

## **Minutes of the twenty-first meeting of National Committee on Dam Safety (NCDS) held at CWC, New Delhi on 22.2.2000**

The twenty-first meeting of National Committee on Dam Safety (NCDS) was held on 22<sup>nd</sup> February 2000 in Central Water Commission under the Chairmanship of Shri A.D.Mohile, Chairman, CWC and Chairman, NCDS.

The list of officers/representatives of various Organizations and special invitees who attended the meeting is given at Annex.

The Chairman welcomed the members and representatives of various dam owning agencies participating in the meeting and desired the members to share the experience of Dam Safety Assurance and Rehabilitation Project (DSARP) which was completed by 30.9.1999 and the details of proposals made under DSARP Phase-II in which eleven member States of NCDS except West Bengal are participants.

After a brief introduction of the members/representatives, the Chairman asked the Chief Engineer (DSO), CWC who is Member Secretary of the Committee to take up the agenda items for deliberations. The following literature, A gist of DSARP, Implementation Completion Report (ICR) proposal for DSARP-II and Pamphlets on Dams and Seismic Risks, DSAR Project, training material on PMP Atlas, instrumentation of dams, Dam Break Analysis, list of National Importance dams etc., were distributed to the participants of the meeting for their information.

### **21.1.0 Confirmation of the minutes of 20<sup>th</sup> meeting of NCDS**

21.1.1 Minutes of 20<sup>th</sup> meeting were circulated to all the members of NCDS and State Dam Safety Cells vide CWC letter No.3/19/NCDS/98/DSM/ 586-623 dated 26.2.99. The minutes of 20<sup>th</sup> meeting as circulated is confirmed.

### **21.2.0 Status of implementation of Dam Safety Assurance and Rehabilitation Project (DSARP) and position of proposed DSARP-Phase-II**

Chief Engineer (DSO) has given a brief of the last one year activities of the World Bank assisted DSAR Project which was completed on 30.9.99 and brought out the achievements of the project under the three main components of the project i.e. institutional strengthening, basic dam safety facilities and remedial measures. The Chief Engineer gave the details of the Stake holders workshop held by the World Bank after completion of the project, to share the experience gained from the project

work by Central and State Government Officers, consultants, contractors, farmers etc. He has narrated the following lessons learned from the project for information of the members.

- a) Provision of all infrastructure facilities to the DSOs and field units implementing the project should have been provided within the first year of start of the project.
- b) Training of project implementation officials in procurement procedures of the World Bank is necessary for speedy implementation of the project.
- c) Proper realistic Hydrology studies on dams should be completed well in advance.
- d) There should be more than one DSR Panel for fast decisions on identification and execution of remedial works.
- e) Better framing of the contractual documents could have been done to avoid ambiguities.
- f) Strict implementation of procurement schedules should be ensured at the highest level.
- g) Regular review of construction schedule, identification of bottlenecks and removal of them expeditiously to be done.
- h) Officers responsible must be trained and transfer of any project staff and monitoring agencies should be avoided.
- i) PERT, CPM charts and implementation schedules to be prepared and reviewed at highest level at regular intervals.
- j) Adequate funding is an important and necessary requirement.

After this a brief accounts of the proposal made for DSARP Phase II was given. He explained the need for a DSARP Phase II project (aided by the World Bank) to give a boost to the dam safety activities in the country and how the same was initiated in May 1999 and submitted a preliminary proposal with Centre and five new States and also the four previous States, viz. CWC and Andhra Pradesh, Karnataka, Gujarat, Maharashtra, Uttar Pradesh and Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu. He stated that subsequently on receipt of information from Kerala and Bihar a revised proposal is prepared including the two

States. West Bengal is not included as no information received from them. He stressed the need to meet the requirements specified by the World Bank on certain dam safety activities by the States for consideration.

Director (DSM) read out the list of items distributed to the members for their information and explained about requirements specified by the World Bank to meet by the States for consideration to include in the World Bank aided project.

- a) Establishing of a State Dam Safety Cell (SDSC) in the State.
- b) Constituting a Dam Safety Review Panel (DSRP)
- c) Conducting periodical (post- and pre-monsoon) inspections of dams.
- d) Conducting Phase I inspection of the dams.
- e) Analyzing and identifying dams for Phase II inspection.
- f) Hydrological review of existing dams.
- g) Safety structural review of dams once in ten years.

While some members of States/Kerala Electricity Board/DVC raised the issue of dam safety problems of the autonomous bodies/private agencies, Chairman clarified that there should not be multiple ownership as far as dam safety is concerned. As almost all the dams are under the Government, the safety aspect of the dam is rest under the State DSO or under the DSO maintained by other Organizations.

Chief Engineer (DSO) requested to refer para 10.3 under the action points in "Report on Dam Safety Procedures" and to follow accordingly if no separate DSO is available under such Organizations / private bodies.

### **21.3.0 Review of National Scenario**

- 21.3.1 The States and representatives of dam-owning agencies were requested to intimate fresh cases of distress in dams, structural and operational deficiencies noted and failure cases, if any, since the last meeting.

21.3.2 Chief Engineer (Irrigation), Kerala gave details about the handling of the problem of crack in Malampuzha dam. Dam Safety Committee of the State met and reviewed the problems of cracks in the dam. Thus the same was referred to the research wing available in the State and the work done by the research wing also not satisfactory. The Chief Engineer, Kerala requested Chairman to take up the matter by CWC. Chairman told if the work done by the State Dam Safety Committee and Research Wing has not found out any solution and if the Chief Engineer feels it necessary, CWC is ready to send a team to inspect the dam. Chairman requested him to discuss the matter with Director (DSM) who would be on tour to the State from the next day.

