

**Minutes of the sixth meeting of  
National Committee on Dam Safety held on 19.7.1990**

1.0 The sixth meeting of National Committee on Dam Safety was held on 19 July 1990 in Sewa Bhavan, New Delhi under the chairmanship of Shri V.B.Patel, Chairman, Central Water Commission.

1.1 The list of officers who attended the meeting is given in Annex I.

1.2 The Chairman welcomed the members of NCDS and other participants.

**2.0 Confirmation of the minutes of 5<sup>th</sup> meeting.**

2.1 Minutes of the fifth meeting of NCDS held on 30 November 1989 at New Delhi were confirmed.

**3.0 Dam Safety Assurance Project.**

3.1 Chief Engineer (DSO), CWC introduced the subject. Member (D&R) elaborated and intimated that the main thrust of the project is on rehabilitation of selected dams in distress. Participants of the project are States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu who together own about 40% of the large dams in the country and the present institutional efforts on the dam safety assurance programme for these States is to be adequately supported through the project. Tentatively, 30 dams have been identified for rehabilitation. Member (D&R) added that as part of institutional strengthening, CWC will also be strengthened and an important area being strengthening of hydrology unit of CWC.

3.2 Members were requested to offer their comments on this project. They were unanimous in stating that the hydrological review of large dams is a very important issue and lot of effort is required in this direction.

3.3 Chief Engineer (Hydrology), CWC stated that during review of hydrology of any project, for determination of PMF or SPF, a lot of effort and assistance was required from IMD. Presently the set up in CWC and IMD was sufficient to undertake hydrological review for dams of National Importance which number about 45 in a routine manner. However, for undertaking hydrological review of all large dams in the country number 3000 and odd, regionalized PMP charts would be necessary. In this connection IMD may need strengthening.

3.4 Representative from IMD intimated that a programme of expansion of IMD for rendering precipitation values for hydrologic review of large

dams is under consideration. He stated that a lot of studies have been carried out for providing precipitation values for dams of National Importance. However, for medium and small dams, regionalized PMP charts would be useful. For preparation of regional maps of PMP for the whole country, about two years would be necessary.

- 3.5 The Maharashtra representative was of the opinion that presently IMD is not in a position to cater to the needs of all the States. Chairman, NCDS desired that in order to determine the work load of IMD, the States should send a list of cases pending with IMD to CWC for taking up the matter with IMD.

(Action : States / Members / IMD)

#### **4.0 Review of National Scenario.**

- 4.1 The national scenario particularly with reference to distress to dams, deficiencies, if any, in the structural and operational features and failure cases is to be reviewed mainly by the NCDS.

- 4.2 Members attending the meeting reported the following:

- (a) BBMB : BBMB reported no distress and no operational problem upto 30 June 1990. A note on functioning of Bhakra Beas complex for period ending 30.6.1990 was handed over during the meeting.
- (b) Gujarat : Representative from Gujarat reported leakage in Karjan dam from its foundation. A detailed report on seepage in Karjan dam was submitted. A pre-monsoon inspection report of June 1990 of dams of National Importance, viz. Kadana, Karjan and Ukai was handed over during the meeting. Members may send their comments.
- (c) Maharashtra : Representative from Maharashtra reported no distress and operational problems.

- 4.3 Representative from IMD reported good monsoon distribution all over the country till mid-July. The rainfall distribution was such that in the 35 divisions of the country, 22 had more than average rainfall. Out of the 410 meteorological districts in the country, forecast was correct for 70% of the districts. Region-wise, there was less rainfall in Saurashtra and Kutch. Tamil Nadu also had a mal-distribution of rainfall. He further intimated that information in the form of rainfall charts is being sent weekly to all related organizations including the press.

- 4.4 Member (D&R) intimated that on many instances, cases of dam incidents and dam failures are noticed through paper cuttings and preliminary information comes from the press. He requested all representatives of States to immediately send such information of incidents and distress to CWC so that CWC do not have to rely solely on press reports.

