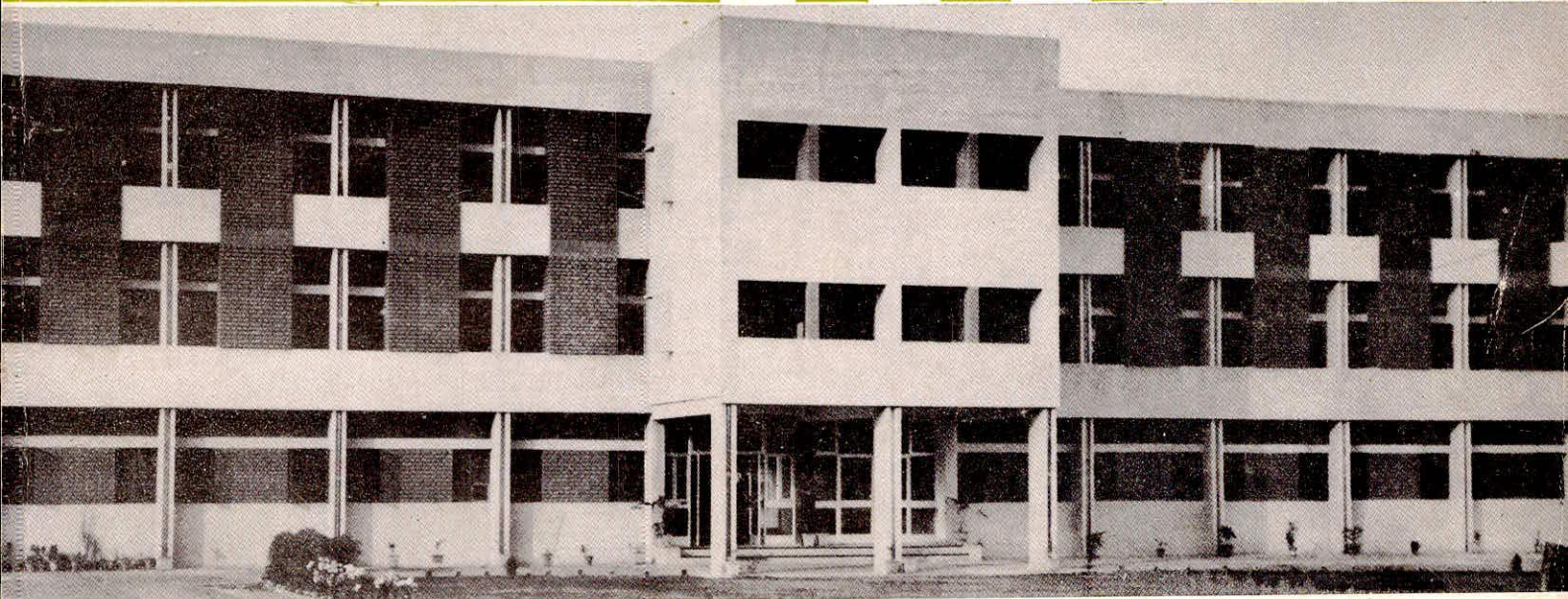


annual report  
1984-85

national  
institute of hydrology



**NATIONAL INSTITUTE OF HYDROLOGY  
ROORKEE**

**ANNUAL REPORT 1984-85**



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# 1. INTRODUCTION

## 1.1 General

The National Institute of Hydrology was set up in December 1978 and it became operational in February 1979 with the joining of the first Director and nucleus staff. The Institute has been registered under the Societies Registration Act 1860 as a Society fully aided by Government of India, Department of Irrigation, Ministry of Irrigation and Power with its Headquarters at Roorkee. The Union Minister for Irrigation and Power is the President of the Society, Minister of State Incharge of Irrigation is the Vice-President of the Society. The Secretary (Irrigation), Government of India is the Chairman of the Governing Body.

The University of Roorkee has provided 6.5 acres of land on long term lease to the Institute. The main building of the Institute was constructed in 1982 and was occupied in December 1982. The infrastructural facilities are being developed and are gradually becoming operational.

