October 2014
Volume 10, No. 2

INDIAN SOCIETY OF ENGINEERING GEOLOGY

(IAEG India National Group)

A Biannual Newsletter

ISEG NEWS

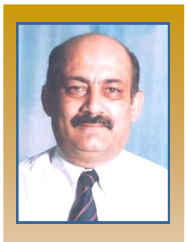
Bridging Communication Gap.....Dissipating Information

www.isegindia.org
www.joegindia.com

NHPC Ltd
Pioneers in Hydropower Development

Geological Survey of India
(Ministry of Mines, Govt. of India)

Mineral Exploration Corporation Limited
(A Mini Ratna Company of Govt. of India)



EDITORIAL

Dear Colleagues;

I am delighted to present Newsletter of October 2014 with interesting articles on Concrete Face Rockfill Dams, Landslide Susceptibility Mapping and other regular features. Please take a note that the layout and framework for EGNM 2015 have been formulated and further preparations are in progress. ISEG is fully geared up to make this really a golden international event. We have the wonderful opportunity to host Executive Committee and Council Meetings of IAEG at New Delhi prior to the international conference in October 2015. Special thanks and felicitations are due to our President and Secretary for their deft canvassing and encouragement. Efforts by Shri Yogendra Deva who attended the IAEG XII Congress at Torino are praiseworthy. The detailed report in this regard may be seen inside.

Now let us review some of the current issues and the foremost which strikes our mind is the state of affairs in some quarters of construction industry. If we have a look at the infrastructure projects in the country it is seen that while tremendous progress has been made in construction of high-rise structures, highways, bridges, flyovers and metro both surface and underground; it is still the prim-

.....Continued on Page 3

MESSAGE FROM SECRETARY

Dear Members,

Indian Society of Engineering Geology, established on 15th October, 1965, completed 49 years of service and next year by this time, on completion of 50 years of service, would celebrate its Golden Jubilee. To commemorate the event, we propose to organize an 'International Conference on Engineering Geology in New Millennium' (EGNM) at New Delhi on 27-29 October, 2015. Efforts are on as all Members of the Society wish to celebrate it as a truly global event. We can put any effort to celebrate the event in grandeur but our main aim is to bring out quality publications on basic, fundamental and applied aspects of science and art of Engineering Geology.

The ISEG, the Indian National Group of International Association of Engineering Geology and Environment, has rich heritage of having pioneers and doyens of Civil Engineering and Engineering Geology as its Members, standard publications, Journal of Engineering Geology, the only journal of the country dedicated to the science of Engineering Geology. ISEG News, biannual Newsletter, was launched in March, 2004, showcasing all developments of the ISEG, besides technical articles. The ISEG aims to promote the study of Engineering Geology, Geotechniques and Geohazards. All these years, the Society has effectively served as a formidable bridge between the Geologists and Engineers, provided a vibrant platform for discussion and debate on a host of geotechnical issues including state of

.....Continued on Page 3

EGNM 2015
www.egnmindia2015.org

Abstracts Closing Date: December 31, 2014

Engineering Geological, geotechnical, engineering, academic, scientific, research, environmental and related fraternity is invited to contribute technical papers at the earliest!

BIANNUAL HIGHLIGHTS

May 2014 to October 2014

1. ISEG conducted its *3rd Executive Council meeting* on May 24th, 2014 at MECL, Scope Complex, New Delhi under the Chairmanship of *Dr. Gopal Dhawan, President ISEG*. The meeting was focused on the important issues w.r.t. organization of Golden Jubilee Conference EGNM at New Delhi during October 2015.
2. A two day *"National Seminar on Engineering Geology, Geotechnique and Geohazards – A quest for excellence"* has been successfully organized by ISEG in association with Geological Survey of India on 10-11 July 2014 at Kolkata. Geoscienctific fraternity participated in the Seminar.
3. *Second General body meeting* along with a brain storming session for discussing various preparatory activities for Golden Jubilee Conference was held on 10th July at Kolkata. A core team of ISEG members for organising the *EGNM-2015* has been formed. The first meeting of core group was held during 20-21 July, 2014 at Nagpur to discuss various arrangements to be made for organising EGNM.
4. Shri Yogendra Deva (Past Secretary) attended *IAEG XII International Congress and annual IAEG Council and Executive meetings* held during September 2014 at Torino, Italy. Shri Deva on behalf of ISEG presented its bid for holding IAEG Council and Executive meetings during Golden Jubilee Conference 2015 in India. He made presentation and placed fliers and a A0 size poster of EGNM-2015 at the IAEG Conference Venue in Torino, Italy. The efforts helped in bagging the sponsorship and IAEG Council and Executive Meetings at New Delhi just prior to EGNM-2015.
5. *Shri Yogendra Deva,* who was ISEG nominee has been elected as *Vice President (Asia), IAEG* for next four years term. Shri Y. Deva has been elected against stiff competition from Japanese candidate for the above post. This is for the first time that any IAEG post has gone to India NG.
6. *Fourth Executive Council meeting of ISEG* was conducted on September 30th, 2014 at GSI Office, Pushpa Bhawan, New Delhi under the Chairmanship of *Dr. Gopal Dhawan, President, ISEG*. Various important issues pertaining to organization of EGNM-2015 viz., finalization of venue, organising committees, road map for EGNM, publications, sponsors, opening of new bank account for EGNM and release of 2nd circular etc. were discussed.
7. *Second Circular of Golden Jubilee Conference EGNM-2015* released by President, ISEG during October 2014.

ACHIEVEMENTS

Indian Society of Engineering Geology Congratulates **Shri P. K. Gupta**, General Manager (Geotech), NHPC Ltd and Life Member of ISEG for being selected for **Exemplary Commitment Award** by NHPC Ltd.

Shri P.K. Gupta

Indian Society of Rock Mechanics and Tunneling Technology (ISRMTT) has given the **Best Paper Award** for the year 2013 to the paper titled ***"Tunnelling in Adverse Geological Conditions: Key Issues"*** authored by S/Shri Imran Sayeed and Rahul Khanna of NHPC published in INDOROCK–2013 under the category "Case history of Tunneling and Foundation on Rocks".
Congrats from ISEG!

ISEG National Seminar, Kolkata, July 2014: Picture Gallery

Thinking should become your capital asset, whatever ups and downs you may come across in your life.

:- A.P.J. Abdul Kalam

EDITORIAL

(Continued From Page 1)

primitive technology in vogue in some of the river valley projects. What we saw nearly twenty five years back in projects like Chamera I and Uri I appears to be a thing of the past. Tunneling and underground works need drastic improvement so that we can gift the technological knowhow to younger generations not only in soft copy but through practical demonstration. There is a need to be cautious about statements such as in this particular rock hole collapses, rock bolts cannot be installed or shotcrete doesn't adhere in phyllite. In a country which launches satellites regularly in space and has a successful Mars mission how archaic technology has remained in some projects is a question to ponder and make necessary improvements and corrections. This also should be one of the objectives of ISEG because invariably geology comes under scrutiny and fire in cases of delays and failures.

In my first editorial in newsletter dated April 2013, importance of communication and how conflicts can be over come through proper communication was mentioned. Shri Kumara Mangalam Birla, has also pointed out in context of effective corporate governance that "I do not believe that you can ever over communicate". Newsletter is one of the important means of communication of the society through which we communicate not only with our members but also with all professionals, scientists and academicians related with our field.

Finally I would make a appeal to all geological, geotechnical and civil engineering fraternity to contribute technical papers for EGNM 2015 and visit our websites www.isegindia.org, www.joegindia.com and www.egnmindia2015.org. We have given an exhaustive list of themes for inviting abstracts of 250 words. We solicit maximum participation for this memorable Golden Jubilee Event which has the sponsorship of International Association of Engineering Geology. Please feel free to email us at *iseg2015@gmail.com* in case any clarifications are required.

