

ACHIEVEMENTS DURING 2007-2008 AND THRUST OF ANNUAL PROGRAMME FOR 2008-2009 OF GEOLOGICAL SURVEY OF INDIA

I. ACHIEVEMENTS DURING 2007-2008

Mineral Finds

Coal & Lignite

- An additional resource of 2760 million tonnes of coal has been assessed by GSI during 2007 -2008 (up to June, '08).
- The geological resource of coal of the country stands at 264.53 billion tonnes and lignite at 38.93 billion tonnes as on 01.04.2008.

Gold

- The total gold ore resource in Bhukia Gold Belt, Banswara District, **Rajasthan**, has been augmented from 55.22 million tonnes with 1.87g/t Au to 60.58 million tonnes with 1.89g/t Au.
- In the western extension of Baghmara block, Sonakhan area, Raipur district, **Chhattisgarh**, an additional resource of 0.09 million tonne of gold mineralisation was estimated with average grade of 0.93 g/t of gold.

Diamond

- Two new kimberlite bodies (CGK-3 and 4) were discovered in Chagapuram sub block, Mahaboobnagar district, **Andhra Pradesh**.

Platinoid Group of Elements (PGE)

- Investigation for PGE mineralisation was continued in Hanumalapura area, Davangere district of **Karnataka** where the mineralized zone was proved for a total strike length of 2.0 km.
- In Mettupalaiyam Ultramafic Complex, Coimbatore and Erode districts, **Tamil Nadu** moderate PGE values (0.24ppm Pt and 0.52ppm Pd) for 225 m over a width of 6.0m have been delineated.
- In Sittampundi Layered Ultramafic Complex, Namakkal district, **Tamil Nadu** a prominent mineralized zone for about 900m strike length showed average grade/width of 1.68ppm (Pt+Pd) / 1.55m in the eastern part, 1.11ppm (Pt+Pd) / 2.20m in the central part and 0.70ppm (Pt+Pd) / 1.20m in the western part.

Basemetal

- In Sikar District, **Rajasthan** an additional copper resources of 34.0 million tonne has been estimated during the year 2007-08 resulting a total resources of copper ore of 85.26 million tonnes with an overall grade from 0.37% to 0.47% Cu.

Iron Ore

- A resource of 6.20 million tonnes of iron ore with 55% to 60.60% Fe has been estimated in Ghoraburhani block, Sundergarh district, **Orissa**.
- In selected free hold areas in NMDC block in parts of Sandur Schist belt, Bellary district, **Karnataka** the resource has been upgraded from G-4 to G-3 of UNFC system.

Manganese

- Exploration for manganese in Bolani block, Bonai-Kendujhar belt, Kendujhar district, **Orissa** has yielded a resource of 0.65 million tonne of Mn ore at 20% Mn cut-off. In Lasarda North Extension (Bolani) block, an additional resource of 1.365 million tonnes of Mn ore with an average grade of 26.42% Mn has been estimated at 20% cut off.

Limestone

- Investigation for flux grade limestone in Niwar area, Katni district, **Madhya Pradesh** has augmented a resource of 1.49 million tonnes with an average grade of 48% CaO.

Regional Systematic Surveys

- ❖ Systematic geological mapping of 840 sq km has been carried out (on 1:50,000 scale) resulting total coverage of 98.305% of the total mappable area of the country.
- ❖ 21,514 sq km has been covered by geochemical mapping in various states during current year (up to June, 2008).
- ❖ A total of 21,225 sq km has been covered under Geophysical Mapping.
- ❖ An area of 7960 sq. km has been covered by Specialized Thematic Mapping (1 : 25,000 scale) during the XI Plan period (up to June 2008).
- ❖ Aero-geophysical survey data was acquired using the multi-sensors over 19,628 line km covering an area of 33,443 sq km in (i) western off shore area between Kanyakumari and south of Kannur (Tamil Nadu and Kerala) and (ii) Kanker-Dhamtari area in Bastar Craton, Central India, Chhattisgarh.
- ❖ Seabed mapping of 1,23,941 sq km within Territorial Water and 18, 48,318 sq km in the Exclusive Economic Zone (EEZ) beyond Territorial Waters (TW) completed till FS 2007-08