(Action : States / Members)

## **5.0 Implementation of recommendations of the "Report on Dam Safety Procedures."**

- 5.1 Chief Engineer (DSO), CWC informed the Committee that during the last meeting of NCDS, State representatives were requested to prepare a brief note intimating present position and difficulties faced in implementation of some of the recommendations for consideration of NCDS.
- 5.2 During the meeting, this information was supplied by representatives of the following States in a consolidated manner:
- (a) Karnataka
  - (b) Gujarat
  - (c) Madhya Pradesh
  - (d) Maharashtra
  - (e) Orissa

From time to time, other States have also supplied piecemeal information as they went about implementing the recommendations of the "Report on Dam Safety Procedures." They were requested to send a brief consolidated reply for information of NCDS. On receipt of such information, a consolidated report will be placed before NCDS for taking an appropriate view in the matter.

- 5.3 General Manager, NHPC intimated that dam safety activities have been organized both in the corporate and field offices of NHPC.

(Action : States / Members)

## **6.0 Creation / Strengthening DSO / Cells in the States.**

- 6.1 Chairman, NCDS desired to know from representatives of States, details of proposals under consideration of State Governments for strengthening of the States' DSOs / Cells.

6.2 Members attending the meeting intimated as below:

- 1) BBMB : Further strengthening not necessary.
- 2) Gujarat : Proposal for strengthening is with Government.
- 3) Karnataka : A proposal is under consideration of Government.
- 4) Orissa : No fresh proposal.
- 5) Rajasthan : Apart from the strengthening proposed under the DSARP, there is another strengthening proposal for Design Wing of the States.
- 6) Uttar Pradesh : Proposal for strengthening has been prepared.
- 7) West Bengal : Strengthening proposal is under discussion between Department and the State Governments.

6.3 Member (D&R) requested for CWC a copy of the strengthening proposals so that the same can be pursued with appropriate authorities of the State Government at National level.

6.4 Shri B.M.Hukku, President, Indian Society of Engineering Geology was of the opinion that there should be Engineering Geologists in every State DSO for tackling foundation problems. Representative of GSI intimated that in many instances services of Engineering Geologists are requisitioned by the States at the last stage in dealing with rehabilitation measures for dams in distress. This leaves much to be desired. It would be necessary to associate Engineering Geologists from the initial stages while dealing with a distress problem so that the geological aspects of the problem can be viewed in proper perspective. Reacting to this, Member (D&R) requested GSI representative to prepare a note for having a standing arrangement between GSI and the State Governments for association of Engineering Geologists in dealing with rehabilitation measures of dams in distress where structural and geological problems are predominant.

6.5 Chairman, NCDS desired that each State should collect information on availability of Engineering Geologists in their States for the purpose and examine its adequacy. A brief note on this subject may be prepared by all the States and sent to NCDS for further action.

(Action : States / Members)

## **7.0 Dams under the purview of State DSOs / Cells**

- 7.1 As all large dams do not come under the purview of Dam Safety Cells of the State, a proforma was circulated during the meeting, requesting members to fill up the number of large dams in their States under various agencies. So far information has been obtained from the States of Andhra Pradesh, Karnataka, Kerala, Gujarat, Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal. Other States are yet to supply this information and are requested to expedite.
- 7.2 Member (D&R) intimated that the Chief Secretaries of Tamil Nadu and Kerala were addressed by Chairman, CWC to bring dams of State Electricity Boards under the purview of State Dam Safety Cells for dam safety activities. Representatives from Tamil Nadu and Kerala intimated that no decision had been arrived as yet on this issue.
- 7.3 It also transpired during discussions that many of the States have not conducted a census of large dams owned by other agencies in their States like Water Supply, Industries, Mines, etc. Chairman, CWC desired that this information may be compiled by all the States in the proforma supplied during this meeting very early. He also suggested that the Dam Safety Cells / Organizations of the States may conduct safety inspections of all large dams owned by other agencies in the State free of charge, so that the Dam Safety Cells remain fully aware of the safety status of such dams.

