



Orissa Geological Service
Association

October 2009
Volume-XXII

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Views expressed in various articles belong exclusively to their respective authors and are not essentially that of OGSA -Dr Rajashree Das, Editor

EDITORIAL

Government of Orissa has taken a decision to upgrade the entry level posts of OAS, OES and OFS cadres to Junior Class I, whereas no attention has been paid to the Orissa Geological Service Association in this regard. I would like to draw the attention of all members to the fact that the upgradation of the entry

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level post of our cadre is long overdue and most imminent due to reasons discussed below.

The minimum qualification for the post of Geologist/ Petrologist/ Geophysicist/ Geochemist is post graduation degree (M.Sc) in the relevant subject while for their other counterparts in different posts like Doctors/ Engineers/ OAS officers, it is just a graduate degree.

Deputy Superintendents of Police of the state were once recruited directly as Class-II officers along with other Class-II category officers of the state. But now, their recruitment is made directly to Junior Class-I from the entry level. Medical College teachers, Government college lecturers and officers of the Judiciary, once recruited at the entry level as Class-II officers are now recruited as Junior Class-I, having higher scale of pay and better promotional avenues. Government has also notified the post of Assistant Surgeon as Junior Class-I.

Since, higher qualification of post graduation is required for a Geologist at the entry level, and he/she is pursuing scientific work for the mineral development of the state, there is a common feeling amongst the geologists that they are let down by the Government of Orissa by not being offered the upgradation of the entry level post, which has been awarded to the medical fraternity, Orissa Administrative Service officers and others.

The officers of exploration wing of Geological Survey of India (Government of India), Geological Service in states of Gujarat, Madhya Pradesh, Chhatisgarh, Jharkhand,

Maharashtra, Andhra Pradesh, Karnataka, Rajasthan etc. with similar job requirements and qualification have Junior Class I posts at entry level.

It is worth mentioning that considering the importance of the duties and responsibilities of a Geologist the state government had fixed a scale of pay of Rs.300-780 in 1965, whereas the scale of pay of other Class-II officers like OAS and Mining Officers was Rs.260-780.

Most importantly, after the Revision of scales of pay, some of the staff, who operate under the officers of Orissa Geological Service, have same pay-band and basic pay. It will be difficult to maintain the administrative structure unless the

UPGRADATION OF CADRE

entry level posts of the Orissa Geological Service cadre is upgraded.

Directorate of Geology, Orissa has got the services of 38 Geologists/ Geophysicists against a sanctioned strength of 59. Young Geologists are finding the entry level scale of the state government unattractive compared to that of other states and central government organisations as well as private sectors. The jobs in the private sector are fetching the Geologist far more benefits as compared to the Government of Orissa. As a result few officers of our cadre have already left the job (some are contemplating to leave) and joined private sector on very high scale of pay. Attractive pay package from private sector has prompted many senior officers to rethink to continue in government sector. This is an alarming situation while the government is serious for mineral development of the state.

ADDITION OF 11.58 MILLION TONNES OF IRON ORE TO THE STATE RESERVES

P K Panigrahi, Geologist

In view of rapid industrialisation and the changing steel scenario of the State, assessment of iron ore is indispensable. Directorate of Geology has laid the thrust on the search of iron ore in the well known Bonai belt of Sundargarh district. The Dholta Pahar iron ore deposit was brought to limelight by the author during the field season 2006-07. This deposit is high level iron ore occurrence above 800m RL and features in the Survey of India Toposheet No. 73G/01. It is situated at a distance of 8km SSW of Dengula. The deposit is 600m in length and 250m in width with average thickness of 40.97m as deciphered from 5 boreholes and 227m drilling. The haematite intercepted in the boreholes is in the form of soft laminated ore, hard laminated ore and blue dust.

A proved reserve of 9.98 million tonnes of high grade ore with average 63.22% Fe has been estimated. Besides, 1.87 million tonnes of lower grade ore (45% to 57% Fe) has also been estimated. This lower grade ore with average Fe content of 53.25% can be suitably blended with higher grade ore. Other chemical components like Al_2O_3 , SiO_2 and P_2O_5 are within the tolerable limit. With an Ore : OB ratio of 9:1, the deposit seems to have a very good economic potential.

