

Minutes of the 3rd meeting of the CGPB Committee No.XII on Geoscience for Sustainable Development held on 22nd July 2010 at 11.30 AM in Aluminium Hall, Ministry of Mines, Shastri Bhavan, New Delhi.

3.1. The third meeting of the Committee - XII (Geoscience for Sustainable Development) of the Central Geological Programming Board (CGPB) of the Geological Survey of India (GSI) was held under the Chairmanship of Smt. Ajita Bajpai Pande, Joint Secretary(Minerals and Regulation), Ministry of Mines (MoM) at 11.30 AM in the Aluminium Room, MoM, Shashtri Bhawan, New Delhi. List of Members who attended this meeting is given at **Annexure 1**.

3.2. Smt. A.B. Pande welcomed the participants in the meeting. Initiating the discussions, the Chairman observed that GSI, a premier geoscientist's organization tasked with preparing national geological, geo-physical and geo-chemical maps and assessing the mineral and energy resources of the country, is now being positioned as a scientific body for generating and maintaining geo-scientific data bases for a variety of geological, environmental and social applications having geo-spatial dimensions. It is intended that GSI's balance of activities now shift from data gathering to value added activities such as data analysis, data sharing and geo-scientific and environmental information dissemination. The Chairman observed that the outcome of deliberations of the meeting would formalize such areas.

3.3. Minutes of the Second Meeting held on 18th January, 2010 were confirmed.

3.4. Considering the large participation and presence of several new members, the chairman desired that the Member Secretary, [Director (Technical)] make a brief presentation on role and activities of GSI as envisaged in the Terms of References (TOR) for the CGPB Committee-XII (given at **Annexure 2**).

3.5. Progress on Action Taken Report on recommendations of the Second Meeting:-

A. MoU between GSI and CGWB

MoU between GSI and CGWB was formally signed on 8th July, 2010 at MoM, New Delhi on 'Geoscientific data sharing and cooperation in the field of Groundwater, Sub-surface Geology and Hydrology' by Shri Nitesh Kumar Dutta, DG, GSI and Shri B.N. Jha, Chairman, CGWB in gracious presence of Ms. Shanta Sheila Nair, Secretary (Mines) and Shri U. N. Panjiar, Secretary, Ministry of Water Resources. Shri S. Vijay Kumar, Special Secretary (M), Smt. Ajita Bajpai Pande, Joint Secretary, MoM and Senior Officers of MoM. Sh. Garg, Joint Secretary Ministry of Water Resources, along with Senior Officers of the CGWB, Faridabad and GSI, New Delhi were also present on this occasion of signing of the MOU. MOU between CGWB and GSI has been the result of deliberations in the Central Geological Programming Board (CGPB) Committee-XII on 'Geosciences for Sustainable Development' under the Chairmanship of Smt. Ajita Bajpai Pande, Joint Secretary, Ministry of Mines.

Highlights and the follow-up actions on geoscientific data sharing and cooperation in the fields of groundwater, subsurface geology and hydrology were detailed for information of members:

- Application of deep geophysical resistivity surveys for prospecting of deeper Ground Water aquifers in alluvium up to 1000 m. The studies will be initiated in the Ganga alluvium in part of Uttar Pradesh as a pilot project. The Resistivity data generated by GSI will be validated through test drilling to be done by CGWB. Areas for joint studies and surveys will be selected for mutually agreed locations.
- Support of geochemical/ mineral/ trace element and temperature variation analysis by using available facilities of GSI labs., and hydro-chemical and trace element/ temperature variation analysis by using available facilities of CGWB labs. for the study of geogenic contamination due to

presence of excessive salts and Nitrate in ground water in parts of Bhatinda district in Panjab. An improved understanding of the genesis of the contamination and for evolving the long-term remedial measures and other alternatives would be the outcome.

- Operationalization of various Regional Projects under Mission-II for taking up detailed investigations on groundwater and subsurface hydrogeology and the Mission headquarters at Faridabad.