(Action : States / Members)

## **8.0 Setting up of hydrological unit in the States for review of hydrology of existing dams.**

- 8.1 It was reported during the fifth meeting of NCDS that the States of Gujarat, Madhya Pradesh and Maharashtra had undertaken review of hydrology of existing dams. Madhya Pradesh has submitted a list of 22 dams giving details of design flood, before and after review, including methodology adopted and the mode of accommodating the revised flood. Similar information in details has been supplied by Gujarat for 49 on-going schemes and 70 existing schemes which are not under the World Bank aid. The State has supplied information for 35 World Bank aided projects also. This information may be passed on to WP Wing of CWC.
- 8.2 Member (D&R) intimated that under DSARP posed for World Bank aid, Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu have proposed to strengthen their hydrology unit. He desired to know action taken by

other States to strengthen their hydrology organizations. Maharashtra and West Bengal representatives intimated that proposals have been formulated for this purpose.

- 8.3 Chairman, CWC requested remaining States to immediately prepare proposals for establishing such units and intimate the same to NCDS.
- 8.4 Chief Engineer (Hydrology), CWC observed that in general, inadequacy of data is the main problem in undertaking hydrological review of both new and existing dams. He stated that for existing dams, CWC will not render a purely consultancy job. CWC in such cases will do only joint studies with the State Government referring the case.

(Action : States / Members)

## **9.0 Safety review of dams.**

- 9.1 Member (D&R) intimated that one of the recommendations in the "Report on Dam Safety Procedures" related to safety review of all large dams by an independent panel of experts once in ten years. This recommendation was accepted by Government of India in 1987 and as such one review by 1997 becomes due for all large dams. He also stated that for dams situated in seismic zones, seismic revaluation is necessary. It would be essential for the States to develop capability for conducting dynamic analysis also, say in the next five years.
- 9.2 Chairman, NCDS desired that all States should prepare a programme for safety review of large dams under intimation to NCDS to complete such review by 1997. The representatives of States informed that they were in the process of conducting these reviews by 1997. The programme may be finalized within a month.

(Action : States / Members)

## **10.0 Safety status of dams of National Importance.**

- 10.1 Chief Engineer (DSO), CWC intimated that out of the 43 existing dams of National Importance, health status of 19 dams is yet to be supplied by the States. Position of pending cases is as under:

(a) Karnataka

Malaprabha : Information pending

(b) Kerala

(i)	Kakki	:	
(ii)	Idukki	:	
(iii)	Cheruthoni	:	No information supplied
(iv)	Kulamavu	:	
(v)	Idamalayar	:	

(c) Madhya Pradesh

(i)	Gandhi Sagar	:	Information incomplete and
(ii)	Tawa	:	not in specified format

(d) Orissa

(i)	Hirakud	:	
(ii)	Salandi	:	
(iii)	Balimela	:	No information supplied
(iv)	Rengali	:	
(v)	Upper Kolab	:	

(e) Rajasthan

	Rana Pratap Sagar	:	No information supplied
--	-------------------	---	-------------------------

(f) Uttar Pradesh

(i)	Rihand	:	
(ii)	Ramganga	:	No information supplied
(iii)	Meja	:	

(g) West Bengal

	Kangsabati	:	No information supplied
--	------------	---	-------------------------

(h) NHPC

	Salal	:	No information supplied
--	-------	---	-------------------------

10.2 The representatives of concerned States agreed to send the pending information within a month.

(Action : States / Members)