Chief Engineer (DSO), CWC pointed out the dam safety problems of the two National Importance dams in U.P. viz. Matatila and Rihand Dams. Director, SM, CWC inspected the dams in December 1999. The Director informed that hydrology review of Matatila dam to be done. The dam has already faced two major floods. The dam consists of very long embankment on both the ends. Comprehensive safety review of the dam to be done urgently. Regarding Rihand dam, the Expert Committee met long back i.e. in July 1999. Such delay must be avoided giving importance to the safety of the dam. The matter regarding convening of the meeting of Expert Committee was reminded several times. The Chief Engineer, U.P. has agreed to look into this matter.

The member from Madhya Pradesh has given a brief account of three dam failures (all less than 15 mts) in the State and how the situation was controlled. The dams are (i) Bhimbaitika (ii) Bakhari (iii) Old Pillowa dam. The first two dams failed due to piping in the body of the dams in the month of August 1999. The third dam failed due to flooding.

Chairman appreciated on giving such information for sharing the experience with Committee members. He requested the member to send a report on this to DSO, CWC.

The member from Orissa narrated the experience during the super cyclone hit at Orissa coast. On his request Chairman agreed to include the affected dams to be rehabilitated to include in DSARP Phase-II.

All the States/Organizations were requested to inform such incidents to DSO/CWC without fail.

#### **21.4.0 Progress of implementation of the recommendation of "Report on Dam Safety Procedures."**

21.4.1 The States had been requested to implement the recommendations contained in the "Report on Dam Safety Procedures" circulated in 1987 and send a consolidated report indicating achievements on various issues and highlight the issues which are difficult to implement. A report on this is required to be presented to the Committee in every meeting of the committee giving the latest position.

21.4.2 During the meeting an abstract report has been submitted by the State of Gujarat, Bihar, Rajasthan, Karnataka and Tamil Nadu. A glance on the report is given below.

##### **1. Bihar :**

- i) Dam Safety Cell established in December 1995.
- ii) Two independent DSR Panels constituted for safety review of dams.
- iii) Hydrology review is entrusted to Hydrology Cell of the State.
- iv) All the dams are designed by C.D.O. of the State.
- v) Instrumentation done for few dams but all are not in working condition.
- vi) Preparation of Data book, completion reports, O&M Manual, Annual Report and structural review, hydrology review etc., being done.

##### **2. Gujarat:**

- i) Dam Safety Organization established in 1981.
- ii) Dams other than Irrigation Department also brought under the State DSO for safety purpose.
- iii) All design works are done in C.D.O. of the State.
- iv) Expert Panel not yet constituted. Major problems are being referred
- v) to CWC, CSMRS, CWPRS etc. Inspections are being carried out
- vi) for safety review of dams.
- vii) Flood forecasting system established.
- viii) Preparation of Data book, completion reports, O&M Manual, Annual
- ix) Reports, structural review, Hydrology review, etc., are being done.

- x) All functions of the Dam Safety Cell are being carried out on the lines
- xi) suggested in Dam Safety procedures.

3. Rajasthan:

- i) Dam Safety Organizations (regular) established in 1991.
- ii) State Dam Safety Committee formed in April 1991.
- iii) State Dam Safety Review Panel constituted and held 14 meetings so far.
- iv) The reports such as Data book, completion reports, O&M Manual, Annual Report, structural review, hydrology review and Emergency Action Plan are being done and reported as per the suggestions given in Dam Safety Procedures.

4. Karnataka:

- i) No Central Design Organization. Chief Engineer, WRDO, Chief Engineer (Design) available to investigate design and construction of dams.
- ii) Dams other than Irrigation Department are brought under State DSO for safety purpose.
- iii) DSO is attached to Director, Karnataka Engineering Research Station.
- iv) An independent Review Panel constituted in July 1999.
- v) The work on Data book, completion reports, O&M Manual,
- vi) Annual Report, structural review, Hydrology review, Emergency
- vii) Action Plans etc. are being done as per the guidelines in the
- viii) Report for Dam Safety procedures.

5. Tamil Nadu :

- i) DSO established in 1991.
- ii) Investigation, design, construction of dams are being done as per the latest procedure of I.S.Code of practice.
- iii) Dams other than Water Resources Department also brought under State DSO for safety aspects.
- iv) It is considered not necessary to constitute an expert panel as WRO of the State has the experts.
- v) The work on data book, completion reports, O&M Manual, Annual Report, structural review, hydrology review, Emergency action plan are being done and reported as per the guidelines in Report on Dam Safety Procedures.

No such reports received from other States/Organizations. The States of Uttar Pradesh, West Bengal and Kerala from where no report has been received so far, have not submitted any report during this meeting also. The Director, West Bengal reported that the works could not be carried out in absence of a full fledged DSO in the State even though the same was initiated with Government of West Bengal. Letter was addressed to Secretary, W.R.O., West Bengal in this matter. Chairman desired to pursue the matter at Chief Secretary level of the State. The Chief Engineer, Uttar Pradesh also was advised to form a full fledged DSO as the same is required to enter into the World Bank aided Dam Safety project II.

