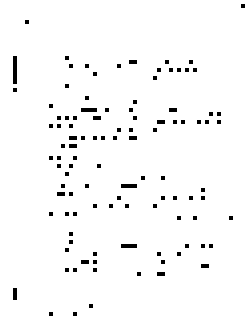

MINUTES OF THE SIXTH MEETING OF THE NATIONAL COMMITTEE ON SEISMIC DESIGN PARAMETERS (NCSDP) HELD ON 20.9.95 AT NEW DELHI.

OPENING REMARKS

The Sixth Meeting of the National Committee on Seismic Design Parameters (NCSDP) was held in CWC Committee Room No.307, Sewa Bhawan, CWC, New Delhi on 20th September, 1995. Shri Ramesh Chandra Member (D&R), CWC and Acting Chairman, CWC, chaired the proceedings. List of the participants is at Annexure I

Item No.1

Adoption of Agenda

The tentative agenda as suggested by the Secretariat was unanimously adopted by the participants. However, on request of participants from CWPRS, Pune the sequence of Tipaimukh Dam Project (Manipur/Mizoram) and Srisailam H.E.Project (AP) was changed and discussions on item 3 started with these projects.

Item No.2

Confirmation of Minutes of the 5th Meeting of NCSDP

The Minutes of the 5th Meeting were confirmed with the amendments given in Annex II. The Amended minutes of 5th meeting of NCSDP will be issued by Secretariat.

An expansion of all abbreviations used in the Minutes for the sake of brevity is available at the end.

Item NO.3

NEW PROJECTS

Item No.3.1

Bombay IV Water supply Project - Middle Vaitarana Dam:

The presentation of the Project features, geology and Seismicity by Sh.V.R.Khatkhate and Sh.M.G.Kulkarni of Municipal Corporation of Greater Bombay and Tata Consulting Engineers respectively.

Considering the importance of the dam which is 103^{m} high (for which dynamic analysis are to be done as per BIS Code provision) DEQ UOR felt that an accelarogram of Koyna type of Earthquake may be relevant and should be applied for checking. Sh.Narula GSI represented the need to follow site specific studies evolved based on ICOLD guidelines after considering important geological features & disaster management studies should be evolved later. Prof. Jaikrishna suggested the need to ensure that for a similar hazard scenario, the upper Vaitharana Dam should also be checked. The NCSDP accordingly asked the Project Authorities to ensure that the Safety aspects of all the dams in the basin are met with. The Project clearance by CWC could be done with the proviso that the requirements as per ICOLD are to be met with in pre-construction phase.

as per ICOLD are to be met with in pre-construction phase.

Item No.3.2

TIPAIMUKH DAM PROJECT

The Project features were presented by GM Brahmaputra Board. He also indicated the involvement of CWPRS to undertake micro-earthquake studies & the establishment of four recorder stations at Aizawl, Silchar, Chotachandpur & Project site. An earlier studies to evolve site specific parameters by DEQ UOR was indicated by Prof. Chandrasekharan UOR. MEQ tremor studies were undertaken by DEQ UOR in 1991 where with four portable stations, 762 events were recorded. DEQ UOR felt that at least 8 station net-work should be established. Dr.Narula GSI felt that the present locations of MEQ recorders are spreadout & it is required to be a close net-work to be of utility.

The plunge of river course from North-South to South-North East was reviewed, when pointed out by GSI. Mr. N.B.G Tilak who had earlier studied the river morphology of Barak basin ruled out any reasons of tectonic nature & pointed out that this was more due to drainage characteristics.

After further consideration of all related issues, NCSDP desired that the number of stations could be increased to eight by Brahmaputra Board & observation of micro-tremors should continue. The preliminary design could be checked utilizing the results of the earlier studies of DEQ UOR; a further review of seismic design parameters as per earlier consultancy studies could be undertaken after gathering additional information from the MEQ network.

