

Minutes of the eighth National Committee on Dam Safety meeting held on 11.10. 1991 at Central Water Commission, New Delhi.

The eighth meeting of National Committee on Dam Safety (NCDS) was held on 11 October 1991 in Sewa Bhavan, R.K.Puram, New Delhi under the chairmanship of Dr.C.D.Thatte, Chairman, CWC and Chairman of NCDS.

List of officers who attended the meeting is given in Annex I.

Dr.Thatte, Chairman, NCDS welcomed the members of NCDS & other participants and items in the agenda were taken up for discussion.

1.0 Confirmation of the minutes of seventh meeting.

- 1.1 Minutes of the 7th meeting of NCDS held on 15.3.1991 at New Delhi were confirmed.

2.0 Dam Safety Assurance and Rehabilitation Project

- 2.1 Members of the NCDS were informed that for this project, the participants were the CWC and four States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu. Director (Dam Safety), CWC informed for the information of all concerned that the World Bank had arranged to provide for this project an IBRD loan of US \$23 million and IDA credit of US \$130 million. Estimates for total base costs had been worked out in which the Central Component was US \$2.68 million and the States' share was US \$143.38 million.
- 2.2 Agreements for financial assistance of US \$153 million were finalized on April 1991 and retro-financing of the project commenced from December 1990. Activities concerning inspection of dams, appointment of consultants for review, institutional strengthening and inspection of dams by Dam Safety Review Panels had already started. The project having actually started in 1991 was likely to spill over for a year into the 9th Five Year Plan.
- 2.3 The World Bank monitoring team visited India between 26-27 June 1991 and held discussions in New Delhi with officers of CWC and the participating States to determine the progress made by the participants in the implementation of this project.
- 2.4 The Chairman intimated that the second phase of this project could be initiated with the participation of a few more States. The prospective participants should, however, start working on the identification report from now, as between the commencement of identification and appraisal, the time taken was approximately a year. It was also

desirable for prospective States to initiate hydrology review of dams under their charge since that was one item which could create a bottleneck in the programme and on which World Bank would lay stress, for completion before undertaking remedial measures for dams in distress.

(Action : States)

3.0 Review of National Scenario

- 3.1 During this monsoon there had been press reports of distress in Nagarjunasagar dam in Andhra Pradesh, Totladoh dam in Maharashtra and Chandora dam in Madhya Pradesh. While distress in the first two dams was not considered of serious nature, Chandora dam failed by overtopping due to failure of gates to open and discharge of inflow floods.
- 3.2 Representative from Maharashtra intimated of the failure of "Pashana" Minor Irrigation Tank in Konkan Region on 15.8.1991. The tank was an earthfill structure of 24 mt. height impounding a storage of 30 m.cum. The embankment failed due to piping on 15.8.1991 during first filling.
- 3.3 Discussing on the issue of failure from overtopping, it was felt that all dams should have sufficient low level outlets for depletion of reservoir in case of distress. In this connection Director ("Dam Safety Assurance and Rehabilitation Project") mentioned that a document titled "Criteria and Guidelines for Evacuating Storage Reservoirs, sizing low level outlets and initial filling of reservoirs," was circulated to all the irrigation departments and the dam safety cells of the States in May 1986. None have offered comments. A copy of the same is enclosed for ready reference as Annex 2. Members were requested to offer comments, if any.

(Action : States)

4.0 Implementation of the recommendations of the "Report on Dam Safety Procedures"

- 4.1 The States had been taking action from time to time in implementing the recommendations contained in the "Report on Dam Safety Procedures" circulated in 1987. So far, information had been received from 8 member States and BBMB. The States of Bihar, Kerala, Rajasthan and Kerala had not yet responded. They were requested to send in their replies at the earliest.

- 4.2 On receipt of information from all members, CWC would prepare a note on the issue touching upon those action points where the States had expressed difficulty in implementation and the NCDS would be in a position to take decision on such issues.