### **21.5.0 Dam Safety Legislation**

21.5.1 During the 20<sup>th</sup> meeting of the Committee, the Chairman had underlined the importance and need to finalize the draft legislation after incorporating the comments received from States/Organizations.

21.5.2 The following State Governments have communicated their concurrence with minor comments.

1. Andhra Pradesh
2. Gujarat
3. Maharashtra
4. Orissa
5. Rajasthan
6. Tamil Nadu
7. Kerala
8. Bihar
9. Uttar Pradesh
10. Karnataka

21.5.3 Information has been received from the States of Madhya Pradesh and West Bengal also. However, formal letters from these State Governments were yet to be received.

21.5.3 The comments received from the States / Organizations have been incorporated in the draft legislation and the revised Draft Act-2000 has been sent to Ministry of Water Resources, duly approved by Chairman, CWC vide No.3/30(3)/91-DS/507 dated 21.2.2000.

Madhya Pradesh has requested to intimate the reply to the comments offered by them so as to seek the approval from the

Government. West Bengal agreed to pursue the matter with the Government.

#### **21.6.0 Preparation of emergency action plans and inundation maps for d/s area**

21.6.1 Decision for preparation of inundation maps and emergency action plans (EAP) for d/s areas of dams of National Importance by all the States has already been taken during earlier meetings.

21.6.2 Chief Engineer (DSO) informed the Committee that Government of India, Ministry of Water Resources has constituted a high powered committee on "Preparation Disaster Management" headed by Shri J.C.Pant (Ex Secretary, Government of India). The function of the committee is improvement of disaster management and flood mitigation in different areas. He has requested all the States/Organizations to intimate the progress on preparation of EAP for the dams under them to the committee, as input to the high powered committee is highly required now.

The following information is given during the meeting regarding preparation of EAP scheme.

##### Works completed

- i) Rajasthan - 9 dams  
(one NI dam, Rana Pratap Sagar dam)
- ii) Maharashtra - 74 dams (2 NI dams, Kainipaitham)
- iii) NHPC - 1 dam (NI dam)
- iv) Bihar - 1 dam (Tenughat, not NI dam)

The member, Rajasthan reported that Dam Break analysis for Sei dam is under preparation. While reported by the member, EAP for Parbati dam and Kota Barrage is to be prepared by CWC, Chairman clarified that only dam break analysis will be done by CWC but EAP must be prepared by State Department itself as EAP involves extensive survey and social activities, etc. The State of Orissa reported that EAP for Hirakud dam is prepared as per USBR guidelines and work is under progress for other identified dams also. The member from Madhya Pradesh also reported establishing of dissemination of flood forecasting for Gandhisagar dam and also analyzing of some thumb rules for preparation of EAP Schemes. Chairman requested the member to publish the thumb rule. Regarding two N.I. dams in Bihar, Maithan and Panchet the member from Bihar reported that the



EAP for the above dam has to be done by DVC. But as per the information from DVC the work to be done by the Government Of West Bengal. Regarding training required on Dam Break Analysis for the officers of Kerala Electricity Board, Chairman told to take up the matter with Director, FE&SA Directorate, CWC. The State of Tamil Nadu has reported to be drawn a scheme for collection of data required for Dam Break analysis.

Chief Engineer (DSO) requested the member States/ Organization to give priority of preparing EAP scheme to National Importance dams and other dams may also be identified seeing the importance for the scheme.

## **21.7.0 Compilation of data book**

21.7.1 As per decision taken by the NCDS, "Data Books" for dams of National Importance (NI Dams) were to be prepared by the respective States and submitted to DSO/CWC for record/reference.

21.7.2 The position of States who have prepared data books of NI dams is given below:

1. Andhra Pradesh	1 dam out of 3 dams
2. Kerala	5 dams out of 5 NI dams
3. Maharashtra	1 dam out of 4 NI dams
4. Orissa	1 dam out of 5 NI dams
5. Uttar Pradesh	4 dams out of 4 NI dams
6. West Bengal	1 dam out of 1 NI dam
7. Gujarat	2 dams out of 2 NI dams
8. Rajasthan	1 dam out of 1 NI dam
9. Tamil Nadu	2 dams out of 2 NI dams
10. Bihar	2 dams out of 2 NI dams (Under DVC)
11. NHPC	2 dams out of 2 NI dams
12. BBMB	2 dams out of 2 NI dams

21.7.3 14 dams of National Importance are under construction. Data books in respect of these dams may also to be prepared.

The States of Karnataka and Madhya Pradesh were requested to initiate and complete the work at the earliest. The State of Andhra Pradesh and Orissa were also requested to expedite the work.

## **21.8.0 Preparation of completion report of large dams**

21.8.1 Completion report giving complete history of the dams for existing 3596 large dams are to be prepared by the respective States and dam owning agencies giving priority in the first phase to dams of National Importance.

21.8.2 As per the information received from the States, completion reports for the following dams have been prepared :

Gujarat	3
Karnataka	19
Kerala (Electricity Board)	5
Maharashtra	127
Orissa	2
Rajasthan	10
Tamil Nadu	12
Uttar Pradesh	123
BBMB	<u>3</u>
Total	<u>304</u>

21.8.3 During 21st meeting of NCDS the following information was given. The member from Madhya Pradesh informed that 16 dams have been identified for preparation of completion report. NHPC has collected data as specified in the NCDS meeting and preparation of the report is under progress. The States of Andhra Pradesh, Bihar, Kerala (Irrigation Department), Madhya Pradesh and West Bengal were requested to initiate and complete the work early.