B. Hazardous impact of high altitude lakes and Hyperspectral Surveys

Hazardous impact of high altitude lakes leading to health problem of people living in adjoining areas have not been reported so far in India. It has been observed that World Wildlife Fund (WWF) could be asked for specific areas where problems were encountered in the ensuing CGPB meeting, GSI would then take-up site specific medical geological studies in those areas (depending on availability of manpower).

PGRS Division of GSI, CHQ, has neither carried out any work on the use of Hyperspectral mapping of clay minerals for agricultural purposes nor does it have the requisite expertise. However, a limited area as a pilot project would be taken up by GSI on specific request provided Hyperspectral Survey (HS) data are available.

C. National Geoscientist Congress

It is proposed to set up a registered society “National Geoscientists Congress of India (NGCI), under the aegis of the Ministry of Mines to provide a common platform. The main purpose of the Congress will be to encourage the study and advancement of fundamental and applied research on various aspects of geosciences and socio-economic activities having geoscientific underpinnings or amendable to geoscientific analysis.

Shri A. K. Bhandari, Sr. Advisor C-TEMPO, gave an account of the objectives of the proposed National Geoscientist Congress.

3.6 Shri A. K. Bhandari informed that the rules and regulations and bye-laws of the National Geoscientists Congress of India (NGCI), are yet to be finalized. The Chairman directed Shri Bhandari to expedite all the formalities in this regard jointly with GSI and to ensure that the first National Geoscientist Congress is held in 2010.

(Action: Shri A.K. Bhandari, C-TEMPO / GSI)

3.7 Prof. S. Mukherjee observed that a Research Scholar from Jawaharlal Nehru University is pursuing a Ph.D level work for Bhatinda and Talwandi particularly in areas where Bt Cotton is being grown. He suggested carrying out of the surveys by Proton-Magnetometers in conjunction with and as a substitute for Resistivity surveys in certain ground conditions yield better results. He also mentioned that they are carrying out research work in the entire State of Assam on ground water quality and types of soils, etc. With regard to basin-wide ground water surveys, Dr. Mukherjee pointed out that a team of scholars from various Indian Institute of Technologies will be studying the entire Ganga basin for a comprehensive assessment of environment, hydrology and geohydrology of groundwater occurrences, nature of soils and hazards/ pollution aspects for selected areas.

3.8 Shri S. Kunar, Member (SAM), CGWB stated that studies on trace element analysis of groundwater, variation of temperature in groundwater, geogenic part of the minerals in the groundwater, deep geophysical resistivity survey for prospecting of deeper groundwater aquifers in alluvium up to 1000m have been envisaged in the MoU between GSI and CGWB. A meeting between senior officers of GSI and CGWB was held recently and the following points were agreed upon:

- a) To take-up joint studies in some Arsenic affected areas with the aim to provide solution to the affected people through the involvement of field officers of both the Organizations.
- b) GSI may form a part of a committee of technical experts to study for further exploration of ground water resources in Bundelkhand Region of UP and MP.
- c) Aeromagnetic data available with GSI for hard rock areas shall be provided to CGWB for which the Regional Offices of CGWB may send specific requests to GSI [Dy.DG, (AMSE), Mission-II (Bangalore), or Dy.D.G., Subsurface Hydrology, Faridabad].

CGWB was assured of all possible cooperation from GSI on these issues. Besides, proposal for creating Operational Directorates at various Regional levels for undertaking groundwater related work with CGWB has been initiated by the Mission-II on Subsurface Hydrology, GSI, Faridabad and is under consideration by the Director General, GSI.

(Action: GSI/ CGWB)

Collaboration with Institutes/ Universities

3.9 The Energy and Resources Institute [TERI] was requested to present proposals for work TERI wanted to be carried out in collaboration with GSI. A detailed presentation on proposed TERI-GSI collaboration on Geo-thermal and carbon capture and geological sequestration [CCS] was made.