Last but not the least kindly remember that your feedback is most valuable. We are always eager to hear your views.

With regards and thanks

Imran Sayeed
Editor

Our scientific power has outrun our spiritual power. We have guided missiles and misguided men.

Martin Luther King, Jr.

MESSAGE FROM SECRETARY

(Continued From Page 1)

the art technologies involved and it has projected the nation's achievements in the field of Geotechniques in international arena. The Society, keeping pace with trends of the times, launched its website *www.isegindia.org*. Further, the ISEG has a facility of exclusive website *www.joegindia.com* for its Journal and authors can directly submit their technical papers to this website.

ISEG has distinction of organising 4th International Conference of IAEG at New Delhi in the year 1982. After that, ISEG is going to organize the next international event in the country, EGNM in October, 2015. ISEG participated in the IAEG Symposium at Beijing, China on 24-25 September, 2013. An A0 poster of the ensuing International Conference on EGNM was placed in the IAEG Symposium at Beijing, China by courtesy of Dr Y.P. Sharda and Shri Yogendra Deva. In the similar lines, another A0 size poster on EGNM was placed at IAEG Conference at Torino, Italy on September, 2014. Shri Yogendra Deva helped to present our case and convinced the International authorities of IAEG to sponsor the ensuing EGNM and to organize the International IAEG Executive Council Meeting at New Delhi, just prior to the EGNM. All these activities actually helped to expect good number of international gathering during the EGNM.

The present Executive Council of ISEG conducted (i) in association with the GSI, a National Workshop on 'Contemporary practices in Engineering Geology and Geohazards' at Hyderabad on 14 June, 2013; (ii) in association with the CBIP a National Workshop on 'Natural Disaster with special reference to Uttarakhand' on 20th December, 2013; (iii) in association with the GSI, a National Seminar on Engineering Geology, Geotechniques and Geohazards – A quest for excellence, at Kolkata on 10th July, 2014. All these National Workshops/Seminars helped to provided a vibrant platform for discussion and debate on a host of geotechnical issues.

ISEG with the help of NTPC Ltd., successfully conducted 2nd Geotechnical Orientation Programme (GOP-2013) at the NTPC Ltd., at New Delhi on 11-12 November, 2013. Subsequently, the 3rd Geotechnical Orientation Programme (GOP-2014) is scheduled during on 10-12 November, 2014 at Dehradun, Uttarakhand. The GOP is capacity building programme of ISEG, aiming to impart basic knowledge of common geotechnical aspects to young professionals engaged in engineering geological/ geotechnical and civil engineering disciplines.

Ever since the present Executive Council of the Society took over its charge on 1st January, 2013, four Executive Council meetings of the Society were conducted, the 1st meeting on 1st February, 2013 at New Delhi; the 2nd meeting on 20th July, 2013 at New Delhi; the 3rd meeting on 24th May, 2014 at New Delhi; and the 4th meeting on 30th September, 2014 at New Delhi. Two General Body Meetings were conducted, the 1st meeting at Hyderabad on 14th June, 2013; and the 2nd meeting at Kolkata on 10th July, 2014. One Annual General Body Meeting was also conducted on 20th December, 2013 at New Delhi. A meeting of Core Group of the ISEG was also held on 20-21 July, 2014 at Nagpur to discuss on various arrangements to be made in organising EGNM. In this regard, one Brainstorming Session was also organized at Kolkata on 10th July, 2014. All these meetings helped to exchange of ideas to discharge of duties in a more transparent and democratic manner.

ISEG has another good news in its kit. Shri Yogendra Deva, Past Secretary of ISEG and ISEG sponsored candidate, has been elected as Vice President, Asia of IAEG. With strong presentation, persuasion skills, international exposure, Shri Deva has been elected against stiff competition from Japan. ISEG congratulates Shri Deva on his election and on assuming International responsibilities. This development is a positive sign in favour of our ensuing EGNM. ISEG is scouting for sponsors, co-sponsors, advertisers to support the ensuing mega event, EGNM. Please join us and support the noble cause.

Yours sincerely,

(M. RAJU)
Secretary

50 Glorious Years

IAEG India National Group

ISEG (1965-2015)

Indian Society of Engineering Geology

Announces

International Golden Jubilee Conference on

Engineering Geology in New Millennium

(EGNM-2015)

Organized By

Indian Society of Engineering Geology
(IAEG India NG)

Sponsored By

International Association of Engineering Geology and the Environment (IAEG)

Geological Survey of India
(Ministry of Mines, Government of India)

In Association with

Mineral Exploration Corporation Ltd. (MECL)
(A Mini Ratna Government of India Company)

PROGRAM

IAEG Executive Committee Meeting	October 25, 2015
IAEG Council Meeting	October 26, 2015
International Conference	October 27 to 29, 2015
Technical Excursions	October 30, 31 & November 1, 2015
Sight Seeing Tours	October 30 - November 3, 2015

VENUE

New Delhi, India

4th IAEG Congress in 1982 was also held at New Delhi

ABSTRACT SUBMISSION

ABSTRACT SUBMISSION OPEN FROM 16 AUG.2014

Abstracts are invited conforming to themes given overleaf in 250 words. They can be submitted at www.egnmindia2015.org or mail to iseg2015gmail.com

IMPORTANT DATES

- **Abstracts Submission Deadline : Dec. 31, 2014**
- **Full Paper Submission Deadline : May 31, 2015**
- **Revised Full Paper Deadline (as required) : July 31, 2015**

CONFERENCE THEMES

1. Ambit of engineering geology, international viewpoints, Indian references, historical developments, roles and functions of engineering geologists.
2. Engineering geological education, undergraduate and graduate level study, pure and applied geology, geology in civil engineering, geology in geotechnical engineering, cross disciplinary and collaborative research, new approach in engineering geological education.
3. Recent developments in explorations, new techniques in investigations, exploratory drilling tools, geophysical surveys, geological & geophysical logging, accelerated investigation programs.
4. Application of rock mechanics tests in investigation & pre-construction stages of river valley projects, importance of lab and insitu testing, International Standards and methods, Indian Standards, ASTM and British standards: similarities and differences.
5. How to use test results? Recent techniques of derivation of engineering properties from rock mass classifications.
6. Engineering geological monitoring in construction stage projects, tackling geological problems, role of best construction practices, recent advances in open air and underground excavations and support techniques, slope stability.
7. Soil Mechanics: Slope stability, rock fill & earthen dams and embankments.
8. Investigation and construction methodology for long tunnels, use of TBM's, success stories and pitfalls.
9. Geological input in contract documents, understanding obligations of owners and contractors, risk assessment and sharing, use of specialized agencies, do's and don'ts for engineering geologists while handling contracts.
10. Exploration & testing for construction materials, quarrying, environmental aspects, disposal of tunnel waste, reclamation.
11. Blasting techniques, importance in deep open excavations, blast design for safe and speedy tunneling, methodology for excavation and support of large caverns. Effects of blasting on engineering properties.
12. Application of rock mass classification in engineering projects.
13. Geotechnical studies, engineering & design for large underground caverns related to power stations, desilting chamber and other applications.
14. Engineering geology, geohydrology and rock mechanics for underground oil storage caverns.
15. Rock support elements: Theory & practice, recent advancements both in soil & rock stabilization.
16. Case histories for CFRD and RCC dams.
17. Application of geotechnical engineering and rock mechanics in mining, role of engineering geology, case studies, mining methodology and environmental issues of open cast and underground mining.
18. Geo-environmental studies for large civil engineering projects, sustainable development, environmental aspects of river valley schemes, EIA & EMP studies for river valley schemes.
19. River basin management, hydrological studies in mountains and plains, GLOF studies, reservoir sedimentation and catchment area treatment.
20. Geo-hydrological studies in hilly terrain, ground water modelling for underground projects, use of new techniques, assessment of water ingress.
21. Ground water contamination, cities and country side expansion and water balance studies.
22. Landslide studies and mitigation, hazard zonation, exploration technique, monitoring, engineering solutions, long term measures.
23. Urban engineering geology: Geotechnical evaluation of cities, metro tunnels, underground space technology, waste water treatment plants. Engineering geology and rock mechanics in underground storage caverns.
24. Seismo-tectonic studies and earthquake engineering

