	74.55683	13.96171
30	74.55782	13.96171
31	74.55882	13.96171
32	74.55981	13.96171
33	74.56081	13.96171
34	74.5618	13.96171
35	74.5628	13.96171
36	74.56379	13.96171
37	74.54887	13.96261
38	74.54987	13.96261
39	74.55087	13.96261
40	74.55186	13.96261

57	74.55087	13.9635
58	74.55186	13.9635
59	74.55286	13.9635
60	74.55385	13.9635
61	74.55484	13.9635
62	74.55584	13.9635
63	74.55683	13.9635
64	74.55782	13.9635
65	74.55882	13.9635
66	74.55981	13.9635
67	74.56081	13.9635
68	74.5618	13.9635
69	74.5628	13.9635
70	74.54788	13.9644
71	74.54887	13.9644
72	74.54987	13.9644
73	74.55087	13.9644
74	74.55186	13.9644
75	74.55286	13.9644
76	74.55385	13.9644
77	74.55484	13.9644
78	74.55584	13.9644
79	74.55683	13.9644
80	74.55782	13.9644

PointName	Longitude	Latitude
81	74.55882	13.9644
82	74.55981	13.9644
83	74.56081	13.9644
84	74.5618	13.9644
85	74.5628	13.9644
86	74.54788	13.9653
87	74.54887	13.9653
88	74.54987	13.9653
89	74.55087	13.9653
90	74.55186	13.9653
91	74.55286	13.9653
92	74.55385	13.9653
93	74.55484	13.9653
94	74.55584	13.9653
95	74.55683	13.9653
96	74.55782	13.9653
97	74.55882	13.9653
98	74.55981	13.9653

PointName	Longitude	Latitude
121	74.54987	13.96713
122	74.55087	13.96713
123	74.55186	13.96713
124	74.55286	13.96713
125	74.55385	13.96713
126	74.55484	13.96713
127	74.55584	13.96713
128	74.55683	13.96713
129	74.55782	13.96713
130	74.55882	13.96713
131	74.55981	13.96713
132	74.56081	13.96713
133	74.5618	13.96713
134	74.5628	13.96713
135	74.55087	13.96803
136	74.55484	13.96803
137	74.55584	13.96803
138	74.55683	13.96803

99	74.56081	13.9653
100	74.5618	13.9653
101	74.5628	13.9653
102	74.56379	13.9653
103	74.54788	13.9662
104	74.54887	13.9662
105	74.54987	13.9662
106	74.55087	13.9662
107	74.55186	13.9662
108	74.55286	13.9662
109	74.55385	13.9662
110	74.55484	13.9662
111	74.55584	13.9662
112	74.55683	13.9662
113	74.55782	13.9662
114	74.55882	13.9662
115	74.55981	13.9662
116	74.56081	13.9662
117	74.5618	13.9662
118	74.5628	13.9662
119	74.56379	13.9662
120	74.54887	13.9671

139	74.55782	13.96803
140	74.55882	13.96803
141	74.55981	13.96803
142	74.56081	13.96803
143	74.5618	13.96803
144	74.5628	13.96803
145	74.57075	13.96803
146	74.57175	13.96803
147	74.55584	13.96894
148	74.55683	13.96894
149	74.55782	13.96894
150	74.55882	13.96894
151	74.55981	13.96894
152	74.56081	13.96894
153	74.56181	13.96894
154	74.5628	13.96894
155	74.56379	13.96894
156	74.56478	13.96894
157	74.56578	13.96894
158	74.56976	13.96894
159	74.57075	13.96894
160	74.57175	13.96894

PointName	Longitude	Latitude
161	74.55683	13.96984
162	74.55782	13.96984
163	74.56081	13.96984
164	74.56181	13.96984
165	74.5628	13.96984
166	74.56379	13.96984
167	74.56478	13.96984
168	74.56578	13.96984
169	74.56677	13.96984
170	74.57075	13.96984
171	74.57175	13.96984
172	74.56181	13.97074
173	74.5628	13.97074
174	74.56379	13.97074
175	74.56478	13.97074
176	74.56578	13.97074
177	74.56677	13.97074
178	74.56776	13.97074

PointName	Longitude	Latitude
201	74.57075	13.97255
202	74.57175	13.97255
203	74.55981	13.97346
204	74.56081	13.97346
205	74.56181	13.97346
206	74.5628	13.97346
207	74.56876	13.97346
208	74.56976	13.97346
209	74.57075	13.97346
210	74.56081	13.97436
211	74.56181	13.97436
212	74.56976	13.97436

179	74.56876	13.97074
180	74.56976	13.97074
181	74.57075	13.97074
182	74.57175	13.97074
183	74.56181	13.97165
184	74.5628	13.97165
185	74.56379	13.97165
186	74.56478	13.97165
187	74.56578	13.97165
188	74.56677	13.97165
189	74.56776	13.97165
190	74.56876	13.97165
191	74.56976	13.97165
192	74.57075	13.97165
193	74.56181	13.97255
194	74.5628	13.97255
195	74.56379	13.97255
196	74.56478	13.97255
197	74.56578	13.97255
198	74.56776	13.97255
199	74.56876	13.97255
200	74.56976	13.97255

Field photos and some collected samples photos

Sample Photos

Field Photos