## 1.2 Objectives

The National Institute of Hydrology has been established :

- (i) To undertake, aid, promote and co-ordinate systematic and scientific studies in theoretical and applied hydrology so as to improve the present practices in planning, design and operation of water resources projects,
- (ii) To co-operate and collaborate with other national and international organisations in the field of hydrology,
- (iii) To establish and maintain a research reference library in pursuance of the objectives of the Society and equip the same with books, reviews, magazines, newspapers and other relevant publications, and
- (iv) To do all other such things as the Society may consider necessary, incidental or conducive to the attainment of the above objectives.

## 1.3 Work Review

During the first five years, the Institute had laid emphasis on creation of necessary infrastructural facilities like buildings, recruitment of staff, training of manpower and provision of computer facilities generally with a view to conduct computer oriented studies in the 8 priority areas of research that were defined by the Governing Body and TAC. The Institute procured, implemented and tested a number of computer programmes covering the areas of frequency analysis, rainfall-runoff modelling, flood estimation, reservoir operation and groundwater modelling.

The Institute has procured a sophisticated fourth generation VAX-11/780 computer system with various peripherals including a colour graphic terminal under the UNDP Project. Besides this a number of computer peripherals, an automatic hydrologic station and some field and laboratory equipment have also been ordered and would be procured soon under this Project. The Institute has developed a good library of scientific and technical books and journals. The British Council has also contributed some books and technical literature for the library. Besides the sophisticated equipment, the UNDP Project has also provided training to 17 scientists in diversified areas representing various components of the hydrologic system. The Former Director of the Institute and a senior scientist also undertook study tours under this project. The Chief Technical Adviser and 4 consultants visited the Institute under the project and helped in the development of its research programme.

During the year, efforts have been made to enlarge the studies and research programme. The direction in which the work, is progressing and is planned, are as follows :

- (i) Studies and research involving computer oriented, laboratory and field oriented projects for development of systematic procedures for hydrological analysis and synthesis including planning for use by field engineers and also to conduct theoretical and basic studies in hydrology for understanding the basic component processes and their interaction,
- (ii) To standardise and systematize methods for hydrological analysis and synthesis,
- (iii) To develop appropriate system of documentation of studies and research results through technical and review papers, reports, programme user's manuals, manuals and training documentation reports etc.,
- (iv) To organise short term Training, Workshops/Courses and Seminars/Symposia on new methodologies,
- (v) To conduct studies and research in representative and experimental basins for understanding interaction of component processes and development of mathematical models,
- (vi) To provide assistance and advise engineers and scientists from field organisations in application of procedures developed or implemented by the Institute or procedures being developed for specific field problems, and
- (vii) To develop consultation capabilities in the National Institute of Hydrology for taking up sponsored research and consultancy projects for the solution of complex hydrological problems.

In order to carry out different activities in the Institute at National level as mentioned above and to meet the objectives of the Institute, it is necessary to have a well balanced growth of facilities including computer, laboratory and field oriented research and use of latest technological developments in the areas of instrumentation, electronics, remote sensing, nuclear techniques etc. for conducting research. Facilities have, therefore, to be created by setting up additional two scientific divisions and related laboratories in order to establish capabilities in the following major fields :

#### **Major Fields**

- (a) Surface Water Analysis
- (b) Surface Water Synthesis
- (c) Integrated Planning

- (d) Ground Water Analysis
- (e) Ground Water Synthesis
- (f) Hydrological Investigations
- (g) Remote Sensing Investigations
- (h) Information System, Computer Centre and Services

**Laboratories**

- (a) Surface Water
- (b) Ground Water Including Water Quality
- (c) Nuclear and Hydrological Investigations (including field investigations)
- (d) Remote Sensing Applications
- (e) Services, Instrumentation Workshop

In order to carry out the programme of work, the strength of Scientists, scientific staff and other supporting staff will have to be considerably enhanced and infrastructure facilities be improved by way of increased office space, laboratory blocks, Auditorium and information museum-cum-recreation centre and trainee's hostel etc. At the time of establishment of the Institute, the University has provided some residential accommodation funded by U.P. Government. To house the present staff and proposed staff during the Seventh Five Year Plan, residential accommodation in the form of staff colony will be essential and has been proposed.