* *Please note that depending upon response, the themes may be deleted or combined in final technical program.*

ISEG websites: www.isegindia.org & www.joegindia.com EGNM website: egnmindia2015.org

REGISTRATION

Registration fee for all the delegates including the authors of the technical papers attending the International conference is as follows:

Category	Early Bird*	Standard	Spot
General	US$ 500	US$ 550	US$ 600
IAEG Members	US$ 450	US$ 500	US$ 550
Students/ Accompanying Members	US$ 200	US$ 250	US$ 300
SAARC Delegates**	INR 10,000		INR 15,000

* *Early Bird: Up to 30 June 2015*
** *ISEG Life Members: 30% Off; IAEG Members/Govt. Delegates: 40% Off; Students/ Accompanying Members: 60% Off. Please note only one concession is applicable and available for Indian Members only. Note: 12.36% Service Tax Extra.*

POST CONFERENCE EXCURSIONS AND TOURS

Technical Excursions to largest Indian hydroelectric projects viz., **Nathpa Jhakri & Tehri.**

Amazing India Sightseeing tours to important tourist destinations in New Delhi like Qutab Minar, Red Fort, Jama Masjid, Taj Mahal at Agra & Fatehpur Sikri, Jaipur, Ajanta - Ellora Caves, Khajuraho, Varanasi , Kerala backwaters, fascinating Rajasthan etc. Customized programs to suit duration and cost also.

Incredible Shopping Experience tour to the markets of Delhi like Dilli Haat, Chandni Chowk, Rajeev Chowk, Central Market, etc.

Exciting Spouse Programs like Mehndi (henna), bangles, Saree tying, etc.

CONTACTS

FOR ALL CORRESPONDENCE

M. Raju, Secretary,
Indian Society of Engineering Geology
C/o Dy. Director General, Mission– IV,
Geological Survey of India, CHQ,
15 A&B, Kyd Street, 3rd Floor, Kolkata,
West Bengal-700 016, India.
E-mail: india.seg@gmail.com;
geolraju@gmail.com
Mobile: +91-9432672087

FOR ABSTRACTS/ PAPERS

Imran Sayeed, Editor,
Indian Society of Engineering Geology
O/o Project Investigation Division,
NHPC Ltd., Sector-33, Faridabad,
Haryana-121003, India
Email: iseg2015@gmail.com

NEED TO LAUNCH THE NATIONAL LANDSLIDE SUSCEPTIBILITY MAPPING (NSLM) PROGRAMME IN INDIA – A ROADMAP TO CREATE A NATIONAL DATABASE ON LANDSLIDE

Saibal Ghosh
M. Raju
Pankaj Jaiswal
Geological Survey of India

1.0 SCENARIO OF LANDSLIDE HAZARD IN INDIA

In Indian hilly region, land sliding is a frequent natural hazard that perennially results into colossal damage to the properties and lives. The entire Himalayan terrain, including the sub-Himalayan terrain in the north-east, Western Ghats and Konkan hills in the south and south-west are susceptible to landslides which amount to about 0.42 Million km^2 (excluding the permafrost region). In India, most of the landslides are triggered by monsoon rainfall, however, Himalayas being a highly earthquake-prone, co-seismic landslides are also not rare (Champati Ray et al., 2009; Ghosh et al., 2012a). Apart from rainfall and earthquake, the toe erosion by stream and unscientific anthropogenic interferences such as excessive cutting of slope for construction of roads and buildings also trigger landslides.

2.0 LANDSLIDE SUSCEPTIBILITY MAPPING AND ITS UTILITY

Landslide susceptibility mapping (LSM), i.e., identification of zones of different degree of proneness to land sliding or susceptibility, on basic regional/ macro scale (1:50,000) is essential for landslide risk free land use planning. These macro scale landslide susceptibility maps are excellent geo-information tools to the planners/ administrators for framing land-use zoning regulations which in turn facilitates preparation of better and safe disaster-resilient infrastructures, and, increases the sense of true preparedness in tackling such impending danger. Moreover, such maps are the most fundamental inputs for the estimation of landslide hazard and risk which helps the planners/administrators/ insurers in allocating relevantly the resources while tackling such hazards (van Westen et al., 2006; Fell et al., 2008; Ghosh et al., 2012b).

3.0 LACK OF NATIONAL LANDSLIDE DATABASE IN INDIA

However, unfortunately, compared to the 0.42 Million Km^2 landslide-prone areas, the target of LSM achieved so far (~60,000 km^2) is meager. Moreover, these maps are mostly in analogue form; thus making them difficult to retrieve and periodic updating. These constraints warrant the need of launching a national project for LSM for the entire 0.42 Million Km^2 hill areas of India.

4.0 GSI 'S ROLE AS A NODAL AGENCY

Observing the huge gaps in the basic landslide inventory and susceptibility database, the Geological Survey of India (GSI), being the nodal agency of landslide studies of the country, under the approval of the Ministry of Mines, Government of India, has launched a nation-wide programme on LSM – **National Landslide Susceptibility Mapping (NLSM)** with effect from the current field season (FS) that is 2014-15 and has planned to accomplish the entire task (about 0.42 million km^2 spreading over parts of 1112 nos. of Survey of India Toposheets) in six years (by the end of 2020). During FS 2014-15, GSI has taken up 19 NLSM Programmes in different parts of India, out of which, 12 programmes are prioritised in Uttarakhand targeting the most vulnerable and populated areas of the state (about 16,000 km^2 spreading over 27 Survey of India Toposheets). These areas have witnessed a ravaging landslide disaster during June 2013. During FS 2015-16, GSI has a plan to take up about 44 NLSM programmes throughout the country for which necessary resource allocation, framing up of the programme proposal are in progress. To successfully accomplish this national programme, GSI is also implementing continuous programmes of capacity building and training of its geoscientists at GSI Training Institutes and Geohazards Research & Management (GHRM) Cell, Kolkata by its internationally-trained in-house experts. GSI has also simultaneously sought the cooperation from National Remote Sensing Centre (NRSC) in accomplishing parts of the NLSM target in high-altitude and inaccessible areas in the Himalayas.

5.0 METHODOLOGY TO BE FOLLOWED IN NSLM:

LSM is a scale-dependent exercise for which several methods are available varying from knowledge to data driven techniques. However, all such methods of LSM primarily aim to identify where future landslides are likely to occur based on the fundamental assumption that the geofactors that caused present and past landslides are likely to cause similar landslides in the future (Varnes, 1978; Carrara et al., 1995; Guzzetti et al., 1999). Thus, all methods, in vogue, use either indirect or direct spatial relations between landslides and relevant spatial factors to predict future landslide source areas. Therefore, the fundamental requirement is a good-quality input geofactor and landslide inventory maps, which in NLSM is being prepared utilizing adequate inputs both from high -resolution satellite imagery and field data.