Dr. P.K. Dadhich stated that TERI had deployed a large multi-disciplinary team of researchers on various climate change issues including carbon capture and geological sequestration. Greenhouse gases, both natural and manmade, trap radiant heat from the Sun and give rise to green house effect or the global warming. CO₂ is the most important contributor (more than 50%) amongst the various greenhouse gases. Besides reducing such emissions through adoption of cleaner technology, researches on carbon capture and storage [CCS] in saline groundwater or other geological media are required for sustainable development. CCS has three major components starting from capture of CO₂ in

the atmosphere, its transport to a possible safe storage location and its injection and interaction thereof. R&D efforts in all these areas are needed particularly for long-term safe storage through site characterization, subsurface measurements, monitoring/ verification and risk management through modeling studies. Dr. S. K. Wadhawan pointed out that potential geological formations for CO₂ sequestration in India include deeper saline aquifers in Gangetic plains, Deccan volcanic trap rocks and deeper saline aquifers in Thar Desert in India.

3.10 Dr. P.K. Dadhich further informed that studies revealed that India has large potential of CO₂ sequestration that it is theoretically estimated that 11 million tones of oil equivalent coal will be used in the near future in the power sector only and that will emit large quantity of CO₂ in the atmosphere. Shri Gautam Das Gupta remarked that so far we understand that CO₂ sequestration is to be done under the sea, but it is for the first time that it would be carried out on the land in India. Shri A. K. Bhandari informed that saline aquifers are best developed in Ganga basin, but it will not be possible to use them as they occur in pockets and at variable depths. However, deep saline aquifers in the Vindhyan basin (Bhandar Sandstone) are better suited for this purpose. Shri. Bhandari informed that one Oil Company in India is presently using their depleted gas fields for CO₂ sequestration experiments.

3.11 Shri Virendra Kumar, Director GSI, informed that there are very thick halite deposits in northwestern part of India at sub-surface, even below 1000 meters depth from the surface and the thickness of halite seams are more than 100 meters at places. Halite form very good cap rock even for oil and gas, and it has preserved natural oil and gas in the oil traps for millions of years. Hence, these are the best places for storing CO₂ in liquid form in artificially created very big cavities in the sub-surface. Such huge cavities can also be created in these halite deposits occurring in northwestern Rajasthan, which in future can be used as a resource of CO₂ for industrial purposes. The deeper confined as well

as un-confined saline aquifers could be used for CO₂ sequestration. Dr. Dadhich was requested to prepare the draft proposal of MoU for which necessary background information can be provided by GSI, D.G.C.O., New Delhi and an area of feasibility studies should be identified by TERI for this specific work within specific time schedule in the MOU.

(Action: Dr. Pradeep K. Dadhich, TERI/ Virendra Kumar, GSI)

3.12 Dr. R. Biswas, Asstt. Prof., Insstt. of Town Planners, wanted to know the urban areas that have been studied by GSI for seismic micro-zonation in India. He suggested that GSI should evolve a suitable approach for carrying out urban geological and Seismic Hazard Microzonation Studies in a time-bound manner. Director (T) and Member Secretary gave an account of areas where seismic hazard microzonation studies in [different urban centers] in India as carried out by GSI include: Jabalpur, Delhi, Mumbai, Ahmedabad, Siliguri, Dehradun, Guwahati, Vishakhapatnam, Chandigarh, Chennai, Pondicherry, Jamnagar, Bhavnagar, Jammu. Currently, works in Jullandhar U.A., Greater Bharuch are in progress. At the instance of Earthquake Risk Evaluation Centre (EREC), GSI, carried out geological mapping on 1:10,000 scale for detailed microzonation studies of Delhi area. Both Jabalpur and Guwahati microzonation work was carried out in multi-institutional mode under the aegis of DST with requisite inputs from GSI. Joint micro-zonation study with any Organization may be taken up if request is made and through entering into an MoU with GSI.

