

**GEOLOGICAL SURVEY OF INDIA
CENTRAL GEOPHYSICAL DIVISION
KOLKATA**

**Minutes of the Meeting on
“Planning of Geophysical Surveys, Designing of Standard formats for
data acquisition, standardization of data processing and interpretation
procedures and preparation of Geophysical reports”**

Dates: October 21st – 23rd 2009

Venue: Central Geophysics Division, GSI, CHQ, Kolkata

Present geophysical data acquisition system in GSI is not uniform and is very subjective for various geophysical methods, especially in the case of ground geophysical surveys. In order to bring about uniformity in various geophysical exploration techniques there is an urgent need for setting up an organized methodology of multi-parametric data acquisition system in GSI. This includes preparing standard data acquisition and storage formats for easy storage and retrieval of geophysical field data. Further, it is also essential to standardize the data processing and interpretation procedures, map preparation and reporting format. In order to bring about uniformity in data collection certain norms have to be established prior to planning a geophysical survey.

To achieve the above objective a proposal was submitted by Deputy Director General (Geophysics), Central Geophysics Division to Director General, GSI for holding (GP) (Coordination) at Central Geophysics Division, Kolkata. Director General, GSI has kindly approved the proposal. Accordingly, the meeting was held at the Computer Lab., Central Geophysics Division, GSI, CHQ, Kolkata during 21st, 22nd & 23rd October, 2009.

Each Director (GP) (Coordination) dealt with a specific topic and others interacted and shared their views during the deliberations.

The agenda for the meeting was as follows:

DATE	TIME	ACTIVITY
21.10.2009	10.30-10.35	Welcome by Sri Kalyan Mukherjee, Director (CT), CGD.
	10.35-10.45	Address by Sri S G Gaonkar, Dy. D.G (GP), MW
	10.45-11.00	Geophysical Data Repository by Sri M V Rao, Dy. DG (GP), CGD
	11.00-11.15	TEA BREAK
	11.15-11.30	Geophysical Data Repository by Sri M V Rao, Dy. DG (GP), CGD
	11.30-13.30	Airborne Geophysical surveys by Sri S K De, Director (GP), AMSE. Sum up by Sri Arnab Das, Dy. DG (GP), AMSE
	13.30-14.15	LUNCH BREAK
	14.15-15.30	Marine Geophysical surveys by Dr. B P Pal & Sri Y C Kar, Directors (GP). Sum up by Sri S.G. Gaonkar, Dy. D G (GP), MW
	15.30-15.45	TEA BREAK
	15.45-17.15	Marine Geophysical surveys by Dr. B P Pal & Sri Y C Kar, Directors (GP). Sum up by Sri S.G. Gaonkar, Dy. D G (GP), MW
	17.15-17.45	Issues related to Geophysical repository by Sri M V Rao, Dy. D.G (GP)
22.10.2009	10.30-11.30	Ground Gravity Surveys by Dr. Alok Mukherjee, Director (GP), ER
	11.30-11.45	TEA BREAK
	11.45-12.30 12.45-13.30	Ground Magnetic Surveys & Palaeomagnetic studies by Sri K V Rao, Director (GP), CR.
	12.30-12.45	Address by Dr. Balaram Chattopadhyay, Dy. DG (PPM), CHQ on Geophysical Data Repository.
	13.30-14.30	LUNCH BREAK
	14.30-15.30	Ground Electrical (Resistivity) surveys by Sri H P Mishra, Director (GP), NR.
	15.30-15.40	Address by Sri. N K Dutta, Director General, GSI.
	15.40-16.45	Ground Electrical (SP, IP, EM & Mise-a-la-Messe) surveys by Sri R S Rai, Director (GP), WR.
	16.45-17.00	TEA BREAK
	17.00-17.45	M T Surveys by Dr. D C Naskar & Sri. A K Lahiri, Geophysicists (Sr.)
23.10.2009	10.00-11.30	Ground Seismic (Reflection and Refraction) surveys by Sri. H P Mishra, Director (GP), NR and Smt. Y S Tulasi, Director (GP), SR
	11.30-11.45	TEA BREAK
	11.45-13.30	Geo-Seismological surveys by Sri D K Saha, Director (GP), CGD sum up by Sri S G Gaonkar, Dy. D G (GP)
	13.30-14.30	LUNCH BREAK
	14.30-15.30	Geophysical Borehole Logging by Kalyan Mukherjee, Director (GP), CGD
	15.30-16.00	Format of Geophysical Report by Smt. Y S Tulasi, Director (GP), SR
	16.00-16.10	TEA BREAK
	16.10-17.45	Open House. (moderated by M V Rao, Dy. DG (GP)) 1. Training programmes in Geophysics. 2. Software for Geophysical data processing, Interpretation and Map production by Mr. Baldau Singh, Director (GP), NER. 3. Write off of Obsolete & U/S Geophysical Instruments by Sri. N Kutumba Rao, Director (G), ID, CHQ.
	17.45-17.55	Concluding Remarks by S G Gaonkar, Dy. DG (GP)
	17.55-18.00	VOTE OF THANKS by Sri. D K Saha, Director (GP), CGD