(Action : States / CWC)

5.0 Review of the Dam Safety Activities in India including the status report on health of dams.

- 5.1 States / Members were requested regularly to send status report on dam safety activities in the States, including health status of dams.
- 5.2 The following States / Organisations had responded:

- (a) Andhra Pradesh
- (b) Bhakra Beas Management Board
- (c) Gujarat
- (d) Karnataka
- (e) Madhya Pradesh
- (f) Orissa
- (g) Tamil Nadu

Maharashtra had submitted status report (1989-90) for large dams in the State based on the post-monsoon inspection of 1989 and pre-monsoon inspection of 1990. The reports indicated in brief the deficiencies noticed in each dam and the suggested remedial measures.

- 5.3 Rest of the States were requested to send the information on dam safety activities in their States, including health status of large dams at the earliest.

(Action : States)

6.0 Formation of sub-committees to monitor safety aspects of inter-State dams.

- 6.1 Three sub-committees were set up for monitoring safety aspects of inter-State dams in the Parambikulam Aliyar System (PAP), Mahanadi System and Subarnarekha System in March 1990.
- 6.2 The first meeting of the sub-committee to monitor the safety aspects of inter-State dams in the PAP system was held in the first week of October 1991. Chief Engineer (DSO), CWC informed that two dams,

namely Parambikulam & Sholayar were inspected by a team of officers from CWC, PWD of Tamil Nadu and Irrigation Department of Kerala, who were members of the sub-committee. Maintenance of both these dams was appropriate and no distress has been noticed in any of the two. Foundation drains in both the dams appeared to be choked for which the owners of the dam were requested to investigate. There was scope for improvement in the observation and recording of seepage through the dam which were discussed at site. CWC was preparing a draft report on the inspection and would pass on to the States of Tamil Nadu & Kerala for consideration.

- 6.3 Conveners of the sub-committee to monitor safety aspects of inter-State dams for Mahanadi and Subarnarekha systems might intimate the progress for holding the first meeting and the names of dams proposed to be inspected.

(Action : States – Bihar, Madhya Pradesh, Orissa & West Bengal)

7.0 Compilation of "Data Books"

- 7.1 It was decided during fourth meeting of NCDS that "Data Books" for dams of National Importance needed to be sent to CWC / DSO for record.
- 7.2 Such information had been received from the States of Andhra Pradesh, Bihar, Gujarat, BBMB, Karnataka, Madhya Pradesh (except for Tawa dam) & Tamil Nadu. The States of Kerala, Maharashtra, Orissa, Rajasthan, Uttar Pradesh and West Bengal were yet to send "Data Books" for National Importance dams in their States / Organisations. Information was also pending in respect of Salal dam owned by NHPC.
- 7.3 It is requested that "Data Books" for dams of National Importance be compiled by those States who were yet to supply this information and intimate to NCDS the progress achieved.

(Action : States)

8.0 Safety inspection of barrages

- 8.1 During the 7th meeting of NCDS, the States were requested to take stock of the total number of important barrages in order to verify the list of barrages State-wise supplied by DSO, CWC. States were also requested to fill up a proforma titled "Performance Data on Barrages." Information received from the States was as under:

Sl.No.	State	Total No.of Barrages	Information Supplied (No.)
(a)	Andhra Pradesh	5	5
(b)	Bihar	6	Nil
(c)	BBMB	2	2
(d)	Gujarat	2	2
(e)	Karnataka	3	2
(f)	Kerala	3	Nil
(g)	Madhya Pradesh	5	5
(h)	Orissa	1	Nil
(i)	Rajasthan	1	Nil
(j)	Tamil Nadu	5	2
(k)	Uttar Pradesh	20	Nil
(l)	West Bengal	9	Nil

8.2 States who had not yet responded were requested to compile information on the same and to send to DSO of CWC. States who had supplied partial information were requested to supply the balance information expeditiously.

(Action : States)

9.0 Safety status of Dams of National Importance (NID)

9.1 In all, there were 43 dams of National Importance and information on the safety status of 26 such dams had been received so far. Information was pending from the States as shown below in respect of dams mentioned against each.