OCCURRENCE OF PALAEO BEACH RIDGES ALONG GANJAM COAST

S K Sahu, Geologist

The sand ridges corresponding to ancient shorelines are termed as palaeo beach ridges. They are exposed behind the recent coastal sand deposits. Palaeo beach ridges are important because of higher TiO_2 content in altered ilmenite besides other heavies. Apart from the above, it is easier to exploit heavy minerals from these ridges as they are localized away from CRZ.

In the recent past, the other coastal alluvium containing palaeo-beach ridges have been investigated in central and northern Orissa coastal sector and indicated heavy mineral content varying from 2% to 64%. Such palaeo beach ridges have been noticed in the area between Sorala and Golabandha featured in Toposheet no. 74 A/16 along the southern Orissa Coastal tract of Ganjam district. The area lies in Kanishi Tahsil of Ganjam

district and can be approached through a number of fair weather roads connecting NH5. These palaeo-beach ridges run parallel to the coast in NE-SW direction. Out of a number of palaeo beach ridges at least two deserve special mention. One is near Biswanathpur village, which has dimensions of 3km x 250m oriented in the direction of $N40^{\circ}E$. The other one is oriented in the similar fashion with dimensions of 6km x 750m and is located between the Mendrajpur and Kirtipur villages. They contain significant heavy mineral concentration varying from 4% to 15.86%, which is certainly acceptable at the present cut off level of 4%. The heavy minerals include ilmenite, rutile, zircon, garnet, silimanite and monazite. Apart from the strategic uses, these minerals have wide industrial application in paints, ceramics and refractories, plastics, chemicals etc. The drilling data in the boreholes of palaeo beach ridges has unearthed the presence of marine shells, which are indicative of deposition under marine environment during the geological past.

FUTURE PROSPECTS OF IRON ORE

S N Parida, DDG

Iron as an element forms 5% of the Earth's crust. It is one of the metals, which was first used in 1500 BC. Since then it has consistently played a vital role in the day to day life of the mankind. Today this metal in its various forms and alloys including steel serves as the backbone of the modern civilisation and its development should essentially lead to the development of mankind.

Iron ore is the basic raw material for making steel. Orissa is endowed with vast resources of haematite. This along with the liberalised Economic Policy of the Government of India and the Pragmatic Industrial Policy 2007 of Government of Orissa has attracted huge investments from national and multinational entrepreneurs, who are planning to set up steel plants in the State. As many as 49 MoUs have been inked during the past five years with a proposed production target of 75 mtpa iron and steel. So far 28 steel plants have gone into partial production. Iron ore has registered a record production of 77.19 million tonnes during 2008-09 in spite of a global financial recession.

There is an apprehension that the state may face shortage of iron ore, if all the 49 steel plants are made operational, but no such crisis is visualised for the near future.

In this context, the following strategies need to be formulated to meet future challenges arising out of increased demand and production.

There is a need to utilise BHQ and BHJ which contain significant quantities of iron ore. This can be achieved by use of newer technology. Addition to the existing reserves can be made by puncturing the BHJ and BHQ horizons to discover new iron ore beds below these. Low grade ore with +45% Fe can be used by upgrading through suitable beneficiation process. Extraction of the metal from lower grade ore can be promoted through use of technologies such as Finex and Corex in place of conventional Blast Furnace method. There is an urgent need for modernising the existing steel plants by replacing old equipment and technology in order to cope with the eternally sliding cut-off grade.

Usually, fines make up 40% of the entire iron ore resources of our state. Presently most of this is exported to other countries. Entrepreneurs should be encouraged to make use of fines for extracting the metal through pelletisation and sintering. This will serve the purpose of value addition by creating direct/ indirect employment and socioeconomic development of the State.

Scraps by all means constitute a significant volume. A rough estimate projects that about 30% of scraps are generated from old machineries and spares which, need to be recycled by using the electric furnace. This may reduce the burden on the existing deposits and indirectly add to the existing resources.

