Minutes of the XVI Meeting of National Committee on Seismic Design Parameters (NCSDP) for River Valley Projects held on 27.10.2006 at Conference Hall, NWA, CWC, Pune.

The XVI meeting of the National Committee on Seismic Design Parameters (NCSDP) for River Valley Projects was held on 27th Oct. 2006 at 1000 hrs. in the Conference Hall, NWA, CWC, Pune. Shri S.K. Das, Member (D&R), CWC and Chairman, NCSDP chaired the NCSDP meeting. The list of NCSDP members, project representatives and invitees, who attended the meeting is given in Annex-I.

Item No. 16.1 Welcome by Chairman, N.C.S.D.P.

Shri S.K. Das, Member (D&R), CWC welcomed all the participants and invitees of the XVI meeting of NCSDP. This was followed by a brief self-introduction by the participants. Thereafter, the member-secretary was requested to take up the agenda items for discussion.

Item No. 16.2 Confirmation of the Minutes of the last meeting

Minutes of XV meeting of NCSDP held on 24.02.2005 at CWC, New Delhi under the chairmanship of Shri B.M. Upadhyay, CE (DSO), CWC were issued to all members vide letter No. CWC/ FE&SA/2/2/2004/333-350 dated 22.03.2005. The observations of IIT Rookee vide their letters No. EQD/NCSDP/1426 dated 02.05.05 on the Minutes were considered and deliberated upon. After deliberations it was agreed that minutes as circulated may be retained and the committee approved the minutes. Accordingly, the minutes of the XV meeting were confirmed.

Item No. 16.3 Follow up actions of Minutes of last meeting

Item No. 16.3.1 Guidelines for Site Specific Seismic Studies for River Valley Projects.

The Committee decided to discuss the guidelines subsequent to discussion on seismic parameters of projects under the agenda. However, as the time was short, it could not be taken up during the XVI meeting.

Item No. 16.3.2 Koteshwar H.E. Project, Uttaranchal.

Member-Secretary appraised Committee that as per item 15.4.1 of Minutes of 15th Meeting of IIT, Roorkee was requested to expeditiously review their site specific seismic study of Koteshwar Dam by end of March, 2005 and authorized Chairman, NCSDP to finalise the recommendation with regard to seismic design parameters for Koteshwar HE Project on the basis of revised site specific seismic study report. Project authority vide their letter No. 6862/THDC/D&E/Kot-1 (P) dated 25.5.05 submitted the revised study report as above for Koteshwar HE Project and Member (D&R), CWC in capacity of Chairman, NCSDP has approved for adoption of Peak Ground Acceleration (PGA) of 0.31g for Maximum Credible Earthquake (MCE) and 0.16g for Design Basis Earthquake (DBE) condition along with response spectra as recommended by IIT Roorkee and approval has been conveyed to project authorities with a copy to all members of NCSDP.

The Committee noted the approval.

Item No. 16.3.3 Site specific seismic study for River Valley Projects

Member-Secretary appraised that in view of Minutes of last meeting reminders were issued to project authorities for expediting the site specific seismic study of following projects.

1. Kameng HE Project, Arunachal Pradesh
2. Siang Middle (Siyom) HE Project, Arunachal Pradesh
3. Rampur HE Project, Himachal Pradesh
4. Brutang Irrigation Project, Orissa
5. Thotapalli Barrage Project, Andhra Pradesh
6. Mankulam HE Project, Kerala.
7. Nagarjuna Sagar Tail Pond dams, Andhra Pradesh

The Committee noted the action taken.

Item No. 16.3.4 Shahpurkandi Dam Project, Punjab

The salient features alongwith the geological / geotechnical set up of the project were briefly presented by the project representative.

The Shahpurkandi multipurpose project envisages construction of a 54.5m high concrete dam to irrigate land area in J&K on right bank and to generate 168MW power. The project is located on the Ravi River in the Shahpurkandi town at 32°23'55" N Latitude and 75°40'48"E longitude.