## **11.0 Preparation of Operation & Maintenance Manual.**

- 11.1 A set of BBMB publications in respect of Pandoh dam, its reservoir, water conductor system and Dehar Power Plant (in six parts) and for Beas Dam at Pong (in four parts) supplied by BBMB was exhibited. These are considered as good models for undertaking preparation of O&M Manuals for other projects.
- 11.2 Representative from Gujarat intimated that O&M Manuals have been prepared for Karjan and Damanganga projects and submitted to World Bank for approval. A copy of the Executive Summary of the Reservoir Operation Manual for Karjan Project was exhibited by him.
- 11.3 Representative from Maharashtra intimated that the O&M Manual for Paithan Dam would soon be ready. Representative from West Bengal informed that O&M Manuals for Kangsabati and Mayurakshi dams have been prepared and will be sent to CWC.
- 11.4 Other States were requested to prepare O&M Manuals for National Importance dams in their States in the first instance and send a sample copy to NCDS.

(Action : States / Members)

## **12.0 Preparation of completion reports of large dams.**

- 12.1 Member (D&R) opined that priority should be given to National Importance dams followed by other large dams.
- 12.2 Representative from BBMB intimated that completion reports on design and construction features of Bhakra dam have been completed. Representative from Tamil Nadu intimated that completion report for one dam has been done. Orissa representative stated that such reports have been completed for two dams and are under preparation for three dams. Representative from Gujarat informed that completion reports of 8 dams aided by World Bank are nearing completion. Representative from Maharashtra informed that this job has been completed for 6 dams. Representative from Karnataka submitted a list of experts assigned the task for 20 dams. So far completion reports of 3 dams of National Importance and five other large dams only have been completed. The matter may be taken up with State Secretaries and time bound programme chalked out for the task.
- 12.3 Other States were requested to send a list of dams for which preparation of completion report has been taken up and the likely time frame it would take to complete the job.

(Action : States / Members)



### **13.0 Compilation of Data Books.**

- 13.1 During the fourth meeting of NCDS, it was decided that only Data Books of dams of National Importance may be sent to DSO, CWC for record. So far, Data Books have been received for six dams from Karnataka, two dams from Bihar (DVC), one from Gujarat and two from BBMB.
- 13.2 States as under having dams of National Importance are required to expedite compilation of Data Books and send the same to DSO of CWC:

Andhra Pradesh (2 dams) : Nagarjunasagar & Srisaillam

Gujarat (1 dam) : Kadana

Karnataka (4 dams) : Bhadra, Linganamakki, Supa & Mani

Kerala (5 dams) : Kakki, Idukki, Cheruthoni, Kulamavu & Idamalayar

Madhya Pradesh (2 dams) : Gandhisagar & Tawa

Maharashtra (4 dams) : Koyna, Paithon, Ujjani & Isapur

Orissa (5 dams) : Hirakud, Salandi, Belimela, Rengali & Upper Kolab

Rajasthan (1 dam) : Ranapratap Sagar

Tamil Nadu (2 dams) : Mettur & Sholayar

Uttar Pradesh (3 dams) : Rihand, Ramganga & Meja

West Bengal (1 dam) : Kangsabati

NHPC – J & K (1 dam) : Salal

- 13.3 The State representative agreed to supply the data book of dams of National Importance as indicated in para 13.2 within two months.  
(Action : States / Members)

### **14.0 Standardized meteorological and other observations.**

- 14.1 During the fifth meeting of NCDS, the States / organizations were requested to send a list of dams where meteorological observations were conducted and the list of instruments installed.

- 14.2 Information is supplied by BBMB for 2 dams. Maharashtra has responded with complete information for 76 large dams. Similar information has been supplied by Gujarat for 53 large dams. Karnataka has supplied information in respect of 19 large dams. Tamil Nadu and Orissa have supplied incomplete information. In general it is seen that the type of measurements conducted relate to temperature, rainfall, evaporation, wind velocity and direction.
- 14.3 The remaining States / Organizations are requested to send this information at the earliest. A list is tentatively standardized and is kept at Annex II. All States were requested to procure at least these instruments within one year.
- 14.4 Information on wave height recorders manufactured by CWPRS has been sent to all members of NCDS in April 1990. The remaining States may now proceed for procurement. BBMB has intimated that an electronic automatic wave height recorder developed at Beas project has been installed in the reservoir. Functioning of the gadget is under observation.