A recent compilation by the State Directorate of Geology indicates the iron ore resources of the state to be 5153.30 million tonnes (as on 01.04.2009) out of which 2847 million tonnes are within leasehold areas. The resources of iron ore can be augmented through detailed exploration, scientific mining, conservation of ore by using subgrade material through beneficiation, recycling of scrap and proving commercially viable resources of BHJ/BHQ. As a whole there is no scarcity of iron ore in the state for the upcoming iron and steel industries.

LOW GRADE IRON ORE EXPLORATION: CALL OF THE DAY

RK Mohanta, DDG

Orrisa enjoys unique position in the country so far as iron ore resources are concerned. But due to the increasing consumption of ore in the Iron and Steel

**PRODUCTION CAPACITY ENHANCEMENT
- A CASE STUDY IN IB VALLEY COALFIELD**

M R Panda, Geologist

In the wake of upcoming thermal power plants in the state, production capacity enhancement of working coalmines has become imperative. At the instance of Mahanadi Coal Fields Limited (MCL), a subsidiary of Coal India Limited (CIL), production support drilling was carried out by the Directorate of Geology, Orissa during 2002-03 to assess the disposition, thickness and quality of Rampur and Ib seams in an approximate area of 1 sq km for extension of quarry no. IV and V in the Belpahar Opencast Mines (Lakhanpur Area of Ib Valley).

The exploration contributes 2507m of drilling over 36 boreholes averaging 70m per borehole with generation of 931.17m of coal core samples, which were subjected to Direct Proximate Analysis. Interpretation of subsurface data reveals the existence of potential workable seams of Rampur (four sections) and Ib (two sections) up to a maximum depth of 87.00m. Overall values deduced through weighted average basis assigns E-G for Rampur and D-E for Ib seam. Outcome of the investigation suggests the persistence of mineable thickness of Rampur and Ib seams beyond the existing quarry limits with approximately 30 million tonnes of coal reserves of different grades within the area of exploration.

A comprehensive data as regards the number of borehole intersections, seam thickness range, parting thickness range and grade of coal seams are tabulated below for reference.

Coal seam	No. of BH intersection	Seam thickness range (m)	Parting thickness range (m)	Grade of coal seams
Rampur (Top-I)	10	0.78-03.83	0.92-6.46	D-F
Rampur (Top-II)	11	0.67-03.91	12.50-26.27	D-E
Rampur (Bot I)	35	0.87-11.45	0.50-6.78	F-G
Rampur (Bot II)	36	3.34-13.10	12.26-19.63	E-F
Ib top	36	0.23-05.60	0.49-6.10	D-E
Ib bottom	33	0.34-07.33		C-D

Above findings would certainly boost the production capacity of the mines and endeavours should be made for other working coal mines to ensure the uninterrupted supply of coal to cater to the growing demand of the corporate and private sector thermal power units within the state and elsewhere.

- To delineate the BHQ/BHJ having distinct haematite bands for future use as iron ore by crushing and beneficiation.
- To recover the iron content from the slime by developing new extraction techniques.

The course of action taken will certainly enhance the life span of Iron and Steel plants for some more years with addition of more revenue to the state.

PRELIMINARY INVESTIGATION OF BEACH SAND ALONG PURI COAST
NK Mishra, Geologist

Based on the encouraging results

of Heavy Mineral (HM) concentration along the Ganjam coast (12% to 15%), the coast along Puri was explored by the Directorate of Geology. A length of 92 km from the east of Gabakunda village to Devi confluence at Astaranga was scanned by auger drilling with grid interval of 1000 m along the coast and 500 m across the coast, limiting to a maximum depth of 2m. The area is featured in T.S. Nos.74 E/9, E/10, E/13, I/1 and I/5. The entire study area was divided into three main blocks, namely,

- Brahmagiri-Puri Block
- Puri-Konark Block
- Konark-Astaranga Block

A total of 479 pilot samples were generated from the entire area out of which 149 samples were from the Ist block, 200 samples were from the IInd block and 130 samples were from the IIIrd block. The average sand widths are 2 km & 3.5 kms in the Ist and IInd blocks. The IIIrd block has average sand width of 3.5 kms in the western part and 0.5 km in the eastern part.