Kerala

1. Kakki
2. Idukki
3. Cheruthoni
4. Kulamavu
5. Idamalayar

Madhya Pradesh

6. Gandhi Sagar

Jammu & Kashmir (NHPC)

7. Salal

Orissa

8. Hirakud
9. Salandi
10. Balimela
11. Rengali
12. Upper Kolab

Rajasthan

13. Rana Pratap Sagar

Uttar Pradesh

14. Rihand
15. Ramganga
16. Meja

West Bengal

17. Kangsabati

- 9.2 Chairman, NCDS requested the States to send pending information at the earliest, so that a publication could be brought out on Water Resources Day, i.e. in April 1992.

(Action : States)

10.0 Dam Safety Legislation

- 10.1 During the last meeting of NCDS in March 1991, members of those States who had not responded were requested to pursue with their State Governments for comments on Draft Bill on Dam Safety Legislation. Secretary, Water Resources had already written D.O. letters to the Chief Secretaries of seven States (viz. Andhra Pradesh, Bihar, Karnataka, Kerala, Maharashtra, Rajasthan and Uttar Pradesh) in March 1991.

- 10.2 So far, reply had been received only from the Government of Andhra Pradesh stating that the Draft Bill was acceptable.
- 10.3 The remaining six States indicated above were again requested to pursue the case with their respective Governments. BBMB was requested to get the comments of the Board and Ministry of Energy on the Draft Bill. Comments of the States and Ministry of Energy were required to be sent expeditiously to DSO of CWC for processing the case.

(Action : States)

11.0 Safety Review of Large Dams

- 11.1 According to the recommendations of the "Report on Dam Safety Procedures," safety review of dams of more than 15 m height or which stores 60 m cubic metre or more of water, was to be carried out by an independent panel of experts once in ten years. This was accepted by Government of India in 1987. Hence such review of all large dams is to be completed by 1997.
- 11.2 So far, Gujarat State had prepared a ten year programme of inspection of 197 large dams. The State of Madhya Pradesh had submitted a tentative programme of Phase I inspection of 45 large dams during 1991-92 and 120 large dams during 1992-93. NHPC had conducted safety inspection of Salal dam in March and June 1991. BBMB had intimated that safety review of all three dams is being conducted by the Dam Safety Committee of BBMB. The State of Madhya Pradesh had intimated that since the task of review could be handled by serving officers of the department, constitution of an independent panel of experts was not considered necessary.
- 11.3 Discussing this issue, members of NCDS felt that safety review by an independent panel of experts was necessary and could not be done away with. The States might make an annual programme for such a review for large dams in the State covering a period 1992-97 (since the job is due for completion by 1997) and to intimate NCDS of the annual programme. Chairman, NCDS also pointed out to the members that for the States to qualify for inclusion in the second phase of the on-going "Dam Safety Assurance and Rehabilitation Programme," completion of this item might be a qualifying criteria.
- 11.4 All other States / Organisations other than Gujarat and BBMB were requested to intimate the programme for safety review of large dams in their States.

(Action : States)

12.0 Dam Review Panels for all major irrigation projects

12.1 Regarding establishment of Dam Safety Review Panels for all major irrigation projects in the States, the issue was discussed at length in the 5th meeting of NCDS. So far, replies had been received from the States of Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra, Tamil Nadu, BBMB and NHPC as under:

	States / Organisations	Reply
(a)	Andhra Pradesh	Activities for investigations, design and construction were carried out under the supervision of Chief Engineer of the State who was well experienced. The State did not feel the necessity of having a separate panel of experts.
(b)	Gujarat	Matter was under consideration of the Government.
(c)	Madhya Pradesh	A proposal had been prepared and submitted to State Government.
(d)	Maharashtra	Appointment of Dam Safety Review Panels involved considerable financial implications. However, Government was considering the proposal.
(e)	Tamil Nadu	Since no major irrigation project was under consideration, Dam Safety Review Panels were not considered necessary.
(f)	BBMB	There were no on-going projects and hence Dam Safety Review Panels were not required.
(g)	NHPC	They had a Technical Advisory Committee for their projects which was considered sufficient.