(Action : States / Members)

## **15.0 Dam Safety Legislation.**

- 15.1 So far the States of Gujarat, Orissa, Tamil Nadu and BBMB have shown their willingness to go in for legislation. This has been communicated to the MoWR for further action. Madhya Pradesh did not consider legislation necessary. Their representative may take up the matter again with the State Government. Representatives from the States of Karnataka, Kerala, Maharashtra, Rajasthan, Uttar Pradesh & West Bengal intimated that the case is pending with their State Governments. The position may be ascertained by CWC from Andhra Pradesh and Bihar, since their representatives did not attend this meeting.
- 15.1 Members from States who have not yet replied may consult their State Governments and send their concurrence on Dam Safety Legislation to NCDS.

(Action : States / Members)

## **16.0 Review of the dam safety activities in India including status report on the health of dams.**

- 16.1 So far, status reports on dam safety activities for various periods have been received from the States of Andhra Pradesh, Gujarat, Karnataka, Orissa and BBMB as shown below:

Sl. No.	State		Status Report	When Recd. in CWC
1	Andhra Pradesh	(i)	First status report on dam safety activities of Dam Safety Cell (Dec. 1985 to Dec.1987)	Feb 1988
2	Gujarat	(i)	First status report on activities of DSO (31.7.81 to 30.9.84)	Dec. 1984
		(ii)	Second status report on activities of DSO (During the period 1.10.84 to 31.12.85)	Jan. 1987
		(iii)	Third status report on activities of DSO (1.1.86 to 30.6.86)	Jan. 1988
		(iv)	Fourth status report on activities of DSO (1.7.87 to 31.12.89)	July 1990
3	Karnataka	(i)	First status report of Dam Safety Cell	July 1988
		(ii)	Second status report of Dam Safety Cell	Mar. 1989
		(iii)	Third status report of Dam Safety Cell	May 1990
4	Orissa	(i)	Status report on General Health conditions of dam safety activities of DSO	Jan. 1989
5	BBMB	(i)	Bhakra Beas Complex dam safety activities and instrumentation	April 1988
		(ii)	Bhakra, Beas and Pandoh	Nov. 1989

- 16.2 Chief Engineer (DSO), CWC intimated that status reports are necessary for incorporating information on individual States in the next report on dam safety activities in India which is under preparation in CWC. Members / States who have not yet sent the status report of dam safety activities in their respective States, including health status

of dams, were requested to send the status report covering activities upto December 1989, preferably by the end of August 1990.

(Action : States / Members & CWC)

### **17.0 Formation of sub-committee to monitor safety aspects of inter-State dams.**

17.1 Members were informed that three sub-committees were constituted for monitoring the safety aspects of inter-State dams on the basins of Parambikulam Aliyar System, Mahanadi System and Subarnarekha System. The constitution and membership of the sub-committees was circulated to all members and State Governments in April 1990.

17.2 Chief Engineer (D&R), IDRB, Kerala who is the Member Secretary and Convener of the Parambikulam Aliyar System and Chief Engineer (Design), Orissa who is the Member Secretary and Convener of the Mahanadi and Subarnarekha systems were asked to convene a meeting of the sub-committees immediately and report to NCDS, the action taken.

(Action : States / CWC)

### **18.0 Dam Review Panels for all major Irrigation Projects**

18.1 During the fifth meeting of NCDS, Chairman had indicated the desirability of establishing independent Dam Review Panels for all on-going major irrigation projects in the States. He desired that the States should take action and report.

18.2 Representative from Madhya Pradesh intimated that a proposal has been prepared and submitted to the State Government. Representative from Gujarat intimated that no DRP has been established for projects other than those aided by World Bank. Major problems are referred to CWC, CSMRS and CWPRS. Therefore, independent panels are not considered necessary. He was asked to take up the matter with State Government once more. General Manager, NHPC intimated that they have Technical Advisory Committee for their projects. It serves the purpose of DRPs.