The project lies in seismic zone IV as per the seismic zoning map of India for earthquake resistant design of structures IS 1893 Part I (2002).

The site specific study report submitted by project authorities (No.P-2005-09 (September 2005)) related to the local and regional geological conditions, earthquake occurrence and seismo-tectonic set up of the region carried out by IIT, Roorkee was deliberated in the meeting and committee approved that the PGA value of 0.31g and vertical spectral acceleration value as 2/3 of the corresponding horizontal value, the normalized horizontal response spectra given in Fig. as 2 & 3 of site specific study report with multiplication factors 0.31g for MCE condition and 0.16g for DBE condition. For the purpose of pseudo-static analysis to fix dimensions of the structures the committee suggested that the design seismic coefficients can be arrived at by dividing the maximum spectral acceleration ordinate for DBE condition by 1.6, or 2.0 as is being currently recommended by CWPRS or NGRI in their reports.

Item No. 16.3.5 Modifications of site specific seismic studies for river valley projects.

In view of item 15.3.4 of minutes of XV meeting of NCSDP, IIT Roorkee was to submit additional notes on fault geometry and rationale behind assigning magnitude to each of the following projects.

a) Omkareshwar Project, Madhya Pradesh
b) Siang Middle (Siyom) Project, Arunachal Pradesh
c) Uri-II HE Project, Jammu and Kashmir
d) Nimboo Bazgoo HE Project, J&K.
e) Kameng HE Project, Arunachal Pradesh.

The notes submitted by IIT Roorkee was deliberated upon and the Committee was of the opinion that the reports of each of these projects should have an addendum giving details about arriving at the values of earthquake magnitude with relation to site conditions such as project geology including details like faults, MCT, detached planes their location from project site etc. along with a diagram showing these details. IIT Roorkee agreed for submission of these details in respect of the above projects. The Committee desired that all the study reports on seismic design parameters submitted in future should also include these details. It was decided to finalise the seismic design parameters of the above projects after IIT Roorkee submits the required information.

Item No. 16.4 New Projects

Item No. 16.4.1 Chutak H.E. Project, J&K

The salient features and geological aspects of the project were briefly presented by the project representatives.

The Chutak H.E. Project, involves construction of a 47.5m long, 15m high barrage on river Suru. The project is located at Kargil distt of Ladakh at latitude 34°27'N and longitude 76°05'E.

The project site lies in seismic zone IV as per seismic zoning map of structures IS 1893-Part-1 (2002).

The site specific study report no.P-2005-05 (April- 2005) related to the local and regional geological conditions, earthquake occurrence and seismo-tectonic set up of the region were carried out by IIT, Roorkee. The IIT, Roorkee recommended the PGA value of 0.36g and the vertical spectral acceleration values as 2/3 of the corresponding horizontal value. The normalized horizontal response spectra given in Fig. 2 & 3 of site specific study report with multiplication factors 0.36g for MCE condition and 0.18g for DBE condition was discussed by the committee. The Committee accepted the recommended values of multiplying factors for MCE and DBE conditions.

Item No. 16.3.2 Koteshwar H.E. Project, Uttaranchal.

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The Committee noted the action taken.

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The notes submitted by IIT Roorkee was deliberated upon and the Committee was of the opinion that the reports of each of these projects should have an addendum giving details about arriving at the values of earthquake magnitude with relation to site conditions such as project geology including details like faults, MCT, detached planes their location from project site etc. along with a diagram showing these details. IIT Roorkee agreed for submission of these details in respect of the above projects. The Committee desired that all the study reports on seismic design parameters submitted in future should also include these details. It was decided to finalise the seismic design parameters of the above projects after IIT Roorkee submits the required information.

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The project site lies in seismic zone IV as per seismic zoning map of structures IS 1893-Part-1 (2002).