## **21.9.0 Preparation of Operation and Maintenance Manual**

21.9.1 During the previous meetings it had been emphasized that O&M Manual is an important document for operation and maintenance of dams and this manual should be available before commissioning of the project. As O&M manuals have not been prepared for several dams, this work needs to be taken up without any further delay and completed expeditiously by the respective States/Organizations owning the dams.

21.9.2 Present status on preparation of O&M manuals is given below:

BBMB	-	All dams
Tamil Nadu	-	All dams
Uttar Pradesh	-	All dams
KSEB	-	All dams
NHPC	-	Guidelines for operation of each dam

under the Organization has been prepared.

Rajasthan	-	All dams with ungated spillways and 12 gated dams (out of 22).
Maharashtra	-	101 dams
Orissa	-	20 dams
Madhya Pradesh	-	10 dams
Andhra Pradesh	-	3 dams

- 21.9.3 Director (DSM) pointed out that the remark made by World Bank in their ICR (DSARP) regarding lacking interest shown in preparation of O&M manuals. NHPC demanded a copy of the format of O&M manual (Madhya Pradesh) circulated earlier.

All the States/Organizations who have not completed/initiated the work were requested to take up and complete the work without delay.

#### **21.10.0 Periodical inspection of dams and report on dam safety activities in the States**

- 21.10.1 The States/Organizations were requested to carry out periodical inspection of dams and send a consolidated annual report on the status of dams and dam safety activities under the title "Health Status of Dams and Dam Safety Activities in the State" to DSO/CWC in the format circulated by DSO/CWC.

- 21.10.2 The reports received by DSO/CWC are given below:

Andhra Pradesh	-	upto 1998
Bihar	-	upto 1998
Gujarat	-	upto 1998
Madhya Pradesh	-	upto 1999
Maharashtra	-	upto 1998
Orissa	-	upto 1999
Rajasthan	-	upto 1999
Tamil Nadu	-	upto 1999
BBMB	-	upto 1998
NHPC	-	upto 1999
DVC	-	upto 1999

The States of Karnataka, Uttar Pradesh & West Bengal and Kerala Irrigation Department & Kerala Electricity Board were requested to do the routine pre- and post-monsoon inspections and to submit the annual report for every year. Other

States/Organizations were also requested to follow the routine practice of inspections and submission of reports punctually.

#### **21.11.0 Safety review of large dams (once in ten years)**

21.11.1 In accordance with the recommendations contained in the "Report on Dam Safety Procedures (1987)," safety review of large dams which are more than 15m in height or which store 60 million cu.m or more water are to be carried out by an independent panel of experts once in ten years. For this purpose, experts committees comprising of only those officers from the States who were not connected at any stage either with construction or maintenance of the structures are to be constituted.

21.11.2 Dam Safety Review Panel has been constituted by the States/Organizations of Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra and BBMB. Constitution of DSR Panel were reported to be initiated by the States of Gujarat, Karnataka, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh during the 19th meeting, but formation of the Panel has not yet been done. No such proposal has been reported by the States/Organizations of Kerala Irrigation Department, Kerala Electricity Board, West Bengal, NHPC and DVC.

Along with the States which constituted DSRP, inspection of dams is reported by the States of Gujarat, Rajasthan and Tamil Nadu pending for the formation of Panel.

All the States/Organizations were requested to take up and complete this very important issue without any delay. When some of the States opined on formation of DSRP with the retired officers of State department, Chairman clarified to constitute DSRP with officers directly or indirectly not connected with the concerned dams.

#### **21.12.0 Safety status of dams of National Importance (NI)**

21.12.1 The States/Organizations have been requested to prepare safety status of 46 completed dams of National Importance in the prescribed proforma circulated by DSO/CWC.

21.12.2 Safety status report of all the NI dams except Lakhya dam in Karnataka has been received. The State of Karnataka was requested to submit the report of Lakhya dam.

Chairman desired to examine the reports received and to give a feedback to the Committee. It is also desired to have the safety status report of NI dams by March of every year.

**21.13.0 Monitoring safety report of inter-State dams by sub-committees**

21.13.1 Three sub-committees were set up in March 1990 to monitor the safety aspects of inter-State dams in (a) Parambikulam Aliyar Project (PAP), (b) Mahanadi River System and (c) Subarnarekha River System.

21.13.2 The progress made by the Committees so far is given below:

Parambikulam Aliyar Project - 2 meetings held in 1991 and 1992 respectively.

The next meeting is proposed to be held in March 2000.

Mahanadi River System - One meeting held in 1992.

The next meeting is proposed to be held in the last week of February 2000

Subarnarekha River System - 3 meetings held so far. (last one on 24.7.98)

The next meeting is proposed to be held in March 2000

The concerned States were requested to hold meetings regularly and to take the required follow-up actions in time.

**21.14.0 Setting of hydrological units in the States for review of hydrology of existing dams**

21.14.1 Hydrology of all the existing dams is required to be reviewed by setting up/strengthening the existing hydrology units in the States/Organizations. Some States/Organizations have already initiated action for strengthening/ setting up of hydrology units and review of hydrology of selected dams has been taken up.