With the advent of the Geographic Information System (GIS) since the late eighties, the application and development of various data-driven empirical methods for landslide susceptibility mapping became popular (Aleotti and Chowdhury, 1999). These data-driven methods are mostly statistical or mathematical (both bivariate and multivariate) and are primarily based on the observed data of landslides and relevant spatial relation with geofactors. In NLSM Programmes, similar approach is being followed in 2-stages (Ghosh et al., 2011) – i) first by selecting and weighting the relevant terrain-specific geofactors by quantifying the bivariate spatial interrelationships between geofactors and landslides, and ii) finally by generating the landslide susceptibility models by integrating the selected and weighted geofactor maps using weighted multi-class index method. However, any method of predicting landslide susceptibility needs validation which sometimes may be difficult in areas having no land sliding history. But in general for all NLSM programmes, quantitative validation through preparation of success and prediction rate curves, following the internationally-accepted methods proposed by Chung and Fabbri (Chung and Fabbri, 1999), are strongly recommended, which would also facilitate classification of raw landslide susceptibility score maps into qualitative ("High", "Moderate", "Low") landslide susceptibility maps, easily understandable by all stakeholders.

Contd... on Page-06

Contd... From Page-05

6.0 RESULTS AND OUTCOMES

The NLSM Programme is aimed to produce in a GIS, the seamless 1:50,000 scale landslide susceptibility maps of the entire landslide-prone areas of India along with spatial database of historic landslides of the country which is presently lacking in India. All these resultant maps will be uploaded/ disseminated through GSI -portal for use of public. This will form the **national landslide hazard database of India** for future study as a fundamental and base data in the event pertaining to of landslide hazard.

REFERENCES

1. Aleotti, P. and Chowdhury, R., 1999. Landslide hazard assessment: summary review and new perspectives. Bulletin of Engineering Geology and Environment, 58: 21-44.
2. Carrara, A., Cardinali, M., Guzzetti, F. and Reichenbach, P. (Editors), 1995. GIS technology in mapping landslide hazard. Geographical information systems in assessing natural hazards. Kluwer Academic Publishers, 135-175 pp.
3. Champati Ray, P.K., Parvaiz, I., Jayangondaperumal, R., Thakur, V.C., Dadhwal, V.K. and Bhat, F.A., 2009. Analysis of Seismicity Induced Landslides due to the October 8, 2005 Earthquake in Kashmir Himalaya. Current Science, 97 (3): 1742-1751.
4. Chung, C.-J.F. and Fabbri, A.G., 1999. Probabilistic prediction models for landslide hazard mapping. Photogrammetric Engineering and Remote Sensing, 65 (12): 1389-1399.
5. Fell, R., Corominas, J., Bonnard, C., Cascini, L., Leroi, E. and Savage, W.Z., 2008. Guidelines for landslide susceptibility, hazard and risk zoning for land use planning. Engineering Geology, 102 (3-4): 85-98.
6. Ghosh, S., Carranza, E.J.M., van Westen, C.J., Jetten, V.G. and Bhattacharya, D.N., 2011. Selecting and weighting spatial predictors for empirical modeling of landslide susceptibility in the Darjeeling Himalayas (India). Geomorphology, 131 (1–2): 35-56.
7. Ghosh, S., Chakraborty, I., Bhattacharya, D., Bora, A. and Kumar, A., 2012a. Generating field-based inventory of earthquake-induced landslides in the Himalayas -an aftermath of the 18 September 2011 Sikkim Earthquake. Indian Journal of Geosciences, 66 (1): 27-38.
8. Ghosh, S., van Westen, C., Carranza, E. and Jetten, V., 2012b. Integrating spatial, temporal, and magnitude probabilities for medium-scale landslide risk analysis in Darjeeling Himalayas, India. Landslides, 9 (3): 371-384.
9. Guzzetti, F., Carrara, A., Cardinali, M. and Reichenbach, P., 1999. Landslide hazard evaluation: a review of current techniques and their application in a multi-scale study, Central Italy. Geomorphology, 31 (1-4): 181-216.
10. van Westen, C.J., van Asch, T.W.J. and Soeters, R., 2006. Landslide hazard and risk zonation—why is it still so difficult? Bulletin of Engineering Geology and Environment, 65 (5): 167-184.
11. Varnes, D.J., 1978. Slope movements types and processes. In: R.L. Schuster and R.L. Krizek (Editors), Landslides: Analysis and Control. Special Report 176. Transportation Research Board, National Academy of Sciences, Washington, D.C., pp. 11-33.

DRILL STEM TEST (DST) - A POSSIBLE TOOL TO FORECAST THE WATER IN TUNNELS

Y. P. Sharda

(Ex-Director, GSI)

SNC Lavalin Engineering India Ltd, New Delhi

Many hydroelectric projects involving long head race or tail race tunnels, particularly in Himalaya, have suffered inordinate delays due to encountering large quantities of water suddenly. In certain cases like Dul Hasti HEP, Parbati HEP and Tapovan Vishnugad HEP the quantity of water encountered was very large that work had to be halted for months or years. This was due to the fact that it was not possible to estimate the quantity of water and pressure at which it was ingressing into working area in advance. It is a known fact that in order to fulfill ever increasing demand of energy in the country, especially during the peak hours, the hydro potential in Himalaya will have to be harnessed to maximum capacity sooner or later. Many projects coming up in Himalaya will be involving long tunnels with high super incumbent cover. Possibility of encountering large quantities of water suddenly will be very much there and we will either have to live with the situation and suffer long delays resulting in time or cost over runs or invest some money during investigation stage and save time and money during construction stage.

One test that can be used to estimated the quantity of water and pressure at which it would ingress into tunnel is **Drill Stem Test (DST).** This test is performed in oil industry to know about the producing potential of a formation. The objectives of this test include formation evaluation, estimation of reservoir pressure, pressure gradient, transmissibility and/ or permeability. The data obtained from these tests include quantity and quality of produced fluids during a measured time interval, flowing and closed in pressure and rate of pressure buildup with the formation closed in. In nutshell this test is performed in order to determine the parameters of reservoir quantity of fluids and pressure at which the are likely to flow.

The drill stem test may be divided into two classes i.e. open hole (before casing is set) and cased hole to test through perforations or to test a short section of open hole below the casing shoe. Further, tests may be divided into regular test (testing a zone below a packer) and straddle test (testing a zone isolated between two packers).

Drill Stem Testing or Formation testing has been very common in oil industry for a long time but made its entry into the field of Engineering Geology and Geo- techniques recently when these have been successfully used to delineate the water bearing horizons during investigations of a 56km long railway tunnel which is under construction between Switzerland and Austria in Europe. However, keeping in view the seriousness involved in the investigations and our attitude to keep the quantity of investigations to minimum and face the problem during construction stage, it may take a long time for such a technology to be employed in tunneling field.

CONCRETE FACE ROCKFILL DAMS (CFRD)- NEW CASE HISTORIES

S.C. Mittal
Managing Director,
DMR Hydro engineering & Infrastructure Pvt Ltd.,
Faridabad – 121003

1 WORLD WIDE TREND

Concrete Face Rockfill dams worldwide have become popular choice for those dam sites in which a rockfill dam solution is selected over concrete dam solution due to peculiar characteristics of site. In other words, CFRDs have almost become synonymous with rockfill dam solution and conventional earthen core type rockfill dams (ECRD) are no longer preferred solutions. CFRDs have been built in different parts of the world ranging from United States, Europe, Australia, Latin America and Asia. Maximum no. of CFRDs have however been built in Brazil and China.