The site specific study report no.P-2005-05 (April- 2005) related to the local and regional geological conditions, earthquake occurrence and seismo-tectonic set up of the region were carried out by IIT, Roorkee. The IIT, Roorkee recommended the PGA value of 0.36g and the vertical spectral acceleration values as 2/3 of the corresponding horizontal value. The normalized horizontal response spectra given in Fig. 2 & 3 of site specific study report with multiplication factors 0.36g for MCE condition and 0.18g for DBE condition was discussed by the committee. The Committee accepted the recommended values of multiplying factors for MCE and DBE conditions.

Item No. 16.4.2 **Chuzachen H.E. Project**

Chuzachen H.E. Project is in the east of Sikkim State and consists of two gravity dams of height 48 & 41m respectively. The Rangpo dam is located at latitude and longitude of 27°12'14"N and 88°39'59"E and Rangli dam at 27°14'30"N and 88°42'46"E respectively.

The project site lies in seismic zone IV as per seismic zoning map of India IS:1893 (2002).

The site specific study report no. IITK March 2006 related to the local and regional geological conditions, earthquake occurrence and seismo-tectonic set up of the region were carried out by IIT, Kanpur.

Prof. S.K. Jain of IIT Kanpur presented the project salient features and the approach and methodology for arriving at the PGA value of 0.40g. Three attenuation relationships published recently and applicable for shallow crustal earthquakes have been considered in the study. The mean values of peak ground acceleration have been obtained by these attenuation relationships. For MCE condition, the values of PGA are in the range of 0.29 g to 0.48 g with the average value being 0.387g. Similarly, for OBE condition, the average value is 0.203g for the estimated range of 0.14g to 0.26g. It has therefore been proposed to use a PGA value of 0.20g for the OBE condition and a PGA value of 0.40g for the MCE condition.

The Committee after deliberating on the report suggested that the Response Spectra shall be worked out using mean + sigma (84 percentile) basis and not on mean basis as has been done now. Also, the peak of the spectra should be made flatter to reduce its sensitivity to dam frequencies. The Committee opined that it is not, per se, against using a number of attenuation relationships to arrive at different values of multiplying factors for MCE condition, but after undertaking such an exercise, the concerned agency shall opt for one relationship suitable for that site, rather than taking the highest values arising out of such an exercise.

The Committee stressed that the basis of fixing an earthquake magnitude for a particular project along with necessary calculation in brief,

including formulae adopted in attenuation relationships shall be clearly brought out in an annexure to the report. The reports as are being prepared now are just a gist of the subject.

Item No. 16.4.3 Pakal Dul (Drangdhuran) H.E. Project, Jammu & Kashmir
(At the request of project authorities Chairman, NCSDP allowed to discuss this project at agenda item 16.4.10)

Pakal Dul H.E. Project envisages utilisation of 417m gross head by constructing a 305m long and 167m high concrete faced rockfill dam across the river Marsudar, a tributary of Chenab in Distt. Doda of J&K state. The Project is located at latitude 33°27'30"N and longitude 75°48'50"E.

The proposed site lies in seismic zone IV as per the seismic zoning map for earthquake resistant design of structures IS 1893 (part-1) 2002.

The site specific study [report No.EQD-2001/2005-06 (March 2006) related to the local and regional geological conditions, earthquake occurrence and seismo-tectonic set up of the region was carried out by IIT, Roorkee.

IIT, Roorkee has estimated the PGA value of 0.31g. The vertical spectral acceleration values have been recommended as 2/3 of the corresponding horizontal value. The normalized horizontal response spectra has been given in Fig. 2 & 3 of site specific study report with multiplication factors 0.31g for MCE condition and 0.16g for DBE condition.

The project representative presented the project features and the study report and after deliberations the committee suggested that as has been stated earlier for other projects, for this project too, the logic of arriving at the earthquake magnitude along with the relation of the fault plane distance from the dam site on earthquake calculation has to be made clear and the report should be supported by a diagram explaining all this. This

would enable the Committee and the project authorities to know the basis of earthquake generation and estimation. The IIT, Roorkee agreed to this suggestion.