Analysis results of the Ist block (Puri-Brahmagiri) shows that about 92% of sand (core) samples possess HM ranging from 8% to 30%. As this block has a substantial sand width, it appears promising. Similarly, 87% samples from the western side of IInd block (Puri-Konark) possesses HM ranging from 8% to 25%. This block has a high sand width and hence promises for a good reserve of HM in the beach sand. Results of the remaining area have not yet been received.

sector and export of ores from the state, the state may run out of high grade ore in future.

Presently, almost all the high grade ore bearing areas of the state have been explored in detail by various geological organisations with +58% Fe as cut off except a few isolated and small deposits. Considering the present demand scenario for iron ore, systematic assessment of low grade ore available in the state, mainly in Keonjhar, Sundergarh, Mayurbhanj, Jajpur and Nabarangapur districts is warranted with 45% Fe to add to the state's reserve of iron ore for future consumption.

If the Government of India has the vision of production of 110 million tonnes of

steel by 2020, the following aspects may be taken care of.

- Assessment of low grade ores in the virgin areas, mine dumps, lateritic and ferruginous shale zones of all ML/PL areas by carrying out fresh exploration programmes to enhance the resource base.
- To set up and design new steel plants in the state to consume more of low grade ores.
- To set up more pelletisation plants to utilize fine ores available in large quantity in the state and to check the export of fine ores.
- To encourage the beneficiation of low grade ore.

MORE REVENUE FROM SAND

A. K. Mohanty, DDG

Sand is one of the most important building materials required for modern civilization. Now-a-days people's awareness on the use of qualitative and quantitative building materials has become indispensable. The geologist can also play a vital role on this awareness programme for selection of qualitative building materials. Besides, the old prevailing laws on minor minerals require reformation for generating additional resource to the state exchequer. To arrive at the fact, sand is chosen as the right example for reformation. A trip load of hilly terrain sand (coarse, gritty, medium grained) cannot be equal in weight to a trip load of sand of coastal river bed (fine & well sorted). Considering the mineralogy, the hilly terrain sand bears quartz, feldspars with accessories of ferromagnesian and mica with variable hardness. The coastal belt sands collected from river courses are in absolute form of quartz, well sorted with minor accessories. It is now clear that the qualitative and quantitative value of coastal sand is definitely superior to that of hilly terrain sand. In both these cases, buyers pay a equal amount of revenue for a trip load of sand to the lessees. If enforced, the coastal tract sand can fetch 20% to 25% extra revenue at the time of leasing process. This additional raise in price can easily be recovered from the buyers for the qualitative difference of sand of coastal tract. The geologists have the role to certify the leasing spots for auction by giving clearance on the heavy mineral concentrates of national interest and occurrences of placer deposits, if any. Besides, the quality of sand i.e. whether it belongs to hilly or coastal tract can be categorised. The fate of action can be decided basing on the joint hearing by the Departments of Steel and Mines, Revenue and Forests, if the proposal draws merit.

HIGH RESOLUTION AIRBORNE MAGNETIC SURVEY DATA AND GROUND GEOPHYSICS FOR GROUNDWATER STUDY

K C Mohapatra, DDG

In crystalline metamorphic rocks, groundwater is mostly tapped from the shallow weathered zone. In dry seasons the saturated thickness of the weathered zone is reduced and at places it is almost negligible creating acute shortage of water

supply. This warrants the search of an alternative perennial source of groundwater using high resolution airborne magnetic data, which reveals deep fractures of highly productive nature. The occurrence of such fractures is not regular and their delineation is difficult. In the present study, the potential areas for groundwater exploration were selected around Tushra of Bolangir district in Toposheet no. 64P/10 and P/11. The area is a high grade metamorphic terrain comprising essentially of nonporous rock types. Occurrence of groundwater is expected in fractures and fissures caused by faulting/shearing. Faulted zones with associated fractures are generally more porous and form conduits for groundwater movement. Detailed ground geophysical studies were necessary to position the faults (interpreted from the high resolution airborne magnetic and radiometric data) precisely on the ground. The dipole-dipole resistivity profiling was adopted with an electrode spacing of 25m along with Schlumberger sounding were conducted at suitable places basing on the profile data to know the layer parameters. Dipole-dipole resistivity profiling is quite useful in delineating the presence of the litho-contacts and fractures in hard rocks. In this kind of survey, the effect of overburden, the value of the low resistivity and break in resistivity are important considerations. As such it is an effective technique for pinpointing sites for vertical electrical sounding and drilling for groundwater. Vertical Electrical Sounding gives the impression of the fractures present in rock strata from the bending of the curves.