Specialised Investigations

- GSI, as the Nodal Agency for landslide hazards, has prepared and submitted the Draft National Disaster Management Policy and Guidelines on Landslide to the National Disaster Management Authority. About 2425 sq. km. area covering ~ 615 line km road corridors by Landslide Hazard Zonation (LHZ) on Macro scale (1:50,000/25,000) and studies on Meso-scale (1:10,000/5,000) in Joshimath, Chamoli District, Uttarakhand; Munnar area, Idukki District, Kerala; Madikere Town, Coorg District, Karnataka have so far been completed in the current year. Real time monitoring through instrumentation in Survee landslide, Mussoorie, Uttarakhand and Hospital landslide, Coonoor District, Tamil Nadu is being undertaken in collaboration with Geological Survey, Canada to develop early warning system.
- GSI has long been engaged in seismic hazard assessment of earthquake prone areas. Active fault (source area of earthquake) studies involving multifarious inputs of geological, geophysical, seismological, geodetic techniques have been carried out in different sectors of the Himalaya and in Central India. Seismic hazard microzonation (in sites likely to be affected) has been carried out in Bhabnagar, Chennai and Jammu. Urban planning and building rules need to be guided by the outcome of these studies. The Broad Band Seismic (BBS) observatory at Nagpur and Jabalpur are operating continuously to record earthquake events of the distant, regional and local origin.
- From the last decade GSI had started evolving to more focused, time-bound generation of geo-environmental base line data, its synthesis and collation, as its principal agenda. In the liberalized socio-economic frame work, outcome of GSI work will become more and more relevant for planning sustainable development programmes, evaluation of geo-environmental status and mitigation of environmental hazards. Twenty one geo-environmental investigations were taken up including Regional Geo-environmental Appraisal, Site/Theme Specific Geo-environmental Studies, Public Health Hazards, Desert Geology, and Studies on Coastal Dynamics and Fluvio-Geomorphologic Dynamics. Conservation of the archaeological monuments at Ajanta & Ellora Caves, Aurangabad District, Maharashtra, was also carried out.
- Global warming has become a burning issue worrying mankind around the globe. Reports of recession of glaciers, changes in volume of water flowing along major rivers have sent warning signals to scientists and administrators. Geological Survey of India is actively engaged in the field of glacier regimes studies involving glacier mass balance, glacier flow, hydrometry, suspended sediment transport, microclimatic

parameters, secular movement and geomorphology of selected representative glaciers in the states of Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh. These studies would help to monitor the possible effects of warming, if any. Detailed glaciological studies for last seven years (2000-2007) on Hamtah glacier, Lahaul-Spiti districts, H.P. indicated that it has evacuated an area of 0.0286 sq. km with an average value of 0.004 sq. km /year. Study of recession pattern of glaciers of Bhaga basin, Lahaul and Spiti district, H.P. demonstrated that during the last 44 years (from 1963 to 2007) the Panchi Nala I glacier has receded by 465m at an average of 10.57 m/year, vacating a total area of 0.24005 sq. km whereas the Panchi Nala II glacier has receded by 525m with an average retreat of 11.93m/year, vacating a total area of 0.2695 sq. km in the proglacial regime.

Antarctica & Arctic studies

- Geological Survey of India has been participating in the Indian Antarctic Programme since its inception during the austral summer of 1981-82. Twenty seven Antarctica Expeditions have been conducted up to the end of 2007-2008. The Earth Science programmes in Antarctica are an ongoing programme of long-term nature. This year programmes will be carried out under different heads, which include geological mapping with inputs for global climate changes, comparative studies on crustal evolutionary history of the then contiguous parts of Antarctica and Eastern Ghats of India, delineation of land-ice-sea interface, etc. Routine glaciological observations were carried out revealing an accumulation of 65.5 cm snow during 2007-08 on the ice shelf along Princess Astrid Coast. Overall average recession of Dakshin Gangotri glacier snout in Schirmacher Oasis during the same period was recorded to be 1.10m.
- Two GSI scientists were nominated for the 1st Indian Arctic Expedition held in March 2008.