21.14.2 Status of completion of hydrology review upto 20<sup>th</sup> NCDS meeting as reported by the representatives is as follows:

1. Gujarat	-	156 dams
2. Madhya Pradesh	-	60 dams

- |               |   |   |
|---------------|---|---|
| 3. Orissa     | - | 46 dams   |
| 4. Rajasthan  | - | All large dams 122 Nos.<br>(except some new large dams<br>- 31 identified recently) |
| 5. Tamil Nadu | - | 17 dams   |

21.14.3 Progress in setting up of hydrology units upto 20<sup>th</sup> meeting

- a) Separate hydrology units have been established in the following States / Organizations :

1. BBMB
2. NHPC
3. DVC
4. Maharashtra
5. Orissa

- b) Following States have informed that the existing units in their State have been strengthened for carrying out hydrology review of large dams.

1. Bihar
2. Gujarat
3. Madhya Pradesh
4. Rajasthan
5. Karnataka

- c) Action has been initiated by the following States for strengthening of existing hydrology units

1. Andhra Pradesh
2. Tamil Nadu
3. West Bengal
4. Uttar Pradesh

21.14.4 The member from Uttar Pradesh intimated that effort is being made to set up hydrology unit. The State of Andhra Pradesh reported of engaging consultancy to complete the work. Kerala State Electricity Board also reported of setting their hydrology unit. Kerala Irrigation Department started collecting data for analysis.

As regards hydrology review of 122 dams in Rajasthan, Director (DSM) clarified that it is only a preliminary review. The State is advised to have a detailed study.

Chief Engineer, Hydrology Study Organization explained the process of conducting hydrology review. The review work to be done by the States/Organizations by themselves or through consultancy, and If any difficulty is faced, CWC can be approached for guidance. Workshop on hydrology review used to be organized every year by CWC and State engineers are being trained on this job. PMP Atlas is available only for Andhra Pradesh, Karnataka and Kerala. Preparation of PMP Atlas for other areas is covered under hydrology project and DSARP Phase II. The Chief Engineer requested all the States to complete hydrology review; otherwise the same will be a bottleneck for entering into DSARP Phase II.

NHPC has reported the Organization's ability to accept consultancy work. A report giving the areas of consultancy work handled by NHPC is received in DSO, CWC. NHPC is requested to circulate the report among NCDS members at the earliest.

## **21.15.0 Instrumentation for dams**

21.15.1 NCDS had decided that the States may take stock of the status of instrumentation in all existing large dams to know the performance of instruments, their mortality rate, periodicity for analysis of data and forwarding the analysis of data to the designers for evaluation, status of structural behaviour reports and adequacy of the staff engaged for this job, etc.

21.15.2 Status of instrumentation of existing dams as per latest information in DSO/ CWC is given below.

1. Andhra Pradesh	-	3 dams
2. Gujarat	-	25 dams
3. Karnataka	-	20 dams
4. Kerala	-	2 dams
5. Madhya Pradesh	-	34 dams
6. Maharashtra	-	41 dams
7. Orissa	-	17 dams
8. Rajasthan	-	33 dams
9. Tamil Nadu	-	6 dams
10. BBMB	-	3 dams
11. NHPC	-	2 dams

In Bihar no instrument is in working condition. The States of Uttar Pradesh and West Bengal may send the details of instrumentation.

- 21.15.3 Out of 25 dams, data of 11 dams has been compiled and analyzed by Gujarat. Karnataka compiled data of 19 dams and analyzed for 10 dams. NHPC also analyzed data for the dams under them.

All the States/Organizations were requested to send details of instrumentation data to Director, Instrumentation Directorate of CWC. The States/Organizations were also requested to give information on up-to-date status of instrumentation in the annual status report of dam safety activities.

#### **21.16.0 Installation of standard meteorological instruments**

- 21.16.1 All the States were requested to supply detailed information as per specified list of items already circulated by CWC on the type of meteorological instruments installed in the catchment areas and at reservoirs of large dams for meteorological observations.

- 21.16.2 Information received on installation of standard meteorological instruments are given below:

1. Bihar	Installed for 1 dam
2. Karnataka	Installed for 71 dams
3. Tamil Nadu	Installed for 11 dams
4. Rajasthan	Installed for 125 dams
5. NHPC	Installed for 3 dams
6. BBMB	Installed for 3 dams

Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra may give the up-to-date information. Kerala Irrigation Department, Kerala State Electricity Board, Orissa, Uttar Pradesh and West Bengal who have not given any information so far were requested to expedite the same.

All States/Organizations were requested to include performance report of meteorological instruments also in the Annual Status Report of dam safety activities.

#### **21.17.0 Seismic studies of dams**

- 21.17.1 DSO/CWC has made available copies of document titled "Guidelines for inspection of dams following earthquake" to all the States/ Organizations with a request to make use of the guidelines and report to the Committee about safety status of dams immediately after occurrence of earthquake in the region.



- 21.17.2 No reports of such incident on dams due to earthquake were received from any of the States/Organizations during the meeting. All States/Organizations were requested to follow the guidelines and to act according to the guidelines on occurrence of any such incident.
- 21.17.3 In the early hours of 29.3.99, an earthquake measuring 6.8 on the Richter scale occurred at Chamoli District in Uttar Pradesh State. Director FE&SA Directorate, CWC, visited the area from 31.3.99 to 4.4.99. No damage to any dam in that area was reported by the Director and also by the U.P. Government. As the report in the ICOLD guideline was not received from UP Dam Safety Organization, the same was pursued vide DSM letter No.3/19/NCDS/99/DSM/3602 dated 6.12.99. The Chief Engineer, Uttar Pradesh was requested to expedite the information for record.