Item No.3.3

PULICHINTALA PROJECT - ANDHRA PRADESH

The Project which has been posed for clearance to CWC is in its preliminary design phase. Briefly, the scope of the Project was explained by Project Authorities. The geological aspects were elaborated by Dir. GSI Hyderabad. With regard to seismicity, it was indicated that the site falls in Zone-III as per zonation map attached to IS 1893-1984. No major known event has been reported nearer to the site, except Bhadrachalam event which lies 120 km North East of site. The nearest dormant fault feature was reportedly around 12 km for which a magnitude of 3.7 could be associated with.

The NCSDP decided that the preliminary design for Project Report could be based on BIS provisions for Zone-III & pseudo-static analysis for evolving the dam section could be followed. Later, detailed site specific Seismic Design Parameter studies are to be commissioned & presented to NCSDP for review.

Item No.4.0

Projects earlier considered which are resubmitted:

Item No.4.1

Renuka Project (H.P.)

The C.E. HSEB explained the scope of the project to NCSDP. Meant essentially as a storage dam (178m ht.) for augmenting watersupply to Delhi, the project has hydro-power generation component also.

In view of the suceptibility of the area being subjected to severe earthquakes an in-depth review of the geological & seismo-tectonic feature was undertaken by the NCSDP. The detailed site specific studies done by

DEQ UOR. The recent Uttarkashi Earthquake was explained by Prof. Chandrasekharan & the available data after the event has been utilised in the revised study. Both deterministic & probalistic approach has been followed to cross-check results of PGA. The PGA associated with MCE was 0.337g and DBE 0.168g. Suitable design Spectrum & compatable acclerogram have been presented in the study report EQ 94-10 of DEQ UOR.

Following the presentation of Prof.Chandrasekharan of the DEQ UOR report, Mr.Narula GSI pointed out that the validity of assuming focal depths of 20 km & above for larger earthquakes as per studies is open to debate. Discussions ensued on Tehri Controversy in the recent past & the hypothesis associated with the inclination of plane of subduction. Dr.Jaikrishna felt that such issues could be left for consideration in a Workshop which can be arranged at Roorkee at an appropriate.

The NCSDP adopted the suggestions made in the Consultancy studies of DEQUOR and advised the Project Authorities to proceed with detailed design during construction phase.

Item No.4.2

Largi HE Project (H-P)

The CE HSEB introduced the project features & indicated that it is a cleared project under execution. The diversion dam of 49^m height (in Zone V) will only have diornal pondage of 283 Ha.m. GSI representative presented the geological & seismo-tectonic setting to the Committee.

The severity ofthe area for earthquake proneness was brought out by Sh.P.N.Narula GSI. The project is located in lesser Himalayas & lie between MCT in North & MBT in South. Transverse features of importance are Shrinagar fault which is close to the area besides Largi thrust. Sh.P.N.Narula felt that the Consultants' study should high-light the logic behind assumptions on Magnitude presumed as relevant in each case and also on focal depth like parameters. He also pointed out several neo-tectonic activities around the area.

Prof.Chandrasekharan explained the study Report. (DEQ-UOR-Report No.EQ 93-14). This study had reviewed the earlier one in thelight of the recommendationsof erst-while standing Committee & the data generated from Uttarkashi Earthquake had also been utilised. The Report provides two levels one for MCE which resulted in a PGA of 0.23g and the other for DBE (0.115g). This as well as safety criteria stipulations of Consultants' review report were explained to NCSDP.

The view of some members including GSI on the logic of seismic hazard scenario were heard by the Committee & the workshop to debate on such of the questionable hypotheses and arrive at appropriate recommendations found favour. Notwithstanding such debatable assumptions, NCSDP felt that the consultants' study report was in order to prescribe the Seismic Design parameters for detaile dynamic analysis. The recommendations of DEQ UOR study report EQ 93-14 for S Seismic Design Parameters for Largi Project was adopted by NCSDP & the project authorities were advised to take further action in accordance with the provisions of Consultancy Report.