12.2 Other States / Organisations who have not responded were requested to expedite their reply.

(Action : States)

13.0 Undertaking emergency action downstream of dams and demarcation of flood zones.

- 13.1 During the last meeting of NCDS, States were requested to work out modalities for undertaking Emergency Action Planning for dams of National Importance in their States, as a starting point.
- 13.2 The State of Tamil Nadu replied that it did not consider essential to enact the flood zoning bill. However, Emergency Action Planning for dams of National Importance would be taken up. The State of Madhya Pradesh had already intimated that such a proposal was under consideration of the State Government. The State of Maharashtra had commenced this work with the dams of National Importance and had already prepared Emergency Action Planning for Koyna, Paithan & Ujjani dams. Chairman, NCDS opined that as a first task, the four States who were participants in the "Dam Safety Assurance and Rehabilitation Project" should undertake Emergency Action Planning for the 33 dams for rehabilitation.
- 13.3 The remaining States / Organisations are requested to intimate the progress achieved for undertaking Emergency Action Planning for dams of National Importance in their respective States.

(Action : States)

14.0 National Register of Large Dams

- 14.1 CWC of DSO had requested all the States to examine the National Register of Large Dams and intimate corrections required to be made, if any.
- 14.2 Some States have responded and necessary corrections in the computerized data had been undertaken. The States of Bihar, Kerala (for dams under KSEB), Orissa, Rajasthan, Uttar Pradesh and West Bengal were yet to respond. They were requested to examine the register and send details of corrections, if any, to DSO, CWC to enable updating the register.

(Action : States)

15.0 Strengthening of Dam Safety Organizations / Cells in States

- 15.1 A note titled "Strengthening proposal of Dam Safety Organisation in States" was circulated along with minutes of the 7th meeting of NCDS. It contained strengthening proposal from the States of Andhra Pradesh, Kerala (KSEB), Maharashtra and Uttar Pradesh.
- 15.2 The States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu had already intimated that such proposal had already been covered by the

"Dam Safety Assurance and Rehabilitation Project" under the World Bank assistance. The States of Gujarat, Karnataka and West Bengal had reported that strengthening proposal for their organization was under consideration of the respective State Government. These States were requested to send details of the proposals.

- 15.3 Bihar was the only State who has not responded to this item and the State is requested to intimate NCDS on whether a proposal for strengthening their DSO has been prepared.

(Action : States)

16.0 Setting up of hydrological unit in the State for review of hydrology of existing dams

- 16.1 During the 7th meeting of NCDS, necessity of reviewing the hydrology was discussed. Representatives of Gujarat, Madhya Pradesh and Maharashtra had intimated NCDS that such review had been undertaken by their States. So far, Gujarat had carried out such review for 74 dams, Madhya Pradesh for 22 dams and Maharashtra for 14 dams. Representative from NHPC intimated that such review had been undertaken for Salal dam.

- 16.2 The States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu were covered under the DSARP with World Bank assistance. The proposal also included strengthening / creation of a hydrology unit and review of hydrology of all existing large dams in these States.

- 16.3 It was agreed that the first target should be the dams of National Importance in the States and the States should endeavour to complete the hydrology review of such dams within a year.

- 16.4 The remaining States / Organisations were requested to intimate action taken by them in setting up an independent unit for undertaking hydrology review of existing dams.

(Action : States)

17.0 Data on Gates Storages

- 17.1 To obtain updated data on gated storages for all large dams, the States were requested to supply information. Information had been received from the States of Gujarat, Maharashtra, Tamil Nadu & BBMB.

- 17.2 The information was pending from the following States:

- | | | |
|-------------------|---|--|
| 1. Andhra Pradesh | : | 44 dams
(storage against gates for 41 dams given) |
| 2. Bihar | : | No response |
| 3. Karnataka | : | 23 dams
(storage against gates for 19 dams given) |
| 4. Kerala | : | 6 dams |
| 5. Madhya Pradesh | : | 17 dams |
| 6. Orissa | : | 48 dams
(storage against gates for 1 dam given) |
| 7. Rajasthan | : | 23 dams
(storage against gates not given) |
| 8. Uttar Pradesh | : | 30 dams
(storage against gates for 24 dams given) |
| 9. West Bengal | : | No response |

17.3 Discussing on the issue of gated storages, the Committee felt the need for determining the time taken to operate the spillway gates and to examine for the dams of National Importance whether the time taken to discharge flood waters satisfies the reservoirs operating criteria.