18.3 The State representatives were requested to once more take up the matter with State Governments and intimate their concurrence to NCDS.

(Action : States / Members)

## **19.0 Safety and inspection of barrages.**

- 19.1 During the fifth meeting of NCDS, members were requested to fill up a proforma titled "Performance Data on Barrages" in respect of barrages in their States to enable NCDS take a decision on whether safety inspection of barrages would also be undertaken by States' Dam Safety Cells. A list of barrages in various States was also supplied to the States as an enclosure to the agenda for the sixth meeting of NCDS.
- 19.2 Information has so far been received from BBMB, Madhya Pradesh and Gujarat. The remaining States are requested to send information in the proforma sent to them for placing it before NCDS in the next meeting. Meanwhile, States may start safety inspection of large barrages.

(Action : States / Members)

## **20.0 Undertaking emergency action downstream of dams and demarcation of flood zones.**

- 20.1 In order to form inter-disciplinary committee for evolving operational plan for emergency action downstream of dams and demarcation of flood zones, the Chief engineer (Flood Management), CWC wrote a letter to all the Chief Secretaries, Chief Engineers (Flood) of States in March 1989. Copy of the letter enclosed with the agenda for the sixth meeting of NCDS was considered. States were requested to intimate action taken by them to NCDS.
- 20.2 Reply has not been received from any of the States. They were requested to send a brief status report on flood zoning and flood forecasting arrangements in their States.

(Action : States / Members)

## **21.0 International commission on Large Dams – 58<sup>th</sup> Executive Council Meeting.**

- 21.1 The 58<sup>th</sup> Executive Council meeting of the ICOLD and International Symposium on Safety & Rehabilitation of Tailings Dams was held in Sydney, Australia from 20<sup>th</sup> to 26<sup>th</sup> May 1990. Shri D.N.Kulkarni, Chief Engineer (Irrigation) and Joint Secretary, Government of Maharashtra who attended the meeting intimated NCDS about the following issues discussed during the meeting:

Safety evaluation of existing dams, causes of dam unsafety, methods of improving dam safety and updating information on lessons from dam incidents. Another important issue discussed related to the control of dam safety which included safety report about the design, construction and operation of dams as also quality control during the construction. NCDS will keep in touch with these developments and bring up an appropriate agenda item in the next meeting of NCDS.

## **22.0 INCOLD sub-Committee on Dam Safety.**

- 22.1 A copy of the minutes of the fifth meeting of INCOLD sub-committee on dam safety held at CBIP, New Delhi on 12.1.1990 was circulated with the agenda. Members were requested to provide guidance to the INCOLD sub-committee for further action, if any.

(Action : States / Members)

## **23.0 Terms of Reference for DSRPs and criteria for selection and use of DSRP for World Bank aided projects.**

- 23.1 A document from the World Bank titled "Procedures and criteria for selection and use of independent Dam Safety Review Panels" along with the comments of CWC and an alternate draft was tabled during the sixth meeting of NCDS. This document relates to selection of experts for DRPS for World Bank aided projects. The draft received from the World Bank was considered by NCDS during the meeting and an alternative draft was finalized.

## **24.0 National Register of Large Dams.**

- 24.1 A compilation titled "National Register of Large Dams" published and released in April 1999 was sent to all the members of NCDS and State Governments for information and comments. So far, the State of Madhya Pradesh has recompiled and sent information in respect of dams in Madhya Pradesh. Other States are requested to examine the register and intimate corrections or improvements, if any.

(Action : States / Members)

## **25.0 First International Conference on Research Needs on Dam Safety.**

- 25.1 The Conference being organized by CBIP, is scheduled on 3-6 December 1991 at New Delhi. CBIP has issued the first bulletin requesting all its members to contribute papers / response papers to the Conference. Members of NCDS were requested to contribute

papers based on their experience for publication in the proceedings of the Conference, to ensure maximum participation and maximum dissemination of information.