Item No. 4.3 Sriram Sagar Project, Andhra Pradesh

Item No. 4.4 Lower Manair Project, Andhra Pradesh

Item No. 4.5 Nagarjuna Sagar Project, Andhra Pradesh

Item No. 4.6 Srisailam HE Project, Andhra Pradesh.

The Project Authorities who were invited to attend the NCSDP were not present. The Chief Engineer (Andhra Pradesh) in-charge of Pulichintala Project indicated that these projects are under the charge of other Chief Engineers in the state who could not come to the meeting. The Committee decided to defer consideration of these projects to a subsequent meeting.

Item No. 4.7

Lakhwar Vyasi Project (UP)

During the meeting of 4th NCSDP when the project came up for review, it was suggested by the committee that a fresh study should be undertaken through consultants for developing detailed seismic parameters.

Based on the suggestions of NCSDP, the UP Irrigation Department had approached DEQUOR for further studies. A subsequent report on "Seismic Parameters for Lakhwar-Vyasi Project" had been made available to the Members of the Committee after receipt from Project Authorities.

The Committee during the meeting accepted the suggestions in the brief report on "Seismic Parameters for Lakhwar-Vyasi Project" of DEQUOR and recommended that the seismic Parameters as given therein may be utilized by Project Authorities for dynamic analysis.

Item No. 4.8

Dhauli Ganga HE Project (Stage-I).

Sh. V.K. Gupta, NHPC appraised the Committee Members with the important features of the Dhauli Ganga H.E. Project. The Project is located in Zone V as per Seismic Zoning Map of India (IS 1893-1984). During its last sitting NHPC provided the report of the consultants DEQUOR No. EQ 84-17 on "Design parameters for Dhauliganga H.E. Project."

The Consultants (DEQ UOR) in their letter dated 18.1.95 to NHPC had indicated that their report EQ 84-17 of 1984 is still valid except that zero period acceleration is to be increased to 0.36g from 0.3g.

From the briefing given on sub-surface geology at dam site, the Committee noted that the foundation strata, comprising loose material of varying size extend to a considerable depth in foundation; the possibility of liquifaction phenomenon could therefore, merit detailed consideration.

Dr. Jai Krishna opined that apart from seismicity a combined consideration of sub-surface geology, Dam Structure & type should always be kept in mind.

The Committee approved the consultants' recommendation as per EQ 84-17 as modified by their letter of 10th Jan., 1995 for adoption.

Item No. 5

SPECIAL ISSUES :

Item No. 5.1

Deformation of Earth's Lithosphere due to Reservoir Lodding.

The Committee considered that this item is not in the purview of the committee and need not therefore be discussed.

Item No. 6

Review of the works completed by "Sub-Committee on Instrumentation".

The item No. 6 was deferred to the next meeting.

Item No. 7

Any other item with permission of Chair

Sh. A.B. Joshi, the then Member D&R and acting Chairman of CWC, chaired four NCSDP Meetings (IInd to Vth) and two special Meetings (One on NCSDP for

River Valley Project and another on NCSDP for VLBI Projects). He also participated in the 21st, 22nd and 23rd Standing Committee Meetings of CWC, as a member in the capacity of C.E. (DSO).

The Committee appreciated his valuable contribution in the field of seismicity related to River Valley Projects & placed it on record. The meeting ended with a vote of thanks to the chair.

Annex II

Amendments to the Draft Minutes of the 5th NCSDP circulated by Secty.

(i) Item No. 4 of Agenda of 4th Meeting.

Srisailam Dam (Andhra Pradesh)

The paragraph commencing with the "Member representing NGRI' may be reworded as "Committee Members".

(ii) Item No. 5 of Agenda of 4th Meeting

Nagarjunasagar Dam (A.P.)

The para 5.2 of draft minutes may be amended as follows.