Sri S.G. Gaonkar, Dy. Director General (Geophysics), chaired the meeting.

The meeting was attended by the following members.

1	Sri S G Gaonkar	Dy. Director General (GP)	Marine wing, Kolkata
2	Sri A K Das	Dy. Director General (GP)	RSAS, Bangalore
3	Sri M V Rao	Dy. Director General (GP)	CGD, Kolkata
4	Sri K V Rao	Director(GP) (SG)	CR, Nagpur
5	Dr. B P Pal	Director(GP) (SG)	Marine, Kolkata
6	Mrs. Suguna Tulasi	Director(GP) (SG)	SR, Hyderabad
7	Sri R C Pathak	Director(GP) (SG)	CR, Nagpur
8	Sri S K De	Director,(GP) (SG)	RSAS, Bangalore
9	Sri K Mukherjee	Director(GP) (SG)	CGD, Kolkata
10	Sri H P Mishra	Director,(GP) (SG)	NR, Lucknow
11	Dr. A K Mukherjee	Director,(GP) (SG)	ER, Kolkata
12	Sri. R S Rai	Director,(GP) (SG)	WR, Jaipur
13	Dr. Baldau Singh	Director(GP)	NER, Shillong
14	Sri Y C Kar	Director(GP)	Marine Wing, Kolkata
15	Sri D K Saha	Director(GP)	CGD, Kolkata
16	Sri B Das	Geophysicist (Sr.)	Coal Wing, Kolkata

Sri Kalyan Mukherjee, Director (CT), CGD welcomed the members and requested Sri S. G. Gaonkar, Dy. DG (GP), MW, Kolkata to chair the meeting and conduct the proceedings.

The Chairman welcomed the members and explained them, about the NMP (New Mineral Policy), HPC (High Power Committee) reports and about the Geophysical Data Repository. He invited the delegates to provide their valuable suggestions for systematising and improving the quality of data collection, processing, interpretation and modelling of the Geophysical data and standardization of Geophysical Reports. He stated that the data repository would be helpful in storing of Geophysical data acquired by GSI and would be made available to public as per the guidelines of Government of India.

Sri M V Rao, Dy. DG (GP), CGD, delivered a key note address on the theme. He stressed the need to review the present data acquisition system which is random for various Geophysical methods. In order to bring uniformity in various Geophysical exploration techniques applied in field in different Regions in GSI there is a need for setting up standard formats for data acquisition and organized storage of acquired multi-parametric data. He emphasized on standard data acquisition and storage formats for easy storage and retrieval of Geophysical field data. He has also explained about the proposal for setting up a National Geophysical Data Repository.

Sri S K De, Director (GP), AMSE wing, Bangalore delivered a lecture on Airborne Geophysical Survey and informed that all the data collected by Airborne Geophysical survey are well structured and are available in digital format. He mentioned that the RSAS would prepare metadata / database block-wise. Data repository will either be in map format or in database format. Raw data, gridded data and image data should be uploaded. More stress on quality control should be given. Figure of Merit and calibration of instruments should be checked every day before and after the survey. Only gridded and small scale data should be provided to the public via the Repository. Sri A K Das gave an overview of the various Geophysical parameters recorded. Sri M V Rao advised Mr. S K De, Director, RSAS to finalise data formats & meta-data pertaining to airborne geophysical surveys and send them to CGD. In reply, Sri S K De informed that he would send it by email.

(Action: Sri S K De, Director (GP), AMSE Wing)

Dr. B P Pal, Director (GP), Marine Wing explained on the functioning of Marine Geophysical Surveys and status of different instruments on board on the GSI vessels in territorial waters and deep sea. He briefed about the data formats being followed for data storage in the Marine Wing. Sri M V Rao enquired about the Data recording system and availability of old records. The Chairman sought clarification regarding the data that should go into data repository and advised to work out the plan in details.