2 FEATURES OF CFRD

2.1 TYPICAL CURRENT SECTION OF CFRD

Figure 1 shows the schematic section of the CFRD consisting of sound compacted rockfill founded on a sound rock foundation.
The zone designations 1, 2 and 3 have become standard internationally.
Zones 1A is a cohesion less silt or fine sand and is placed such that it acts as a joint or crack healer over the perimeter joint and the lower part of face slab.
Zone 1B provided support for Zone 1A and consists of random material.
Compaction of Zones 1A and the Zone 1B is by hauling and spreading equipment.
Zone 2A is a processed fine filter with specific gradation limits, minus 20 or minus 12. It is to limit the leakage in the event of water stop failure and to self heal with underwater placement of silt or silty fine sand.
Zone 2B, the face support zone has often been specified as crusher run 75 mm sound rock material.
Zone 2A, and 2B, their gradation, placement and protection during construction are discussed in detail subsequently.
Zone 3 is quarry run rockfill. The differences in A, B and C are principally in layer thickness and size and type of rock.
Zone 3A is to provide compatibility and limit void size adjacent to Zone 2B.
Zone 3B resists the water load and limits face deflection.
Zone 3C receives little water loading and settlement is essentially during construction.
Large rock is often placed at the downstream toe to resist scour and tail water wave action.

2.2 DESIGN FEATURES

Principle design features of a CFRD are:

(a) All the zoned rockfill is downstream from concrete face slab, the water barrier.
(b) A plinth with appropriate foundation treatment below connects the concrete face slab to the foundation.
(c) A parapet wall at the crest provides a wider surface for construction of the face slab and reduces volume of rockfill.
(d) Water load is transmitted into the foundation upstream from the dam axis.
(e) Since all the rockfill is dry, earthquake shaking cannot cause internal pore pressure.
(f) The condition of high shear strength, no pore pressure and small settlement under seismic loading make the zoned rockfill inherently resistant to seismic loading.
(g) The only credible mechanism of failure of a CFRD founded on rock is erosion by sustained overtopping flow. Hydrology, spillway and freeboard design is the response to this risk. Piping of foundation is a potential mode of failure as a result of increasing use of CFRDs on weathered rock and alluvial foundations.
(h) Post construction movements are small and cease after several years.

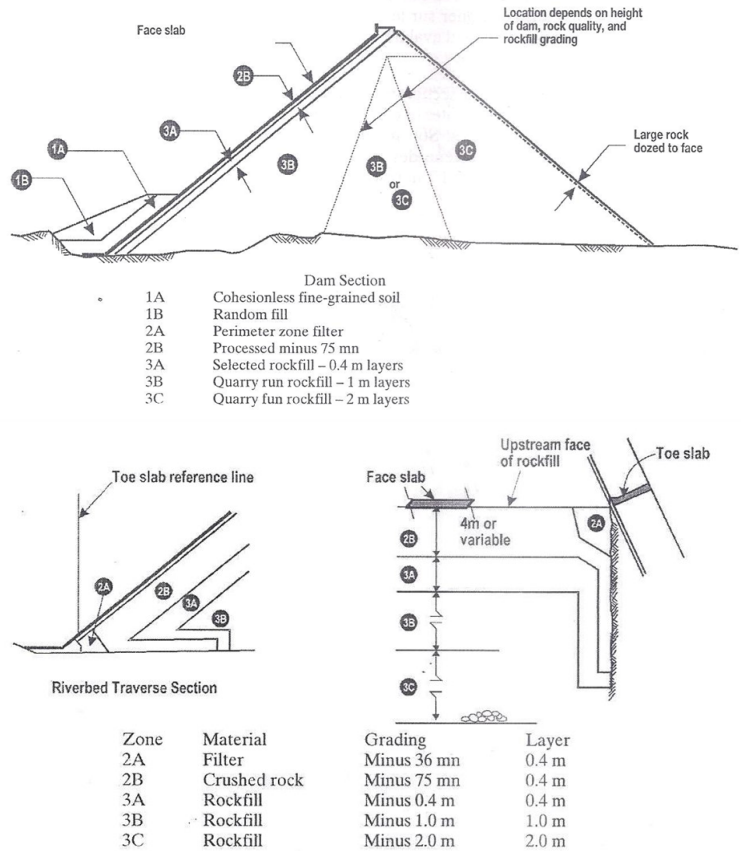


Figure 1– Zones for CFRD of sound rock on sound rock foundation (Adapted from Cooke, 1991,1997)

2.3 CONSTRUCTION AND SCHEDULE FEATURES

(a) Ramps are permitted within the body of the dam in any direction. This minimizes haul roads to the dam and facilitates traffic and placement on the dam.
(b) Where site conditions permit, rockfill may be placed on the abutments prior to river section. This allows required excavations directly into the dam.
(C) CFRDs allow greater flexibility for the management of the river during construction.
(d) The plinth construction and grouting are outside the dam body and do not interfere with the embankment placement or the construction schedule.
(e) Rockfill placement is relatively unrestricted and not affected by rainfall.
(f) The slip forming of the concrete face slab is a repetitive planned procedure that can be reliably scheduled.
(g) The use of the upstream extruded curb have reduced segregation of the transition 2B and eliminating requirement of upstream slope compaction.

Contd... on Page-08

Contd... from Page-07

Photo 1 Teesta-III CFRD in final phase of construction (2013)

Photo 2 Stung Tasal CFRD before reservoir filling (March 2014)

3 ADOPTION OF CFRD IN INDIA

First CFRD to be designed and constructed in India was 56 meters high Dhauliganga CFRD founded on bouldery alluvium. The Design of the dam was conceptualized by NHPC during 1997 – 1998. The dam construction was completed during the period 2001 to 2004. The reservoir filling was carried during 2005. Since then, CFRD has reported excellent performance. With the successful experience with Dhauliganga CFRD (56 m high), two more CFRDs with almost identical site conditions and similar design have been adopted in the country in 2005-2007. One of the them is 60 m high Teesta 3 CFRD on Teesta River in Sikkim. The project is on PPP model being developed by The SPV, Teesta Urja ltd. Other CFRD is 37 m high Kishanganga CFRD on Kishanganga River in J&K. The project is being developed by NHPC. Both the projects are founded with their plinth on riverbed alluvium and plastic concrete cutoff for foundation sealing. Both projects are presently under construction. Pakal Dul CFRD on Marusudan River in J &K is a proposed 160 m high CFRD on alluvial foundation with plastic concrete cutoff wall. The project is being developed by Chenab Valley Corporation, a JV company of NHPC, JKSPDC and PTC.

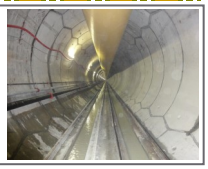
4 STUNG TASAL CFRD IN CAMBODIA

Stung Tasal Irrigation Dam Project was conceived by Royal Govt. of Cambodia on Stung Tasal river during 2010-11. The project involved construction of a 20 m high, 700 m long Rockfill dam to store a gross volume of water as 150 million m3. During the beginning of 2012, the earlier proposed clay core type Rockfill dam was found non feasible due to dispersive nature of the soil. To solve the problem, a concrete face Rockfill dam was proposed which eliminated the use of dispersive soil as clay core. The dam plinth was founded on rock. The construction was carried out from 2012 to 2013. Reservoir filling has recently been completed after completion of hydro-mechanical works.

5 CONCLUSION

Concrete face Rockfill Dams are popular dam types world wide which have replaced the earlier adopted earth core rockfill dams. Conventional CFRDs are founded on rock foundations, which is the major trend in CFRDs world wide. However in India CFRDs design and constructed till date are almost all follow an unconventional design with plinth on alluvium and upstream cutoff wall extended to rock. The Dams designed till now have been of low height and low reservoir volume; however the concept is now being extended to Dams of greater heights and large reservoir volumes. Greater conservatism and care in design should be opted in such projects to win the confidence of the society. Though most design details of CFRD are based upon precedent, peculiar site characteristics and need for conservatism and greater technical scrutiny and analysis coupled with greater need for construction control should not be lost sight of while planning and designing dams of greater heights, so that dam community can win the confidence of public at large. Projects being planned are all in regions of high to very high seismicity. This factor will demand more and more vigil.