(Action: Insstt. of Town Planners, New Delhi/ GSI)

Collaboration with State Governments

3.13 Sh. Vinay Vyasa, Commissioner, Commissionerate of Geology and Mining [CGM], Government of Gujarat outlined various activities being undertaken to further the development of mineral and mining sectors in the state. Government of Gujarat has introduced systematic allocation of mining leases by the process of notification and engaging itself in the large scale mineral exploration to find new mineral bearing areas, development of cluster mining

and comprehensive EIA for the leases of less than five ha area, etc., are being seriously implemented for sustainable development. Gujarat State He requested GSI to take-up geochemical mapping and geoenvironmental appraisal of Kachchh region and Bhuj urban areas and to join CGM programmes with GSI in Kachchh, Gujarat. They were advised to submit their specific proposals in consultation with GSI Gandhinagar office.

(Action: GSI/ GCM, Govt. of Gujarat)

3.14 Sh. T.P. Singh, Director, BISAG, Govt. of Gujarat, informed that they have prepared and put 80 layers of thematic information on Gujarat State on 1: 10,000 scale on their website. They observed that any further collaboration with GSI on specified data sharing, based on remote sensing studies in Gujarat are feasible and expressed keenness for taking up joint studies with GSI on Geoenvironmental assessment in Kachchh and Saurashtra regions of Gujarat.

(Action: GSI/ BISAG, Govt. of Gujarat,)

3.15 Sh. Harsh Vardhan, Rajasthan State Mines and Minerals Dev. Corptn. (RSMMD) Udaipur, informed that they are working in the field of rock-phosphate, limestone, granite and marble. He informed that for sustainable development of the area, they have done very good work in two fields:

- i) They have started generating 55 MW of power by wind power generation in western Rajasthan.
- ii) In Nagaur district, RSMMD has set up de-salination plant to supply water (20 million liters) to the 120 villages in Jayal Block of Nagaur district, which were otherwise suffering from high fluoride content water in the groundwater. This de-salination plant is tapping the saline water from confined aquifer in the Tertiary formations in the area. Shri Virendra Kumar, suggested that such type of saline aquifers are good for CO₂ sequestration also.

3.16 RSMMDc representative also informed that they were facing environmental problem in Barmer district where their lignite mine based power generation plants are generating huge amounts of ash/ fly ash. Members advised RSMMDc to establish contact with Fly Ash Mission of DST, New Delhi for expert advice. He also suggested that GSI should take up detailed investigations of deeper level Tertiary aquifers in Nagaur Basin of Rajasthan jointly with RSMMDc/ DGM Govt of Rajasthan. They were asked to put up formal proposals for collaboration.

(Action: RSMDC/ DGM Rajasthan/ DST/ GSI)

Collaboration with other Governments Departments

3.17 Sh. Manoj Pant, Director, M/o Health & Family Welfare, informed that Health Ministry has launched an 'Integrated Diseases Surveillance Project' and that wherever GSI or other agencies are working on medical geological investigations the local health workers should also be involved for awareness and relevant contributions to the works on pollution of soil, water and air. It was suggested to pursue the matter further for involvement of Health Ministry experts for some selected pilot projects such as the one in Bathinda district of Punjab, etc.

(Action : G.S.I., C.G.W.B., Health Ministry)

3.18 Sh S.N. Das, CSSO, Soil and Landuse Survey of India, wanted digitized map of G.S.I. of 1: 50,000 scales for the catchment areas of certain basins. Dr. S.K. Wadhawan, Member Secretary, informed that they are already on the GSI portal. He was requested to send area-specific proposals and requirements and work further towards arriving at MoU for undertaking joint studies in selected hazardous watersheds to be investigated by both the organizations.

(Action: G.S.I./ S&LUSI)

3.19 Dr. P. S. Acharya, Director, Department of Science and Technology (DST) informed about preparation of various analogue and digital topographical maps

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related data bases being generated by DST. He stated that National Spatial Data Infrastructure (NSDI) has been compiling spatial data on different themes in digitized formats on 1:50,000 maps having hyper-links with GSI Portal. The maps on 1:10,000 scale will contain thematic information with limited topographic details. He informed that there are open series of maps available on their website and there are some restricted maps also. There are certain maps which are available on 'Web Map Service' – as they are scanned images. NSDI will facilitate capacity building and work towards inclusion of geospatial technologies for creating requisite human resources in this domain and upload Meta Data shortly. However, for the availabilities of different maps in the public domain, wider use and fuller comprehension, Dr. Acharya was requested to make a detailed presentation on the subject in the next meeting of the Committee.