(Action: Dr. B P Pal, Director (GP) MW, Kolkata)

Many participants has expressed that they are holding lot of obsolete and unserviceable geophysical instruments and accessories which are occupying lot of storage space and wanted to know the procedure to write off these instruments. Sri M V Rao, Dy. DG, informed that such action was taken successfully in SR sometime back and told the meeting that Sri N Kutumba Rao, who is presently working as Director, has was holding the charge of MM Div., SR and helped in writing off of un-serviced instruments. Chairman then requested Sri N. Kutamba Rao, Director, ID to brief the participants on this issue. Sri N Kutumba Rao briefed the methodology to be followed, which includes preparing report on justification for write off, its purchase details etc. The report should be submitted to the COS for further action at his end Sri Rao gave a hard copy of the relevant forms to the delegates.

(Action: Directors (GP), CGD / CGID / Regions)

An in-depth discussion was made on uniform format of Geophysical Reports in all the regions. Smt. Y S Tulasi, Director (GP) presented a typical format of Geophysical report containing to be followed by all Geophysicists. She suggested that the Geophysical reports should follow uniform pattern and contain all the information required for better understanding of the objective and results of the Geophysical investigations. On a query by Dr. A K Mukherjee, regarding the format, a copy of the typical report format was circulated to all the participants. The Chairman advised all the members present to study the report and discuss with their colleagues and offer suggestions, if any, to CGD. CGD will circulate the finalised format to all regions for adopting the standard format.

(Action: Director (GP), Regions & Dy. DG, CGD).

Sri K V Rao, Director (GP), CR, delivered a talk on ground magnetic survey and Palaeomagnetic studies in the Lab. Sri S K De pointed out about data formatting, and suggested to include physical properties of rocks in the data repository. Sri Rao listed the parameters to be recorded and said that details will be worked out and revised formats will be sent to CGD. He also presented the details of ground magnetic survey. As a reply to a query from Sri H P Mishra, Sri R C Pathak supplemented information by highlighting the detail data structure in ground magnetic surveys. The Chairman advised to keep these points in mind while preparing the final format to be adopted for data repository.

(Action: Sri K V Rao, Director (GP), CR & Sri R C Pathak, Director (GP), CR).

A lecture on ground electrical survey with different arrays and techniques was presented by Sri H P Mishra, Director (GP) with case studies and data formats. Many participants actively interacted and made suggestions regarding data structure and information to be archived.

Dr. Alok Mukherjee, Director (GP), ER, Kolkata delivered a talk on planning of gravity survey with different scales for regional and detailed surveys. He also discussed about the planning & execution of gravity surveys, station-spacing, adopting IGSN-71, and discussed on the use of gravity formula 1980. He suggested 5-10% data should be repeated and drift of instruments should also be checked properly for better quality of data. Sri Baldau Singh raised a query regarding the target specified in GPM projects. Various aspects pertaining to GPM project were discussed in detail. Sri K V Rao & Sri R S Pathak and others participated in the discussion on

presented the highlights of GPM programme. Sri M V Rao clarified certain queries on Gravity and Magnetic Mapping. He suggested Dr. Alok Mukherjee to work out the format in detail. In reply Dr. Alok Mukherjee informed that he would send the revised format by email.

(Action: Dr Alok Mukherjee, Director (GP), ER, Kolkata)

Dr. Balaram Chattopadhyay, Dy. DG (PPM) was invited by the chairman to address the gathering regarding geophysical data repository. Dr. B Chattopadhyay explained about the proposed setting up of National Geophysical Data Repository and told that all data should be available to public. He advised that except gravity data rest could be made available to public in the GSI Repository. He further suggested that different scales should be followed for making the data available to the public via Repository. Data collected by private parties will be made open after two-year lock-in period. He further mentioned that data of sister concerns would also be available to the GSI Repository for dissemination to public, and specific formats should be followed for the data repository. The heads of different concerned departments should be contacted, and we may also request the intervention of the Ministry, if necessary. He replied to the queries raised by the participants on GPM project.

Sri R S Rai, Director (GP), WR, Jaipur delivered a lecture on SP, IP, EM and Mise-a-la-Messe techniques in exploration. He illustrated data formats for the different methods. Sri H P Mishra wanted to know the details of data structure / format for electrical methods and the parameters which will go in the repository. In reply Sri Rai showed the relevant formats and explained them in details.

Sri N. K. Dutta, Director General, Geological Survey of India was invited by the Chairman to address the participants. DG delivered an encouraging and supportive lecture and advised that the Data Repository is a priority project and he expects a total commitment from each and every member to this project.