Kishanganga Hydroelectric Power Project (330 MW) J&K: The 23.24 km long HRT was divided into 14.75 km stretch to be completed by TBM and 8.49 km by drill and blast technique. It is heartening that the 14.75 km long TBM tunnel has been completed on June 10, 2014 in 37 months! Drill and Blast portion was completed earlier in 48 months. Average TBM progress was more than 412m in a month and highest in a month was 812m.



The true wealth of a nation consists not in the stored up gold but in the intellectual and physical strength of its people.

Sir C.V. Raman

ISEG MEMBERSHIP

- Admission fee (one time)
  New Members : Rs. 1000/-
- Institutional/Associate Membership (Annual) : Rs. 2000/-
- Individual Membership

(i) Annual Membership : Rs. 500/-
(ii) Life Membership
For age < 35 years : Rs. 5000/-
For age 35-50 years : Rs. 4000/-
For age > 50 years : Rs. 3000/-

Membership forms available at www.isegindia.org

IAEG MEMBERSHIP

Annual Membership

Members with Bulletin : 29 Euros
(Receive Newsletter also)

Members without Bulletin : 4 Euros
(Receive Newsletter only)

Associate Members : 150 Euros
(Receive Bulletin + Newsletter)

*Note : The dues may be paid in INR by demand draft in favor of **"Indian Society of Engineering Geology"**, payable at **Lucknow.** Online transfers are also accepted.*

ISEG in National Committee on Dam Safety; 33rd Meeting

Indian Society of Engineering Geology (ISEG) is an expert member at The National Committee on Dam Safety (NCDS) and is represented by its President. Dr. Gopal Dhawan, President, ISEG had attended the 32nd meeting of NCDS held in New Delhi during 2013. The 33rd Meeting of NCDS was held at Central Water Commission, New Delhi on 23 Sept., 2014. Shri Imran Sayeed, Editor of the Society, who was nominated on behalf of ISEG attended the above meeting.

BIOGRAPHY

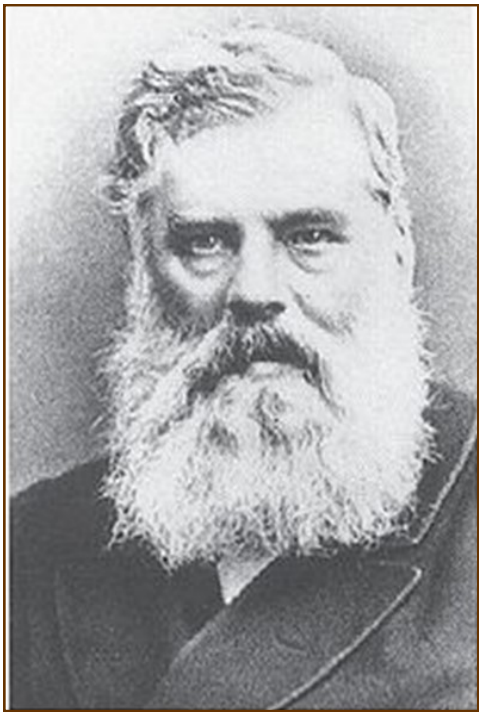
SIR THOMAS OLDHAM

Sir Thomas Oldham (1816-1878), a British Geologist, was born in Dublin on the 4th of May 1816. He was educated there at Trinity College, graduating B.A. in 1936, and afterwards studied Engineering in Edinburgh, where he gained a good knowledge of Geology and Mineralogy under Jameson. On his return to Ireland in 1839, he became Chief Assistant to Captain (afterwards Major General) Portlock, who conducted the Geological Department of the Ordanance Survey, and he rendered much help in field and office in preparation of a report on the Geology of London in 1843. Subsequently he served under captain (afterwards Sir) Henry James, the first local director of the Geological Survey of Ireland, whom he succeeded in 1846. Meanwhile in 1845, he was appointed as Professor of Geology in the University of Dublin. In 1848 he was elected F.R.S. In 1849 he discovered in the Cambrian rocks of Bray Head the problematical fossil named Oldhamia. In 1850, he was selected to take charge of the Geological Survey of India, which he organized, and in due course, established and developed the department.

Search for coal in India became essential to the East India Company for navigation within India and outside, which was the seed sown for the study of geological sciences in India. Initially it started with some sporadic investigations for coal but later the British Government realized the necessacity of systematic exploration, which was realized in formation of Geological Survey of India under the guidance of Sir Thomas Oldham on 4th March, 1851. Sir Thomas Oldham, Professor of Geology at Trinity College, Dublin and the Chief of the Irish Geological Survey landed at Kolkata on 4th March, 1851, who was appointed as the Geological Surveyor, marked the beginning of continuous period of the Geological Survey of India. Around 1852, Sir Thomas Oldham mooted the idea of broadening the scope of functioning of the Geological Survey of India, and consequently, the activities of GSI was expanded to cover a broader geological study and studies of earth sciences of the territories of the Undivided India. Oldham widened the perspective to a continuous and systematic examination of the entire country by submitting a memorandum to the Governor General in 1856. The British crown took over power from the East India Company in 1858 and GSI became a department of the British Indian Empire. He retired in 1876, and died at Rugby on the 17th of July 1878.

Sir Thomas Oldham was the first Geologist of the Survey who rendered geological advice to the Civil engineers on the railway alignment between Calcutta and Patna in 1859. Since then GSI played an active role in geotechnical studies related to all major river valley projects, communication projects and other infrastructure development projects in the country. GSI, subsequently developed a team of geoscientists specially trained in the study of geotechnical properties of rocks, seismotectonics, neotectonics and earthquake-impact studies.

Geological Survey of India commenced its journey in 1851 under the dynamic leadership of Dr. Thomas Oldham, merely with a single writer, a peon and a box of records. It is today the nation's premier and one of the oldest and largest geoscience organizations of the world. Dr. Oldham was appointed as Geological Surveyor to the East India Company for a five years term, and arrived at Calcutta on 4th March 1851 to take charge. While re-engaging Dr. Oldham for a second term on 5th March 1956, the Court of Directors, East India Company asked for a general uniform plan for the operation of Geological Survey of India. In reply, Dr. Oldham raised a series of points and recommendations to the Secretary, Govt. of India, Home Department. One of the point was "I would also most strongly urge that we have been working in this country under very great disadvantages in other ways. There is here no library for reference, no museum of specimens for comparison, no laboratory for analysis." Govt. of India, home department, as well as Lord Canning, the then Governor General took interest and strongly supported the points and recommendations made by



Thomas Oldham
(1816 - 1878)

Dr. Oldham. Lord Canning thus gave orders that the work was to be conducted almost from the beginning in the manner that Oldham had advocated. As a result the organization saw the establishment of its own office at 1, Hastings Street, Calcutta, a Museum of Geology as well a Library. The need of bibliographic control of every growing geoscience literature in that period was realized by the then authority and as a result Dr. Oldham with his successor published several documentary work like Catalogue of Thermal Spring, Catalogue of Earthquake (1883), Bibliography of Indian Geology (1888), etc. which are immensely valuable reference guides to the Geoscienctific community even today. Among them the "Catalogue of Thermal Springs of India" published as Memoirs 19 in 1883 is credited as the first documentation work in specialized field of knowledge in India.