International Activities

- ❖ GSI participated in various International Geological Correlation programmes. In the 33rd Indian National Committee (INC) meeting for IGCP 14 on-going IGCP projects in India were reviewed and two new projects on Gold and Diamond were approved for Indian participation during 2007-2011.

Dissemination of Information

- GSI is the custodian for geological maps and geoscientific database of India and adjoining countries. Being the repository for huge volume of geoscientific information of the country, GSI has not only been continuously generating information but also compiling and developing huge databases. 398 quadrangle maps cover the Indian Territory, of which 334 maps are amenable for printing, and 289 maps have already been printed till June 2008.
- GSI Enterprise portal (<http://www.portal.gsi.gov.in>) has been live since 5th November, 2007. The Data Centre at CHQ, Kolkata is functioning as the hub of activities for this infrastructure providing the environment for maintaining the network and portal related hardware, software and other equipments. The Information Infrastructure is expected to be fully functional by 2008 once the Wide Area Network (WAN) is commissioned. With this, all offices of GSI will be interconnected and end users will be able to transact business through the GSI Portal. This will mean a big leap towards e-governance for GSI.

Research and Development

- Evaluation of causes of arsenic pollution in groundwater in Murshidabad district, West Bengal has revealed an oxidized sequence of hard clay, silty sand and brown fine sand occurs at a depth of 20m. This brown fine sand or "Orange sand" is already established to be a geological solution for this arsenic pollution. This oxidized sequence is followed downward by grey clayey silt and sand which yields high arsenic. As a remedial measure, it has been suggested that the "Orange sand" horizon occurring at a shallower depth than the high arsenic yielding grey sand horizon may be tapped for arsenic free water, thus involving lesser cost of making tube well.
- Geospeleological studies in Meghalaya show profuse development of stalagmites of both active and fossil types, ranging in size from 10cm to >30 m in Krem Mawkhypod cave in east Khasi hill.
- Coal Bed Methane (CBM) study on samples of coal seams intersected at different boreholes in south-eastern part of Rajmahal- Birbhum master basin, (Jharkhand and West Bengal) has indicated gas content ranging from <.03 to 1.16 cc/gm. Relatively higher gas content (0.68cc/gm to 1.16cc/gm) has been noted at depth between 612m and 640m in seam zone I.
- Luminescence dating of Aeolian and fluvial sediments from northern fringe of Thar desert (Haryana & Punjab Plains) was undertaken to constrain episode of climatic changes. The optically stimulated luminescence (OSL) dating revealed that the alluvial sediments lying about 8-10m below Quaternary plains were deposited during humid phase of MIS: 3 which continued till 19ka.

Internal Resource Generation

Internal resource generation during Financial Year 2007-2008 is Rs. 11.41 crores + \$167.00.

Annual Programme for 2008-2009

- Mineral Exploration has been given major thrust for the annual programme of GSI during 2008-2009. A total of 77 items of mineral investigation will be taken up of which 57 are for ores and minerals and 20 items belong to coal and lignite. Among the 57 projects of ores, 17 are for gold, 19 base metals, 3 for platinum group of metals, 2 strategic minerals, 5 ferrous minerals, 5 items of diamond, 1 for manganese and 5 for other industrial minerals.
- Next priority remains the Survey & Mapping: Specialised Thematic Mapping (STM) followed by Geochemical (GCM) and Geophysical Mapping (GPM) constitutes the core activity in recent years. A total of 98 items of investigations are included under Survey and Mapping. STM tops the list with 32 projects, followed by GCM with 30 and GPM with 11 items. The rests are Air Borne and Marine surveys.
- Engineering, Earthquake, Landslide and Environmental Geology are grouped under Special Investigations and during 2008-09 there are about 76 projects included.
- About 49% of GSI's manpower is deployed for working in the three major heads of Mineral Exploration, Survey & Mapping and Special Investigations. Another 16% of human resources are engaged in Research & Development, necessary partly to supplement the different investigations. About 23% of manpower is deployed for Information Dissemination that includes map, publication and information technology while 12% manpower will be deployed for HR and training.