Item No. 16.5 In view of shortage of time the Chairman proposed that the remaining items can be taken up in the next meeting which may be convened at short interval of a month or two. The Committee agreed for this.

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

XVI Meeting of National Committee on Seismic Design Parameters (NCSDP) on River Valley Projects

Date : 27.10.2006.

Attendance

Sl.No.	Name & Address	Designation	Deptt./ Org.	Status/ Representative
I. Committee Members				
1.	Sh. S.K. Das	Member (D&R)	CWC, New Delhi	Chairman, NCSDP
2.	Sh. T.P. Singh	Chief Engineer (DSO)	CWC, New Delhi	Member
3.	Sh. I.D. Gupta	Joint Director	CWPRS, Pune	Member
4.	Sh. Sujit Das Gupta	Director	GSI, Kolkata	Member
5.	Dr. D.K. Paul	Professor	DEQ, IIT Roorkee, Roorkee	Member
6.	Sh. J. Jai Raju	Director, FE&SA	CWC, New Delhi	Member-Secy. NCSDP
II. Special Invitee				
7.	Sh. S.K. Sibal	Director	CWC, New Delhi	
8.	Dr. M.L. Sharma	Assoc. Professor	DEQ, IIT Roorkee, Roorkee	
9.	Sh. Manish Shrikhande	Assoc. Professor	DEQ, IIT Roorkee, Roorkee	
III. Project Representatives and Consultants				
10.	Sh. Anil Malhotra	Director, Shapurkandi dam, Design Directorate	Punjab Irrigation	Shahpurkandi dam
11.	Sh. Anand Kumar Ojha	SDO, Shapurkandi dam, Design Directorate	Punjab Irrigation	Shahpurkandi Dam
12.	Sh Pardeep Singh	Geologist/ Consultant	GSI, SPK Project	Shahpurkandi Dam
13.	Sh. V.V. Hegde	General Manager	NHPC, Faridabad	Chutak HE Project, Kotlibhel HE Project 1-A, 1-B and Stage-2 Debang and Pakal Dul HE Project.
14.	Sh. A. Bhatnagar	Chief Engineer	NHPC, Faridabad	Chutak HE Project, Kotlibhel HE Project 1-A, 1-B and Stage-2 Debang and Pakal Dul HE Project.

	Sh. D.K. Joshi	Sr. Manager, (Geo)	NHPC Faridabad	Chutak HE Project, Kotlibhel HE Project 1-A, 1-B and Stage-2 Debang and Pakal Dul HE Project.
16.	Sh. S. Choudhary	Asstt. Manager	NHDC, Faridabad	Chutak HE Project, Kotlibhel HE Project 1-A, 1-B and Stage-2 Debang and Pakal Dul HE Project.
17.	Sh. K. Sanmukh Gupta	Design Engineer	NTPC, Noida	Lohrinagpala and Tapovan Vishnugarh HE Project.
18.	Sh. J.L. Panda	AGM	NTPC Noida	Lohrinagpala and Tapovan Vishrtugarh HE Project.
19.	Dr. B.K. Mittal	Consultant	Ex- Chairman, CWC	Chuzachen HE Project
20.	Sh. Sudhir Kr. Jain	Professor/ Consultant	IIT Kanpur	Chuzachen HE Project
21.	Sh. P.L. Narula	Consultant	Ex Dy. Director General, GSI	Chuzachen HE Project
22.	Sh. P.K. Ghosh	Consultant	Gati Infrastructures Ltd., New Delhi	Chuzachen HE Project
23.	Sh. U. Bose	Ex. Director	NEEPCO, New Delhi	Karcham Wangtoo HE Project
24.	Dr. A.R. Chandrasekran	Consultant	Rtd. Professor, IIT Roorkee, Roorkee	Indira Sagar (Polavaram) HE Project
25.	Sh. M. Venkateswara Rao	Chief Engineer	Indira Sagar Polavaram Project, A.P.	Indira Sagar (Polavaram) HE Project