Contd... on page-10

Discoveries and inventions arise from observations of little things.
-:Alexander G. Bell

RECENT PROGRAMMES OF PRESIDENT ISEG

President ISEG, and Chairman-Cum Managing Director, MECL, Dr Gopal Dhawan has been recently honoured with **Outstanding Leadership Award for Excellence** in Indian Mineral Industry by Mining Engineers Association of India. The award carrying a memento and a citation was presented to Dr. Gopal Dhawan in a recently held All India Exploration Geologist Meet at Hyderabad. Dr. Dhawan was selected for this honor for handling MECLs activities efficiently under the most challenging and competitive scenario and achieving newer heights during the year 2013-14 by creating the strategic vision for business, framing right policies and technological up gradation in the company. **ISEG Congratulates Dr Gopal Dhawan, President-ISEG for the achievement!**

President ISEG, Dr Gopal Dhawan also attended **"INVEST MADHYA PRADESH"** a **Global Investors Summit** organized by Government of Madhya Pradesh at Indore from 8th-10th October, 2014. The summit was addressed by Hon'ble Prime Minister of India **Shri Narendra Modi** as well as Union minister of Mines **Shri Narendra Singh Tomar** and Chief Minister of Madhya Pradesh **Shri Shivraj Singh Chouhan**. President –ISEG attended B2B Meetings and various country sessions on Boosting the economic in MP and attracting Investors, etc.

SIR THOMAS OLDHAM

Continued from page 9

IMPORTANT ACHIVEMENTS

1. **GSI office was set up at 1 Hasting Street, Kolkata in 1856.**
2. **The Museum of Economic Geology, set up with Asiatic Society in 1841, was handed over to GSI in 1856.**
3. **Thomas Oldham started compiling mineral statistics from 1857. It came out in the Publication of Quinquennial Review of Mineral Production.**
4. **Laid the foundation of Stratigraphical Classification of Indian Geology in 1859.**
5. **Engineering Geology study was first initiated by Thomas Oldham in 1859 for the proposed extension of railway line in Raniganj.**
6. **Thomas Oldham functioned dual roles as Superintendent of GSI and of the Museum of Geology in Kolkata.**
7. **In 1864 he published an elaborate report on the Coal Resources of India.**
8. **Thomas Oldham first initiated earthquake study after Cachar Earthquake of 10th January, 1869.**
9. **The Catalogues of Earthquakes and Hot springs were prepared by Thomas Oldham and were published later by R.D. Oldham in 1882.**
10. **The Geological Map of India and adjacent countries on 1 inch : 64 mile scale was published in 1877.**

The Geological Survey of India in 1870

Standing: **F. Stoliczka, R. B. Foote, William Theobald, F.R. Mallet, Valentine Ball, W. Waagen, W.L. Willson**

Sitting : **A. Tween, W. King, *Thomas Oldham*, H.B. Medlicott, C.A. Hackett**

Compiled by:

M. Raju

GROUTING AND WATER PERCOLATION TESTS IN WATER CONDUCTOR SYSTEM OF RAMPUR HYDRO ELECTRIC PROJECT (412MW) OF SJVN Ltd. H.P.

R. K. Chauhan
Rampur HE Project,
SJVN Ltd.

SALIENT FEATURES OF RAMPUR HE PROJECT

- **Designed to work in tandem with upstream Nathpa Jhakri HE Project (1500MW).**
- **Draws the outflow water from upstream Nathpa Jhakri HE Project.**
- **Head Race Tunnel: 17.177km long, concrete lined with 10.50m dia.**
- **Surge Shaft: 165m high open to sky with 38m dia.**
- **Valve House: Surface Type**
- **Surface Power House: 6 turbines(vertical axis Francis) x 68.67MW each to utilize design head of 119.10m.**
- **Tail race Tunnel: 54m long horse shoe shaped concrete lined 10.5m dia with an open channel.**

(Source: www.sjvnl.nic.in)

1.0 INTRODUCTION

Tunnels are constructed to serve many different purposes for the development of society and nation as whole. The main objective in case of tunnels constructed especially for hydro projects, which carry enormous quantum of water is that, it should not leak and moreover the tunnels which are part of water conductor system should resist the inflow of water from the surrounding ground in order to avoid draining of natural water sources or aquifers into the tunnel, which could lead to a general lowering of the ground water table in a wide area along its alignment. Lowering of the water table may result in subsidence and damage to existing surface structures, loss of capacity of drinking water schemes and in some cases even sliding of the land.

Hydro power tunnels are usually lined even after providing initial and final design support according to the design specifications so that they become water tight in order to serve a longer service life. Grouting and pre-grouting of tunnels serve three different purposes i.e., stabilization, strengthening and partial sealing of the rock mass around tunnels. The main objective is to use cement and water in different ratios to achieve desired design requirements for the long term stability and sustainability of the structure like tunnels.

2.0 CONTACT GROUTING

During the final stage of construction of RHEP (412 MW), grouting process is carried out in two separate stages incorporating contact and consolidation grouting processes. The process of contact grouting is carried out by drilling a hole on 38mm Ø having a length of 30cm into the rock at a sectional spacing of 3m. Three numbers of holes were drilled in case of reaches having rock class I, II & III and 4 number of holes were drilled in case of reaches having rock class IV, V and VI in each section. The grout pressure of upto 2.5 Kg/cm2 is used for pumping the mixture of water and cement at a ratio of 1:1. Approximately 15,000 holes were done for contact grouting of HRT and Surge shaft during the construction of RHEP.

3.0 CONSOLIDATION GROUTING

In case of consolidation grouting, the process is carried out by drilling a hole of 45mm Ø having a length of 6m into the rock and at a sectional spacing of 3m. No consolidation grouting is done in case of reaches having rock class I, II & III which incorporates nearly 40% of total excavated length of 15,096m of the head race tunnel of RHEP. In case of rock class IV, V and VI which encompasses around 60% of total excavation of HRT, six numbers of holes were drilled in section planes which were spaced at interval of 3m following staggered pattern. The water cement ratio varies from 5:1 to 0.8:1 and the pumping pressure of upto 7 Kg/cm2 is used for achieving the refusal which is considered ambient at a intake of 10 Lit./min for a period of upto 10 minutes. The water cement ratio is reduced in order to achieve maximum pressure. The grouting pumps were generally installed at a spacing of 100m and were having make of either **Colonomono** or **Maheshwari**, having capacity of 10 HP and 20 HP respectively. Approximately 24,000 holes were done for consolidation grouting of HRT and Surge shaft during the construction of RHEP.

Photo: Arrangement for water percolation test- Grout pump, Pressure gauge, Water meter, Packer and pipes.

4.0 WATER PERCOLATION TEST BEFORE CONSOLIDATION GROUTING

In order to assure the efficacy of grouting, water percolation testing is an integral and necessary part for evaluation of the seepage potential and for determining practicality of the grouting methods adopted. Water percolation tests were also conducted before and after the process of consolidation grouting for assuring and achieving a Lugeon value of less than 5 as per the guidelines issued by the design department. Around 150 numbers of holes were tested for water percolation tests conducted before consolidation grouting.

5.0 WATER PERCOLATION TEST AFTER CONSOLIDATION GROUTING

362 numbers of holes were tested after consolidation grouting along head race tunnel and surge shaft of the RHEP. The methodology adopted for carrying out the water percolation test incorporates use of Tamrock, grout pump, water meter, pressure gauge and packers.

Three numbers of holes having diameter of 38mm and length of 6m were drilled in sections spaced at an interval of either 100m or less than 100m in case of reaches having extremely weak rock zones or cavities depending on site conditions. The intake of water was noted for total duration of 15 minutes (having 3 intervals of 5 minutes) at constant pressures of 3 Kg/cm2, 5Kg/cm2 and 7Kg/cm2 respectively. The same procedure is followed while reducing the pressure upto 3 Kg/cm2. All these intake readings (water meter) were calculated to deduce the water intake and finally the corresponding Lugeon values. In order to provide stability, sustainability and final satisfactory results of water percolation tests, some of the reaches were also re-grouted and re-tested till the final Lugeon values of less than 5 is achieved.