#### **21.18.0 Need for Research and Development in Dam Safety**

- 21.18.1 The representatives were requested to suggest areas requiring research and development in the field of dam safety in particular, and Water Resources Sector in general and send their suggestions to DSO/CWC. Any scheme identified for research need to be prepared and sent to one of the 5 National Committees set up for taking up research schemes under Water Resources Sector. Such reports may be sent to R&D Directorate which is now attached to MOWR for further action in this matter under intimation to DSO/CWC.

Chairman informed the members that, research schemes on dam safety which requires assistance in fund, etc., may be referred to R&D Directorate, MOWR. He directed Kerala Irrigation Department in case of research on Malapuzha dam cracks and the State of Orissa in case of restoration work of damage caused during the recent cyclone in the State while they raised the issue. The issue raised on research proposal on vulnerability of rainfall, Chairman said that if the research is on the basis of dam safety, the same may be acceptable.

#### **21.19.0 National Register of Large Dams**

- 21.19.1 Chairman, during the 19th meeting, desired to update the National Register of Large Dams published by DSO/CWC in December 1994. A circular to this effect, along with the proforma, was issued during the 19<sup>th</sup> meeting of NCDS with a request to send the updated data. So far information has been

received from Andhra Pradesh, Bihar, Gujarat, Orissa, Rajasthan & West Bengal and BBMB, NHPC & DVC. Tamil Nadu reported the information treated to be nil. The revised number of dams in Gujarat reported as 569 and in Rajasthan 202 dams. All the remaining States/Organizations were requested to give information at the earliest so that the register can be revised/updated at the earliest. If no addition/correction required, a nil report may be given to this effect. The States of Karnataka, Kerala, Madhya Pradesh, Maharashtra and Uttar Pradesh have once again been requested to expedite the data at the earliest.

## **21.20.0 National Performance of Dams Programme**

- 21.20.1 A copy of the letter addressed to Chairman, CWC on "National Performance of Dams Programme" by Shri N.Guru Rau, Head, WRA, Resource Consultant, Bangalore along with enclosures was sent to all Dam Safety Organizations of the States/Organizations for offering comments on the same. In his letter Shri Guru Rau emphasized the need for a systematic collection and archive information on the performance of dams at National Level. He advised association of a scientific institution such as Indian Institute of Science, Bangalore for this purpose. No comments were received from any States/ Organizations. Copy of letter of Shri Guru Rau which was circulated earlier was made available to all the members during the meeting for reference.

As per the special invitation extended to him, Shri Guru Rau was kind enough to attend the meeting to share his views on this aspect.

Shri Rao told the members his experience on dam safety aspects in India. As a Research Officer at Hirakud dam in 1958 by evaluation of instrumentation data of the dam, he could predict the dam was experiencing tensile stress before the occurrence of cracks in the dam. Similarly he identified a bulking point in the retaining wall of Sharavathi dam and could inform the authorities. In another occasion for the same dam, he could identify the dam experiencing high pore pressure and the same was rectified by removing the drainage blockage. All these incidents were pointed out by him to show the importance for maintaining instrumentation of dams and also detailed analyze of data regularly. He told that most of the deficiencies in the safe functioning of dams are due to simple reasons which could be rectified by identifying from the instrumentation data. He categorically told the Committee that in India for most of the

dams instrumentation/collection and storage of instrumentation data/analyses of instrumentation data are totally neglected. He insisted storage of data centrally and total transparency in collection and storage of data systematically in a scientific way by using the services of institutions like Indian Institute of Science (IIS), Bangalore, etc. He told that in USA such centralized storage of data is available even in the "Web Net". Though in India significant number of dams is available, the country is far behind, in the storage and availability of data of the dams. Even in well maintained instrumentation dams, data were not compiled and analyzed. He requested the Chairman and all the members to come forward and to adopt the method followed in the countries like USA. An Act must be introduced for operation & maintenance and compliance in river management. Copy of National Dam Safety of 1997 (USA) was circulated to all members.

When asked about specified format by Member (D&R), Shri Rau told that a set of guidelines on these aspects are freely available from USA, if required.

Member (D&R) clarified that the problem is not on the format but guidance on how the data will be available in a country like India where the dams are owned and maintained by government. Complete transparency in collection and storage of data may be difficult.

Some of the members also expressed their reservation on complete transparency of data. The members from Madhya Pradesh opined that we must develop an indigenous system which may be fit to Indian conditions. There were also suggestions from States/Organizations like Orissa and NHPC that during emergencies like the recent cyclone in Orissa, many volunteer/social Organizations forgetting the State limits worked for the safety measures. Hence safety aspects of dams must be taken in a broader way and must work on it to find out a suitable solution.

Chairman has given his view that restrictions on transparency of data were only for few dams. In case of salient features, there might not be any restrictions for all the dams. All members must take a note of this and a feedback on the view of their Government might be sent to DSO, CWC for information of the Committee.

#### **21.21.0 Dams under State Electricity Boards.**

21.21.1 As per the recommendations in the Report on Dam Safety Procedures, the respective State Irrigation Department is the authority in case of Dam Safety in the State. In most of the States, Electricity Boards also own significant number of dams. Chief Engineer (Civil), Kerala Electricity Board is a member of NCDS. It may be made clear by the States whether the dams under each State Electricity Board are also considered for dam safety review by the respective State Irrigation Departments while reporting on the various issues taken up in the NCDS. It is also requested that a list of dams under the State Electricity Board with details as per the proforma of National Register of Large Dams may please be sent to DSO, CWC by the State Irrigation Departments.