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Deployment

- M R Mishra, DDG, M K Senapati, DDG, D N Pani, DDG, Md Q J Khan, Geologist were deployed in the Directorate of Mines, Bhubaneswar. Sri S P Nanda and Sri SK Rath, Geologists were deployed in the offices of DDM, Koraput and DDM, Rourkela respectively on 15.09.2009.

Training

- S N Parida, N N Singhdeo and Bikash Chandra Sahoo attended a Training cum workshop on "Iron and Manganese ore in Bonai Keonjhar Belt of Keonjhar District in North Orissa" at Bhubaneswar, Joda and Barbil conducted by GSI Training Institute, Hyderabad from 15.12.2008 to 24.12.2008.
- R K Mohanta attended "Advanced course on Mineral Exploration" conducted by GSI from 25.08.09 to 13.09.09 at Zawar, Rajasthan.

Promotion and Posting

- R N Parida, JDG (L-I) on promotion joined as Director of Geology on 28.03.09.

- J R Patnaik, JDG (L-I) on promotion joined as Director of Geology on 25.08.09.
- B C Patnaik, JDG (L-II) was promoted to the post of JDG (L-I) on 27.10.2008.
- S K Das, JDG (L-II) was promoted to the post of JDG (L-I) on 18.08.2009.
- A K Brahma, DDG was promoted to the post of Joint Director Geology (L-II) and posted at Keonjhar

Transfer and Posting

- S K Das, JDG (L-II) was transferred from Keonjhar to Bhubaneswar
- P K Ojha, JDG (L-II) was transferred from Bhubaneswar to Koraput.

Retirement

- N K Patel, JDG (L-II) retired on 30.06.2009 on superannuation.
- G D Panigrahi, JDG (L-II) retired on 31.10.08 on superannuation.

Seminar and Workshop

- Smt S Das, J R Patnaik, B C Patnaik, P K Ojha, S N Parida, T Mohanta, N N Singhdeo, S Mishra and D Sharma attended the "Seminar on Iron Ore Genesis and Exploration Techniques" organized by SGAT on 12.12.08 & 13.12.08 at Bhubaneswar.
- N K Patel, R K Mohanta, A K Mohanty, M R Panda and P K Panigrahi attended the seminar on "The present and Future of Mineral Resources and Mineral Based Industries: Indian Context" organized by Sambalpur University on 13.12.08 and 14.12.08 at Sambalpur.
- S A Jena attended the Pre-symposium tutorial & National symposium on "Advances in Remote Sensing Technology and Application with special emphasis on Microwave Remote Sensing" from 16.12.2008 to 20.12.2008 organized by Nirma University & SAC, Ahmedabad.
- S K Das, S K Padhi, A B Mishra, K D Nath, S N Maharana and S Sahoo attended the seminar on "Emerging Research and Development Trends in Earth System Science" organized by Utkal University on 22.02.2009 at Bhubaneswar.
- R N Parida, B C Patnaik, C B Das, S Jena, K D Nath, J P Behera, P K Chand, S Mishra & R Das attended the workshop on "Groundwater scenario & Quality in Orissa" organized by CGWB on 6.3.2009 & 7.3.2009 at Bhubaneswar.
- S K Das attended 13th International Conference on "Non-Ferrous Metals-2009" organized by Corporate Monitor on 10.7.2009 at Bhubaneswar.
- B C Patnaik, T Panda, G K Bhuyan, A K Mohanty, T Mohanta, S K Padhi, R K Mohanta, N N Singhdeo, S Mishra & D Behera attended the workshop on "Requirement of Power for Mining & Mineral based Industry in Orissa" organized by SGAT on 1.8.2009.

Member awarded PhD

- Dr P K Chand was awarded PhD by Utkal University, Bhubaneswar on the topic "Petrology and Geochemistry of Mafic and Ultramafic Rocks around Kalihata in Keonjhar-Dhenkanal districts, Orissa" on 10.07.2009.

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