(Action : Dr. Acharya, DST)

The meeting ended with a **vote of thanks** to the Chair.

ANNEXURE 1

List of Delegates who attended the 3rd Meeting of the CGPB Committee No.XII on Geoscience for Sustainable Development, held on 22nd July, 2010 at 11.30 AM in Aluminium Hall, Ministry of Mines, Shastri Bhavan, New Delhi.

Name of the Officer		Designation	
1.	Smt. Ajita Bajpai Pande	Joint Secretary	Chairperson
2.	T.P. Singh	Director, BISAG, Govt. of Gujarat, Gandhinagar.	Member
3.	Dr. Pardeep Kr. Dadhich	Senior Fellow, The Energy and Resources Institute [TERI], New Delhi.	Member
4.	Dr. R. Biswas	Assistant Professor, Institute of Town Planners, India, New Delhi.	Member
5.	Vinay Vyasa	Commissioner, Commissionrate of Geology and Mining, Govt. of Gujarat, Gandhinagar.	Member
6.	Manoj Pant	Director, M/o Health & Family Welfare.	Member
7.	S.N. Das	CSSO, Soil and Land Use Survey of India [SLUSI]	Member
8.	Harsha Vardhan	Dy. G.M. [Geology], Rajasthan State Mines & Minerals	Member
9.	Dr. S. Mukherjee	Professor & Head [Geology], SES, Jawaharlal Nehru University [JNU]	Member
10.	S. Kunar	Sci. 'G' and Member SAM, CGWB	Member
11.	R. Kumar	Director, M/o Water Resources, (CGWB/ Irrigation), New Delhi.	Member
12.	P.S. Acharya	Sci.'F'/ Director, Department of	Member

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		Science and Technology [DST].	
13.	A.K. Bhandari	Sr. Advisor, C-Tempo, Ministry of Mines	Member
14.	G Das Gupta	Director, CGPB Sectt., GSI, New Delhi.	Spl. Invitee
15.	Virendar Kumar	Director, DGCOD, GSI, New Delhi.	Spl. Invitee
16.	Smt Neena Singh	Partner, Environmental Resources Management [ERM] INDIA, Gurgaon.	Spl. Invitee
17.	Chanemovgam R.	Consultant, ERM INDIA	Observer
18.	Ms Sumati Bhatia	Consultant, ERM INDIA	Observer
19.	Amit Kr. Verma	Research Associate, TERI,	Observer
20.	Prasun K. Gangopadhyay	Associate Fellow, TERI,	Observer
21.	Dr. S.K. Wadhawan	Director-Technical, Ministry of Mines.	Member Secretary

ANNEXURE 2

Current thrust areas of activities by GSI included: applied aspects of geomorphological mapping, geo-environmental and related studies, geo-chemical characterization of landscape as part of NGCM programs, health and medical geological issues (e.g. geogenic contamination of Arsenic and Fluorides in groundwater and diseases induced by dust such as silicosis, asbestosis, etc.); Urban geology and seismic micro and macro zonation studies; glaciological studies desert geology and desertification, geo-thermal and renewable energy resources, etc.

Terms of References (TOR) for the CGPB Committee-XII are:

- (i) To facilitate integration of geosciences into policy making particularly for environmental issues and to transmit the concepts to potential interest groups including policy makers, non-governmental environmental agencies and general public;
- (ii) To develop a framework and methodology for promoting sustainable development strategies (including optimum land use) through best use of geoscientific data gathered in the course of survey and exploration by GSI and other geoscientific organizations in the country, and
- (iii) Assisting nodal agencies concerned by developing new areas such as geoscientific data collection, particularly spatial data such as geomorphology to help them analyze ecosystem function and make informed planning decisions.