17.4 States who have supplied partial information were requested to supply complete information expeditiously. States who have yet to respond were requested to supply complete information at the earliest as a publication on gated structures was proposed to be published by the end of this year.

(Action : States)

18.0 Preparation of completion report of large dams

18.1 During the 7th meeting of NCDS, Member (D&R) opined that priority should be given to National Importance dams followed by other large dams while preparing the completion report of dams.

18.2 Position regarding preparation of completion report by the States / Organisations was as under:

(a)	Gujarat	Completion reports for 8 dams aided by World Bank were nearing completion.
(b)	Karnataka	Completion report for 3 dams of National Importance and 5 large dams had been completed.
(c)	Maharashtra	Completion Report for 6 dams had been completed.
(d)	Orissa	Completion report for 2 dams has been completed and for 3 dams under preparation.
(e)	Tamil Nadu	History of Cauvery Mettur Project supplied as completion report for Mettur dam.
(f)	BBMB	As part of the completion report for projects under BBMB they had supplied a copy of the following: (i) Construction features, Beas Sutlej Link and Dehar Power Plant - Vol.I (ii) Construction features, Beas dam and Pong Power Plant - Vol.I.

18.3 It was the unanimous opinion of NCDS that the States should concentrate on preparing the completion report of dams of National Importance.

18.4 States of Gujarat, Karnataka, Maharashtra and Orissa are requested to send one copy of the completion report for any dam of National Importance in their States for perusal by NCDS. Those States who have not taken up this job are requested to prepare a programme for preparation of completion reports and intimate the same to NCDS.

(Action : States)

19.0 Preparation of Operation & Maintenance Manual

19.1 So far, Operation & Maintenance Manuals had been received from BBMB for Pandoh dam & Reservoir, its water conductor system; Dehar & Pong Power Plant; Beas Dam & Pong Reservoir. Gujarat had sent Reservoir Operation Manual for Karjan & Damanganga projects. Uttar Pradesh had sent O&M Manual for Yamuna Hydro Electric Project. West Bengal had sent a draft regulation manual for Kangsabati Reservoir.

19.2 During the 7th meeting of NCDS, representative from Maharashtra intimated that the O&M Manual for Paithon dam was nearing completion. A copy of the same may be supplied.

19.3 Other States might take up the preparation of O&M Manuals and report to the Committee the progress achieved.

(Action : States)

20.0 Instrumentation for dams

20.1 Regarding instrumentation for dams, States were requested to verify & update information and intimate mortality, performance, analysis of instrumentation data & conclusions drawn. Members were also requested to supply a copy of the structural behaviour report based on instrumentation data to DSO, CWC for placing it before the NCDS.

20.2 So far, Madhya Pradesh had supplied factual information for 11 dams, Maharashtra for 46 dams, BBMB for 3 dams. The State of Tamil Nadu had supplied information for 6 dams and had also intimated that majority of instruments were not functioning. Gujarat had sent information for 25 dams and also supplied structural behaviour report for Ukai & Sukhi dams. Recently, the Irrigation Department of Maharashtra had sent information concerning mortality of a variety of instruments based on their experience. From their information it was seen that instruments like twin tube hydraulic piezometers, stress meters (resistance and vibrating wire type) and vertical settlement devices were the ones having high mortality rates as much as fifty percent. It had also been stated that none of the pore pressure transducers installed was working.

20.3 Rest of the States / Organisations were requested to send in the information as mentioned above and also supply a sample copy of the structural behaviour report for one major dam in their State for information of NCDS.

(Action : States)

21.0 Equipment for underwater surveillance

21.1 So far, the Remote Operated Underwater Vehicle (ROV) had been successfully used for underwater scanning of the following dams during the period shown against each.

<u>Projects</u>	<u>Period</u>
(a) Koyna (Maharashtra)	November 1990
(b) Tigma (Madhya Pradesh)	May 1991
(c) Bhakra (BBMB)	June 1991
(d) Gandhisagar (Madhya Pradesh)	July 1991

21.2 The following States / Organisations had requested CWC to spare the ROV for underwater scanning of their dams indicated against each.