## **26.0 Dam safety in Parliament.**

- 26.1 Members of NCDS were intimated by Chief Engineer (DSO), CWC that the subject of dam safety figured prominently in Parliament. The questions related to safety inspection, failure and cracks. Details of Parliament questions and their replies given in agenda were considered. Members were requested to send detailed (and corrected) published reports on the cited cases of failure of dams and cracks in dams in their States for updating information available in CWC. Any cases remaining to be included may also be communicated.

(Action : States / Members)

## **27.0 Designing of Dams for Hydrologic Safety**

- 27.1 Chief Engineer (Hydrology), CWC explained to the members of NCDS, the background of designing dams for hydrologic safety. Two issues in general have been broadly highlighted during discussions in the Nagpur seminar, 4 regional workshops and Brain Storming Session in CWC. These are:

- (a) Adequacy of the design criteria for hydrologic safety of storage structures; and
- (b) Design storm analysis and need for standardization and preparation of guidelines for computation of design flood.

- 27.2 He intimated the NCDS about the proposal to appoint a task force consisting of Engineering Hydrologist and Hydrometeorologists from concerned Organizations like IMD, CWC, etc., to consider these issues and come out with a uniform documented procedure to be followed by all the Organizations in the country.

- 27.3 Member (D&R), CWC requested members of NCDS to react to the suggestions of thrust areas and on the task force formation. There was general agreement by members of NCDS on the two issues highlighted and on formation of a task force to arrive at uniform procedures.

- 27.4 The concept of marginal risk was discussed and it was felt that this concept could be used in exceptional cases and situations. It will also involve many studies.

(Action : States / Members / CWC)

## 28.0 Data on Gated Storages

28.1 Gated storages need specific attention in view of separate set of issues associated with safety or their malfunctioning. The States were requested to supply following information.

- (i) Average yield at dam site.
- (ii) Gross Storage
- (iii) Live storage
- (iv) No. & size of gates
- (v) Storage against gates
- (vi) Maximum water level
- (vii) Full reservoir level
- (viii) Crest level of spillway
- (ix) Dead storage level

28.2 Responses received from the States are as under:

- (a) **Andhra Pradesh** : Information has been supplied for 44 dams of which storage against gates was given for 38 dams. The average yield has not been mentioned for any of the dams.
- (b) **BBMB** : Complete information has been supplied.
- (c) **Gujarat** : Complete information has been supplied for 51 dams.
- (d) **Goa** : Complete information has been supplied for Anjunem dam.
- (e) **Karnataka** : Information has been supplied for 23 dams out of which gated storage for 16 dams was mentioned.
- (f) **Madhya Pradesh** : Information has been received for 16 dams out of which gated storage for 15 dams was mentioned.
- (g) **Maharashtra** : Information has been received for 48 dams out of which gated storages for none was mentioned.
- (h) **Orissa** : Partial information has been received for 48 dams out of which gated storages are mentioned in none.
- (i) **Rajasthan** : Information has been supplied partially for 23 dams. However, storage against gates has not been given for any of them.



- (j) **Tamil Nadu** : The State has given information for 42 dams out of which storage against gates has been mentioned for 38 dams.
- (k) **Uttar Pradesh** : The State has given information for 30 dams of which storage against gates has been mentioned for 24 dams.

28.3 All the States were requested to arrange to supply the balance information expeditiously.

(Action : States / Members)

## **29.0 Dam Break Modelling**

29.1 The members were intimated about dam break modeling activities conducted in CWC under the CWC / Danish Hydraulic Institute Cooperation. Dam break models have been installed in CWC. Several officers have also been trained in use of this model in Denmark. The Danish Hydraulic Institute will be running a five week training course on dam break modeling some time in November – December 1990. So far one engineer each from the States of Gujarat and Maharashtra has been trained at CWC, New Delhi on dam break modeling. Nominations for attending this course have been requested by DSO, CWC from the States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu in view of the proposed World Bank aided DSARP.