6.0 CONCLUSIONS

The entire process of various activities like, contact grouting, consolidation grouting and water percolation tests before and after consolidation grouting to achieve the desired design limit of the results posed a problem to ensure proper plugging of around 40,000 number of holes in order to avoid leakage of water from tunnel during operation stage of the project. This matter was brought in notice of the management and it was decided to deploy a team of geologists to ensure proper plugging of these holes. A team of geologists was deployed for the activities and inspection was carried out 3-4 times to ensure proper plugging of these holes. This resulted in successful operation of power tunnel and surge shaft, pressure shaft etc., without any leakage from tunnel side. It is concluded that, sincerity and careful watch on each activity of the tunnel jobs is one of the most important ethic of the geologists and engineers involved in hydropower projects.

ISEG DELHI NCR CHAPTER: 3RD COUNCIL MEETING

ISEG, Delhi-NCR Chapter conducted its **3rd Council meeting** on 27th September, 2014 at Expediting Office of SJVNL Ltd., New Delhi. The meeting was chaired by **Shri. R. N. Mishra, Director (Civil), SJVN Ltd.**, Convener, ISEG, Delhi-NCR Chapter, New Delhi. Various aspects pertaining to ISEG Golden Jubilee Conference and the role to be played by Delhi-NCR Chapter in organising EGNM–2015 were discussed.

ABOUT THE AUTHOR:

Shri R.K. Chauhan is Head (Geology Department) of Rampur HE Project, SJVN Ltd. He and his team of geologists are associated with geotechnical activities of RHEP. Earlier he had served in Nathpa Jhakri Hydro Power Station (1500 MW). He is involved in Hydropower sector from past 27 years in SJVN Ltd. and HPSEB.

ISEG NEWS

(A Biannual Newsletter of ISEG)

Editor, ISEG: Imran Sayeed
C/o Chief (Geology),
Project Investigation Division, NHPC Ltd,
Sector-33, Faridabad, Haryana-121003
E-mail: iseg2015@gmail.com

M. Raju, Secretary,
Indian Society of Engineering Geology
C/o Dy. Director General, Mission– IV,
Geological Survey of India, CHQ,
15 A&B, Kyd Street, 3rd Floor, Kolkata,
West Bengal-700 016, India.
E-mail: india.seg@gmail.com;
geolraju@gmail.com
Mobile: +91-9432672087

Further information on ISEG website: isegindia.org
For Journal of Engineering Geology: joegindia.com

Newsletter designed by :
Editorial team, ISEG
(Imran Sayeed & Rahul Khanna)

GLIMPSES OF IAEG COUNCIL MEETING 2014

ISEG Bags IAEG Year 2015 Meetings and Executive Post !

ISEG had a wonderful September outing at the 12th International Congress of the IAEG at Torino, Italy. This four-yearly prestigious event of our parent organization during 15-19 September 2014 was preceded by annual IAEG Council and Executive Meetings. The ISEG participated in the Council Meeting as a bidder for the Year 2015 IAEG Council and Executive Meetings, coinciding with its Golden Jubilee Conference at New Delhi during 27-29 October 2015, and also as a contestant for the post of IAEG Vice President for Asia during the Term 2015-2018. Mr Yogendra Deva, Ex-officio ISEG Council Member (Immediate Past Secretary of the Society), represented the ISEG in the IAEG Council Meeting and made presentations both as the bidder for IAEG 2015 meetings and as the nominee for the post of IAEG Vice President.

The Council meeting was attended by 62 delegates from all over the world and included the entire 12-member Executive Committee of the IAEG – President Carlos Delgado (Spain), Past President Fred Baynes (Australia), Secretary General Faquan Wu (China), Editor-in-Chief Martin Culshaw (UK), Treasurer Pierre Potherat (France) and the seven Vice Presidents (North America, South America, Europe North, Europe South, Australasia, Africa and Asia). The agenda of the meeting included award of the 13th Congress in Year 2018, Council and Executive Meetings in Year 2015 and election of the IAEG Executive for the Term 2015-2018.

SAN FRANCISCO– THE VENUE FOR 13TH INTERNATIONAL CONGRESS

The next 4-yearly International Congress of the IAEG has been awarded to USA and shall be held at San Francisco in Sept., 2018. In a spell binding presentation, Dr Scott Burns of USA, also the nominee for the post of IAEG President for 2015-2018, presented the highlights of the fascinating city of San Francisco and the proposed Congress. The event is billed to be a Grand Success.

JAPAN AND INDIA COMPETE FOR 2015 IAEG ANNUAL MEETINGS

Japan and India were the bidders for the IAEG Council and Executive Meetings for the Year 2015. While Japan wished to hold these meetings along with the 10th IAEG Asia Regional Conference in September 2015, India desperately needed these meetings along with the ISEG Golden Jubilee Celebration Conference – EGNM at New Delhi in October 2015. Both the countries made the presentations of their proposed events, Dr Chigira for Japan and Mr Deva for India. On the basis of secret ballots, the Meetings were awarded to India. ISEG takes pride in hosting the IAEG Meetings and invites the IAEG Executive Elect for 2015-2018 for the Executive Meeting on 25 October 2015, and the representatives of the IAEG National Groups for the Council Meeting the day after, i.e. on 26 October 2015. The ISEG International Conference – EGNM is scheduled to be held immediately thereafter, i.e. 27-29 October 2015.

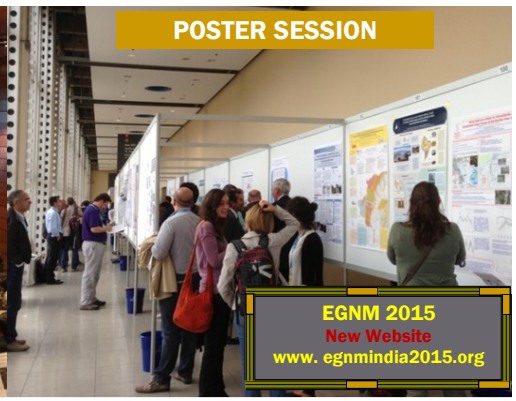
IAEG ELECTIONS FOR TERM 2015-2018– INDIA BAGS VP ASIA POST

In an exciting election for the IAEG Executive Council for the Term 2015-2018 that saw even triangular contests, the nominees made presentations about themselves and their agenda. The ISEG nominee for the post of IAEG Vice President for Asia, Mr Yogendra Deva (Immediate Past Secretary of ISEG), also introduced himself and outlined his agenda. The other nominee for the post was Dr Chigira of Japan. It's a matter of great pride for the ISEG community that Mr Yogendra Deva was declared elected and is scheduled to serve the IAEG for the next four years.

The elected **IAEG Executive Committee for the Term 2015-2018** comprises **President**: Scot Burns, USA, **Secretary General**: Faquan Wu, China, **Treasurer:** Jean-Alain Fleurisson, France, **Editor-in-Chief**: Martin Culshaw, U.K., **Vice Presidents**: Louis van Rooy, South Africa (*Africa*), Yogendra Deva, India (*Asia*), Mark Eggers, New Zealand (*Australasia*), Rafig Azzam, Germany (*North Europe*), Giorgio Lollino, Italy (South Europe), Jeffery Keaton, USA (*North America*), Maria Heloisa B. Oliveira Frasca, Brazil (*South America*).

12th IAEG INTERNATIONAL CONGRESS

Attended by more than 1000 delegates, the 5-day Congress turned out to be a huge success. The details of the Congress can be viewed at *www.iaeg2014.com* .



Printed By: Print Crafts, New Delhi (Mob: 9810023436)