Chairman desired to confirm the inclusion of dams under other private bodies such as municipality, industries, etc., in the report of State DSOs.

The States reported inclusion of dams under State Electricity Boards and other private bodies are given below:

- |               |  |
|---------------|--|
| 1. Bihar      | The dams under Electricity Boards and other private bodies are being compiled. |
| 2. Gujarat    |  |
| 3. Karnataka  |  |
| 4. Tamil Nadu |  |

All the States were requested to intimate the details on this aspect.

**21.22.0** Chairman suggested to make case studies on dam incidents (failures) and analysis of instrumentation data and improvement of instrumentation and to give information to the Committee for knowledge of the members. Hydrology Study Organization may select some five incidents of dam failures and make case studies. In case of analysis of instrumentation data for some good instrumentation dams might be selected phase by phase and data analyzed and suggest improvements by the Instrumentation Directorate.

List of officers participated in the twenty-first meeting of

National Committee on Dam Safety held on 22.2.2000

**Members**

S/Shri

1. A.D.Mohile,  
Chairman, CWC Chairman
2. Dr.B.K.Mittal,  
Member(D&R), CWC Vice-Chairman
3. Shri J.L.Chugh,  
Deputy Secretary,  
Ministry of Water Resources
4. P.V.Ramanna  
Chief Engineer (CDO)  
Hyderabad (Andhra Pradesh)
5. Janaki Raman Prasad Sinha,  
Chief Engineer (D&R),  
Patna (Bihar)
6. M.T.Soni,  
Jt.Director (GERI),  
Vadodara (Gujarat)
7. T.T.Kripananda Singh,  
Chief Engineer,  
Thiruvananthapura (Kerala)
8. J.K.Tiwari,  
Director (Dam Safety)

Bhopal (Madhya Pradesh)

9. B.B.Singh Samant,  
Chief Engioneer,  
Bhubaneswar (Orissa)
10. Jai Singh Nirwan,                      J.L.Sharma,  
Chief Engineer (ID&R),                      Director, DSO,  
Jaipur (Rajasthan)                      Jaipur (Rajasthan)
11. N.Jeyakumar,  
Chief Engineer (O&M),  
Chennai (Tamil Nadu )
12. V.K.Aggarwal,  
Director (Dam Safety),  
Lucknow (Uttar Pradesh)
13. T.C.Ray,  
Chief Engineer  
Calcutta (West Bengal)
14. S.Chaudhuri,  
Superintending Engineer (C),  
DVC, Maithon
15. K.K.Karappan Kutty,  
Chief Engineer  
Kerala State Electricity Board,  
Thiruvananthapuram
16. Smt. O.R.Lalitha,  
C.E. NHPC, Faridabad
17. B.M.Upadhyay,  
CE(DSO), CWC                      Member-Secretary

**Central Water Commission**

Sh/Shri

1. V.V.Badareenarayana,  
CE(HSO)
2. K.S.Khandpur,  
Director(DSM)
3. A.B.Pandya,  
Director(SM)

4. S.M.Hussain,  
Director(FE&SA)
5. R.L.Kawle,  
Director(Instt.)
6. K.Balakrishnan,  
Dy.Director(DSM)

**Special Invitee**

S.N.Guru Rau,  
Head (WRA),  
Bangalore

**Information on the comments of Chairman on the agenda notes  
of 21st meeting of National Committee on Dam Safety (NCDS).**

1. Assure of Irrigation/ Water supply/ Power generation under DSARP resulting economic development : Under DSARP scheme storage/ distributions of water and mitigation of floods etc is improved by identifying and rehabilitation of the distressed dams by several remedial measures such as treatment/ repair of cracks, raising of TBL, treatment of crest, repair of Head regulators, rehabilitation of spillway sluices and gates, treatment of slopes, strengthening of dam, improvement of drainage systems, improvement to spill channel/ approach channel etc. Spillway capacities are increased in about 12 dams and fuse plugs/breaching sections have been provided in some dams. All these rehabilitation measures have resulted in enhanced safety of dams and there is no need to keep the water levels in these dams lower than the FRL, thus resulting in recouping the likely loss in reservoir capacities and providing/ restoring assured irrigation/water supply/power generation in these rehabilitated dams.
2. DSARP - Phase II
  - i) Original proposal submitted to MOWR on 15.6.99 after obtaining approval of Chairman, CWC.
  - ii) Forwarded by MOWR to Department of Economic Affairs on 22.6.99.