"NGRI had, at the instance of Project Authorities provided a report on the seismicity around Nagarjunasagar Dam in July, 1993. Earlier, the DEQ UOR had, as consultants for A.P. Irrigation Department, concluded certain studies & provided the following reports.

(i) EQ 84-14 "Two Dimensional Static and Dynamic Analysis of NOF Section of Nagarjunasagar Dam.

&

(ii) EQ 85-15 "Two Dimensional Static and Dynamic Analysis of NOF Section of Nagarjunasagar Dam Section."

The seismic scenario earlier considered in the analysis as per DEQ UOR's report and the proposed evaluation of NGRI need to be compared: to facilitate proper consideration of the issue NCSDP desired that some further work needs to be undertaken by Project Authorities & their Design consultants. Any other reports of relevance

including response to nearby events of recent nature (such as Latur/Osmanabad) are also to be considered.

(iii) Item No.6 of Agenda of 4th Meeting

Doyang Hydroelectric Project (Nagaland)

The amendment as circulated wide letter No.CWC/FED/2/2/94/533 to 540 dated 18.10.94 has been adopted.

(iv) Item No.7 of Agenda of 4th Meeting

Line 3 & 4 recorded as

"He informed that IS Code was not upgraded even after Koyna Earthquake".

may be modified as

"Although Koyna earthquake did spur us to reconsider zoning of Deccan Plateau, but the upgrading of zoning of certain regions was not due to this earthquake alone. The whole region was reconsidered on the basis of new data that became available after the previous exercise."

List of the Participants of VIth Meeting of the National Committee on Seismic Design Parameters (NCSDP) - held on September, 20, 1995 at New Delhi.

Sl.No.	Name & Designation	NCSDP Committee
1.	Sh. Ramesh Chandra, Ag Chairman/Member (D&R), CWC	Chairman
2.	Dr. Jaikrishna Ex-Vice Chancellor, DEQUR, Roorkee - 247667.	Non-official Member
3.	Director Seismology, IMD	Member (Absent)
4.	GSI (Director of Concerned Engg Geology Divn)	
4.1	Sh. S.K. Srivastava Director, Engineering Geology (HP-II) G.S.I., Lucknow.	-do-
4.2	Sh. N.B.G. Tilak, Director Project Engineer Geology-II (CH)	-do-
4.3	Sh. C.C. Satyanarayan Director Engineering Geology Division, GSI, Nagpur	-do-
5.	Sh. S.K. Thakker Head of Deptt, DEQUR, Roorkee-247667	-do-
6.	Sh. S.C. Bhatia NGRI, Hyderabad - 500007	-do-
7.	Sh. P.L. Narula Director, Land Slides and Seismo Tectonic Group Division, Northern Region, SI, Aliganj, Lucknow - 226020	Member
8.	Sh. A.K. Roy, Head Geo Science Division, Indian Institue of Remote Sensing, Dehradun-248001	-do-
9.	Addl. Surveyor General Geodetic & Research Branch, Survey of India, Calcutta.	Member (Absent)
8.	Sh. E. Sundarayya, C.E. (D&D), CWC	-do-
9.	Sh. M. Gopalakrishnan, Director (P&SA), CWC	Member-Secy