Sri A K Lahiri, Geophysicist (Sr.), CGD and Dr. D C Naskar, Geophysicist (Jr.), ER jointly delivered a lecture on MT, discussing the data acquisition (employing electrical and magnetic sensors), processing and 1D modelling for interpretation of MT data. They discussed about the in-built formats for data storage with the Metronix equipment. Sri H P Mishra sought clarification regarding the results of a field survey. Sri Lahiri has clarified by showing relevant figures from the survey. The Chairman, however, advised to work in detail on the data structure and come up with further details.

(Action: Sri A K Lahiri, Geophysicist (Sr.), CGD, Kolkata)

Sri D K Saha, Director (GP), CGD introduced the work carried out by the newly formed Geo-Seismology Division (GSD). Sri G K Chakraborty, Geophysicist (Jr.) deliberated in detail about the acquisition of seismological data using broadband as well as short period sensors of different makes and the data storage, conversion, merging, phase picking etc. He also discussed about attenuation of aftershocks, velocity modelling and tomography. The format for data repository and inputs for portal display of seismic events were illustrated. The Chairman gave some suggestions on the microzonation surveys and its data storage.

(Action: Sri D K Saha, Director, CGD).

Sri H P Mishra, Director (GP), discussed about the field procedures and data analysis of reflection and refraction seismic surveys. Smt. Y S Tulasi, Director (GP), SR interacted and made suggestions regarding data format. She advised that the data format should also include the instruments used, source of energy, type of Geophones and their natural frequency and spread / layout of geophones etc. Presentation of data / maps should include T-D graphs, time-section, depth-section, 3D views etc. Dr. A K Mukherjee gave some suggestion to be incorporated. The Chairman asked Sri H P Mishra to review the formats and submit the revised formats after incorporating the suggestions from members.

(Action: Sri H P Mishra, Director (GP), NR).

Sri Kalyan Mukherjee, Director (GP), CGD initiated discussion on kind of work carried out by Geophysical loggers, Sri B Das, Geophysicist (Sr.), Coal Wing, made a detailed presentation on the Robertson Logger and Micro Logger (a new version of Robertson logger), borehole Geophysical data recording by radioactive, electrical, thermal, acoustic logging techniques. He mentioned that digital Geo-logging system takes care of data format. He discussed about the Log ASCII Standard (LAS) format has to be adopted for data storage. Sri H P Mishra made a query on data quality, and Sri Das clarified that different speeds for different logging operations are maintained for quality control of the logs, and also mentioned about software techniques with combined logs for better interpretation. Sri M V Rao advised Sri Das to send the specific data formats for perusal.

(Action: Sri Kalyan Mukherjee, Director (GP)).

Dr. Baldau Singh, Director (GP), NER discussed elaborately on the use of computer software for data processing, designing and interpretation and preparation

of Geophysical reports. He suggested corrected/ reduced data should go to the database. He also mentioned that the database contains two parts, one is data and other is map; excel worksheet should be followed for systematic database compilation which can be imported into any software. Oasis Montaj database is well suited for Ground Geophysical, Airborne Geophysical and Marine Geophysical surveys. Sri R C Pathak wanted to know the advantages of Geosoft over the other Geophysical data processing softwares. Dr. Singh spoke on the versatility and compatibility of Geosoft. Sri M V Rao advised him to send his suggestions on data repository.

During the discussions, the members felt that the software implementation should keep provision for incorporating new modules and to add new types of data. This is essential in view of the development of new types of methods, instruments, models and data registration and recording technique.

Sri S Nageswaran, Director, Geodata division, CHQ and Sri Aditya Bhattacharya Geologist (Sr.) were invited by Sri M V Rao, Dy. DG (GP) to discuss with the participants regarding problems faced by them in uploading of Geophysical data under Project: Geoinformatics. They have promised to look into the problems cited by the members & do the needful so that Geophysical data can be uploaded by all regions into the main Geo-scientific database.

The training schedule and course structure for new entrants in Geophysics stream & up gradation of Geosoft software and addition of essential modules in some licences were also discussed.

The Chairman concluded the meeting and it was decided unanimously that all the Directors of the regions, RSAS and Marine wing would provide the necessary formats by 28.10.2009.

At the conclusion of the meeting, select group of Directors were assigned specific topics for finalising the standard data acquisition and storing formats, data processing and interpretation procedures, map preparation and presentation processes and reporting formats, keeping in view the ideas expressed by other participants and discussions during the meeting.

The meeting ended with vote of thanks by Sri D K Saha, Director (GP), GSD, CGD, GSI, Kolkata.