- | | |
|----------------|---|
| (a) Gujarat | : Ukai, Kadana, Dharoi, Karjan, Panam, Damanganga |
| (b) Karnataka | : Talakalale |
| (c) Orissa | : Hirakud |
| (d) Tamil Nadu | : Periyar, Sholayar, Pechiparai, Manimuthar |

21.3 The Diving Gear Equipment (DGE) procured by CWC under the on-going UNDP programme was tested with the assistance of diving technician from DIVEX of UK who were the suppliers of the equipment, and engineers from BBMB at Bhakra Dam. Training of the diving team of BBMB by the suppliers was scheduled sometime in November 1991.

21.4 Director (Dam Safety), CWC requested the members of NCDS that to cover underwater scanning of the remaining projects mentioned above, the Central Soils & Materials Research Station (CSMRS) who were handling the ROV would be able to complete the job by March 1992. Hence, all further requests for use of ROV would be attended during the financial year 1992-93. States might take note of this fact while requisitioning the services of ROV in future.

(Action : States)

22.0 Safety aspects of Inter-State Dams

22.1 States were requested to identify inter-State dams and prepare a list of such dams for compilation by DSO, CWC for putting up the same to NCDS.

22.2 Reply from the States of Tamil Nadu and Madhya Pradesh had been received so far. The State of Tamil Nadu had identified six number

inter-State dams owned by Tamil Nadu PWD. The State of Madhya Pradesh had identified 12 completed and 9 under construction dams.

- 22.3 Other States were requested to identify inter-State dams in their States and to send information at the earliest to enable DSO, CWC to prepare a consolidated report of the same.

(Action : States)

23.0 Seismic status of dams of National Importance.

- 23.1 As a measure of dam safety, many seismic instruments had been installed in the vicinity of some dams and also in the dam body. There was, however, no laid down procedure for reporting the results of analysis of data obtained from these instruments. In line with the practice adopted by the NCDS of reporting safety status of large dams, it was necessary that NCDS compiled the seismic report of National Importance dams regularly. During the last meeting of NCDS, the States were requested to supply information on the seismic instrumentation network for their National Importance dams and the report of analysis of seismic data.

- 23.2 So far, BBMB had supplied information on the seismic network for the three dams under their charge and had intimated that no earthquake of engineering significance was recorded in the year 1990. The State of Maharashtra had submitted a seismological network map of the State and informed that out of 5 National Importance dams, Koyna was equipped with an independent network comprising 6 stations. At Totladoh, a seismic observatory was already set up and the data was properly collected and promptly analyzed. The state of Gujarat informed that all three National Importance projects, viz. Ukai, Kadana & Karjan in the State were monitoring seismic status and had submitted model report of seismic status for regions around Kadana and Ukai Network System.

- 23.3 Other States were requested to supply relevant information in this issue.

(Action : States)

24.0 Dams under purview of Dam Safety Organization

- 24.1 As all large dams do not come under the purview of State's DSO, States were asked to supply information in this regard in the proforma given during 6th meeting of NCDS.

24.2 Information had been received from many of the member States in bits and pieces, and for preparing a consolidated report, information in the proforma circulated was requested for. During the 8th meeting, the State of Maharashtra had supplied information in the format circulated during 6th meeting of NCDS.

24.3 Rest of the States were requested to compile information as per the format and to send the same to NCDS Secretariat.

(Action : States)

25.0 Standardized Meteorological & other observations.

25.1 In order to obtain information on the meteorological and other observations carried out by the States at the dam sites, a list of nine items were suggested during the 6th meeting of NCDS in September 1990.

25.2 So far, information had been received from the States / Organisations as under:

- | | |
|-------------------|---|
| 1. Andhra Pradesh | : for 3 dams |
| 2. BBMB | : for 3 dams |
| 3. Gujarat | : for 53 dams |
| 4. Karnataka | : for 19 dams |
| 5. Madhya Pradesh | : Informed selecting 15 dams for provision of gadgets for hydrometeorological observations. |
| 6. Maharashtra | : for 76 dams |
| 7. Orissa | : for 35 dams (incomplete information) |
| 8. Tamil Nadu | : Informed that they would install a weather station at each dam site. |

25.3 The States who had supplied partial information were requested to send in the complete information, and for the remaining States, requisite information might be sent expeditiously.

(Action : States)