29.2 These States were requested to send their nominations for the training programme and to identify dams for which dam break studies for preparation of emergency action plan was considered necessary.

(Action : States / CWC)

## **30.0 Safety Aspects of Inter-State Dams**

30.1 During earlier meetings of NCDS it was felt essential to evolve a definition for inter-State dams, to help identifying such dams and in preparation of a list of inter-State dams. Members of NCDS were requested to consider some of the points as detailed below in identifying inter-State dams:

1. Dams which are located on inter-State boundaries.
2. Dams owned and operated by more than one State.
3. Dams whose failure would result in loss of benefits to more than one State.
4. Dams in one State whose failure can cause significant damage in other States.
5. Such upstream dams on whose releases a downstream dam situated in another State is dependent.

30.2 Members concurred with the proposed criteria. They were requested to prepare a list of such dams and send it to CWC for compilation and putting up to NCDS.

(Action : States / Members)

### **31.0 Instrumentation for Dams**

31.1 Members were supplied with a copy of the "Report on Dam Safety Activities in India" and were requested to examine information given in Chapter III wherein details of instrumented dams in the country and types of instruments installed in about 40 dams are mentioned.

31.2 In order to get a proper overview of instrumentation of dams in the country, members requested to verify information given in Chapter III, update and supplement the data as under:

1. Verify the list of instrumented dams in India of Annex 3.1 and intimate corrections, if any, and also update the list.
2. Supply information on the types of instruments installed in the dam in the format of Annex 3.2 for all instrumented dams in the State.
3. Compile data on performance of instruments like date of installation, whether working or not, if not since when the instrument is not working, specifications, supplier and agency which installed the instrumentation.
4. Intimate whether analysis of instrumentation data has been carried out for all instrumented dams. If not, indicate names of dams for which analysis has been carried out. Has the analysis referred to dam designers? If so, what is the dam designers' reaction? What were their suggestions?
5. Since in many instances it has not been possible to carry out instrumentation analysis due to shortage of staff, it may be examined whether such jobs can be entrusted to consultants having experience in such work.
6. A copy of instrumentation analysis report may be sent to Chief Engineer (DSO), CWC so that suggestions for improvement, if any, can be brought to the notice of NCDS for consideration.

(Action : States / Members)

## **32.0 Remote Operated Underwater Vehicle**

- 32.1 Chief Engineer (DSO), CWC described to the members of NCDS description of the ROV procured by CWC under the UNDP scheme for dam safety surveillance. Members were informed that after trial in November 1990, the equipment will be available for use at different dam sites where underwater inspection of the upstream face of dams and other facilities become necessary. Representatives from States were, therefore, requested to intimate DSO, CWC their requirement of underwater inspection, so that a programme for deployment of the equipment can be drawn up.

(Action : States / Members / CWC)

## **33.0 Literature on Dam Safety Surveillance & Instrumentation**

- 33.1 Under the UNDP project on updating "Design Instrumentation and Dam Safety Surveillance," four regional workshops were conducted by consultants from USBR, USA at four different places in the country between April 1989 and February 1990. During the workshop, exhaustive material on Dam Instrumentation and Dam Safety, compiled in nine volumes covering 3000 pages were given to the trainees. The set is considered highly useful and DSO, CWC has been getting requests from States for supply of copies. However, in view of the large volume and limited copies printed, it is not possible to supply additional copies. The State DSOs were requested to withdraw few copies from the participants of the States and keep them in their library for reference. A list showing the number of participants State-wise was also supplied to the members.
- 33.2 The State DSOs were requested to review the literature and in case they need more copies for their field formations, training needs, etc., consolidated demand may be placed with the CBIP for printing and supplying the same as a priced publication.

(Action : States / Members)