Special Invitees

12. Prof. Sh. A.R. Chandrasekharan,
Deptt. of Earthquake Engg.,
University of Roorkee,
ROORKEE - 247667.

13. Professor Ashwani Kumari,
Deptt. of Earthquake Engg.,
University of Roorkee,
ROORKEE - 247667.

14. Sh. V.C. Deshpande,
Senior Research Officer,
C.W. & P.R.S.
P.O. Khadakwasla,
Pune - 24.

15. Smt. Sh. R.G. Joshi,
Research Officer,
CW&P S,
Khadakwasla,
PUNE - 24.

16. Sh. Ravinder Nath Padi,
Deputy Director, G.S.I.,
Central Zone,
NAGPUR - 440006.

17. Sh. S.S. Iyer,
Chairman, Brahmaputra Board,

18. Sh. V.K. Gupta,
Manager (Design), NHPC, Office Complex,
Sector-33, FARIDABAD.

19. Sh. R.K.S. Singh,
General Manager, Brahmaputra Board,
Basista, Gauhati-28.

20. Dr. Sh. B.N. Asthana,
C.E. (Dam Design), I.D.O.

21. Sh. G.K. Mahajan,
C.E. (I&P), H.P.S.E.B.
Sundernagar, H.P.

22. Sh. B. Rosaiah,
C.E. (INV.) I&D, CAD, Govt. of A.P.
Errum Manzil, HYDERABAD - 500482.

23. Sh. V.R. Khatkunte,
C.E. (W.S.P.), Annex Building,
Mahapalika, MUMBAI

24. Dr. Gopal Dhawan,
Senior Manager (CC),
NHPC, Sector - 33, Faridabad,
HARYANA.

25. Sh.R.C.Sharma
S.E., I.P.O,
Roorkee.

26. Sh.V.D.Mazumdar
Project Manager
(Water Supply Projects)
Municipal corpn. of Bombay
3rd Floor,
W.S.P. Deptt.
Mahapalika Marg
BOMBAY-400001.

27. Sh.R.K.Gautam
E.E. P&D (C)-I
HPSEB
Sundernagar-174402
H.P.

28. Sh.V.P.Arora
E.E. P&D(c), Ranuka
HPSEB
Sundernagar (HP)

29. Sh.B.D.Patwa
Geologist
NHPC, Sector-83

30. Sh.M.G.Kulkarni
Tata Consulting Engineers

31. Sh.S.C.Giri
E.E., UP Irrigation

CWC OFFICERS

32. Sh R.K.Kalsi
Director,
Dam Safety Monitoring
CWC

33. Sh.A.C.Gupta
Director, CMDD(NW&S)
CWC

34. Sh.C.S.Mathur
Director, CMDD (N&W)
DirecWC.

35. Sh.S.C.Gupta I
Director(Instrumentation)
CWC.

36. Sh.Narendra Kumar
Director, Emb.(E&NE)
CWC

37. Sh.V.N.Vakpanjar
Deputy Director
FE&SA Dte.CWC.

Abbreviations	Full form
1. A.P.	Andhra Pradesh
2. BIS	Bureau of Indian Standard
3. CWC	Central Water Commission
4. CWPRS	Central Water Power Research Station
5. C.E.	Chief Engineer
6. CMDD Dte.	Concrete Masonary Dam Design Directorate (in C.W.C)
7. DEQUKR	Department of Earthquake, University of Roorkee.
8. Dir.	Director
9. DSO	Dam Safety Organisation
10. D&R	Design and Research
11. DBE	Design Base Earthquake
12. EQ	Earthquake
13. Emb.	Embankment
14. FED	Foundation Engineering Directorate
15. FE&SA	Foundation Engineering and Special Analysis.
16. GSI	Geological Survey of India
17. GM	General Manager
18. HP	Himachal Pradesh
19. HSEB	Himachal State Electricity Board
20. HE	Hyoro Electric
21. IS	Indian Standards
22. I&P	Investigation & ~~Power~~ Planning
23. Inv.	Investigation
24. IMD	Indian Meteorological Department
25. IDO	Irrigation Design Organisation
26. MEQ	Micro Earthquake
27. MCE	Maximum Credible Earthquake
28. MBT	Maximum Border Thrust

29.	MCT	Maximum Centre Thrust
30.	NCSDP	National Committee on Seismic Design Parameters
31.	NHPC	National Hydroelectric Power Corporation
32.	NGRI	National Geophysical Research Institute
33.	P&D	Planning & Design
34.	PGA	Pick Ground & Acceleration
35.	UOR	University of Roorkee
36.	UP	Uttar Pradesh
37.	VLBI	Very Long Baseline ~~Informetry~~ Interferometry
38.	WSP	Water Supply Project