- iii) In view of recent letters from MOWR, proposal has been revised and has been put up for approval of Member(D&R) and Chairman, CWC on 16.2.2000.
- 3. (i) 21.4.0 A report is called for from all the States regarding the Action points recommended by the Standing Committee in their "Report on Dam Safety Procedure" (copy enclosed), during every NCDS meeting. The information available on this aspect from various States is enclosed at Annex I.
- (ii) (21.6, 21.8, 21.10, 21.11, 21.12)

As the work involved and the action taken by the States/Organizations are differing, it is difficult to combine all these items.
- 4. 21.7.0 Compilation of data book
  - i) Yes, we have a register of large dams.
  - ii) Dams of National Importance - Completed dams - 46 dams; Under construction - 14 Nos
  - iii) Data book received - 19 dams
  - iv) Data content in the data book are not fixed. Updating is required at each inspection as new problems arise, new investigations are to be undertaken and remedial treatments are to be performed if necessary (copy of the format enclosed).
- 5. Legislation (21.5.0)
  - i) This is central legislation.
  - ii) The comments from State of West Bengal have been received. However, approval of the Government is awaited. State of Madhya Pradesh has agreed in principle and have also forwarded a copy of State legislation for our comments so that it can be adopted by the State Assembly. However, formal approval of Madhya Pradesh Government for the legislation is yet to be received.
- 6. 21.17.0 Seismic studies of dams



Guidelines for inspection of dams following earthquakes (International Commission on Large Dams) was circulated to the States/Organizations to follow the same strictly (copy enclosed). These guidelines give the radius of influence of the effect of earthquake and the inspection of dams within this radius for any earthquake effect depending on the intensity of earthquake based on Richter scale.

#### Annex-1

### **Information on Implementation of "Report on Dam Safety Procedures**

#### Bihar

1. An independent Dam Safety Cell has been created in December 1995 under Chief Engineer, Central Design and the cell is headed by Superintending Engineer.
2. Review of inflow design and spillway capacity is entrusted to State hydrology Cell.
3. Large dams (as defined by ICOLD) have been identified to include in the Safety Programme and technical documentation of the project has not been completed due to difficulty in getting all information from the field.
4. Two independent panel of expert constituted and inspected 44 dams.

5. Pre and Post monsoon (periodical) inspections are being done regularly but not satisfaction due to lack of interest of field engineers. If any problem is observed the same used to be referred to Dam Safety Review Panel for remedial measures.
6. In case of new dams action is being taken to post Engineers who has aptitude in design to Central Design Organization of the State and also proposal for DSR Panel for new dams also under proposal.
7. Instrumentation for dams was done for few dams but all are non-functional.
8. Action being taken for preparation of O&M Manual and preparation of completion reports is proposed to be done through consultants.
9. State hydrology cell is looking after flood forecasting work at important sites.

#### Gujarat

1. Dam Safety Organization exists since 1981.
2. Central Design Organization takes due care for all new dams.
3. Safety review of dams other than of Irrigation Department is also under taken by DSO and CDO of the State.
4. The work of completion reports of dams of National Importance are under progress.
5. Constitution of our independent Dam Safety Review Panel is under consideration of the Government. All functions of Dam Safety Cell are being carried out as suggested in "Report on Dam Safety Procedures."

#### Maharashtra

1. Dam Safety Organization created in October of 1980 which is looking after dam safety problems of Irrigation Department as well as other Department
2. Central Design Organization is looking after design of dams.
3. Completion report compiled for 42 dams.

4. In the State as per identified dams for safety, 356 large dams are with major deficiencies and 363 large dams with minor deficiencies. Due to large number of dams in the State there is financial constraints to complete the safety review of the above dams. It is prevalent practice in the State to constitute DSR Panel as below :
  - i) Dams with difficult foundation conditions.
  - ii) Dams with unusual design features.
  - iii) Important dams
  - iv) World Bank aided dams.

It is decided to take a "preliminary review" so as to exclude those dams which are assessed to be safe under normal operating conditions.

Government has appointed 6 nos. region wise Committees under the Chairmanship regional Chief Engineers. Safety review of dams is being done. The Government has appointed 2 more expert Committees to review for seismic parameters, design modifications etc.

5. Separate Hydrology unit under Chief Engineer (Hydrology) is done in June 1996.
6. Wireless system is established for flood forecasting purpose.
7. Individual O&M manual will be done for important dams and standard O&M manual for other large dams. Guidance given in the "Report on Dam Safety Procedure" is being followed in the State. However the slight deviation accrued is due to heavy work load and financial constraints which has to be sorted out in stages.

#### Karnataka

1. Dam Safety Cell constituted under Chief Engineer, (Director) Karnataka Engineering Research Station in July 1981. Proposal for creation of a Central Design Organization is submitted to Government Modification of the administrative/ technical set up of Dam Safety Cell is also under process.
2. Out of completed 223 large dams completion report of 10 dams completed.

3. Constitution of independent DSR Panel is under consideration of the Government
4. Action being done as reported in Dam Safety Procedures for preparation O&M manual, completion reports, safety review of dams, emergency action plan, Dam safety legislation etc.

#### Tamil Nadu

1. Dam Safety Cell established on 1.11.91 and Dam Safety Procedures as per the guidelines issued under the "Report on Dam Safety Procedures" being followed.
2. History of dams (completion report) is under preparation through consultant for 19 dams.
3. Dam Safety Panel constituted under DSAR Project reviewed safety aspects of 20 dams. Phase-I inspection is done for the remaining dams by the special team constituted for this purpose.
4. No panel of experts formed and construction of major and medium projects are being done by separate Superintending Engineers guided by Regional Chief Engineers.
5. Flood regulation rule is being followed in all dams instead of O&M manual.
6. Flood forecasting system almost completed.

Immediate implementation of all items found difficult due to financial constraints. Action being taken to implement all in stages.

#### Other States (Andhra Pradesh, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh & West Bengal)

The guidelines contains in the "Report on Dam Safety Procedures" being followed in the State and completions of all the items given in the report are being done. Separate report is not received from West Bengal, Uttar Pradesh and Kerala.