The Institute is, therefore, proceeding in the right direction towards, the fulfilment of objectives laid down at the time of establishment of the Institute. The studies and research activities are gaining momentum and the expertise available in the Institute will contribute significantly to the assessment of water resources and their planning for optimal utilisation.

## **2. ORGANISATION AND MEETINGS**

### **2.1 Society**

The National Institute of Hydrology Society is the Apex body and meets atleast once in a year. It reviews the progress and performance of the Institute towards the attainment of the objectives and gives such policy directions, as it may deem fit, to the Governing Body. The membership of the Society is given in Appendix-I.

Due to unavoidable reasons, the meeting of the Society could not take place during the year. The Fifth Annual General Meeting was held on April 2, 1985 to consider and approve Annual Report and Audited Accounts and review the progress and performance of the Institute during the year 1983-84. It also approved the amendment to working rule No. 2 sub rule 4 relating to admissibility of the additional benefits viz. interim relief and bonus to NIH employees. At this meeting, the progress and performance of the Institute during April 1984 to February 1985 was also reviewed, and the Society was satisfied with the progress during this period. The abstracts of the reports of different studies and research under progress during 1984-85 and the latest issue of the newsletter 'Jal Vigyan Samachar' were circulated to the members.

### **2.2 Governing Body**

The Governing Body is the executive body of the Institute to pursue and carry out the objectives of the Society, and implement the policy directions and guidelines laid down by the Society. The Governing Body exercises all executive and financial powers of the Society. The Governing Body is required to meet atleast once in each quarter of the financial year. The membership of the Governing Body is given in Appendix-II.

As per the requirements, four meetings of the Governing Body are required to be held in a year. These meetings were held on April 27, 1984; July 6, 1984; October 8, 1984 and January 28, 1985. Several decisions concerning the administration of the Institute, creation of infrastructural facilities, recruitment of scientists and other staff, finalisation of recruitment rules, progress of training of scientists and amendment of working rules were taken. Programme and progress of the Institute were reviewed at these meetings and suggestions made for furthering the activities of the Institute. The work plan of the Institute and EFC Memo proposals for 1985-90 were also considered and approved for forwarding to Government for consideration and approval by Expenditure Finance Committee.

### **2.3 Technical Advisory Committee**

The Technical Advisory Committee (TAC) is responsible for the technical scrutiny of the research programme of the Institute for inclusion in the Annual/Five Year Plans/External Assistance including proposals for expansion of the Institute and recommend priorities. The Committee is expected to meet atleast once in six months. The Membership of the Committee is given in Appendix-III.

Two meetings of the Committee were held on August 17, 1984 and December 15, 1984. The programme of studies and research was discussed at these meetings. The technical programme of the Institute prepared for 1985-90 was considered by the Committee and organisational structure, research programme, establishment of laboratories and initiation of field and laboratory research were

considered and recommended for inclusion in the EFC Memo proposals for 1985-90. The interaction with State Governments and other organisations and transfer of technology were also discussed by the Committee. Working Groups for scientific divisions were also constituted.

#### **2.4 Co-ordination Committee**

The Co-ordination Committee of the Institute is for ensuring effective co-ordination between the University of Roorkee and the Institute. It considers the extent of assistance to be obtained from the University of Roorkee for utilising the facilities of the University of Roorkee and those available at the Institute for mutual benefit. It also decides the payment to be made to the University (on no-profit-no-loss basis) for assistance rendered including accommodation and services. The Co-ordination Committee shall meet generally once in three months. The membership of the Committee is given in Appendix-IV.

Two meetings of the Co-ordination Committee were held on September 12, 1984 and January 7, 1985. At these meetings, the progress of construction work being handled by the University for the National Institute of Hydrology and the matters related to the facilities extended by the University of Roorkee for housing and other services were discussed. The need for further interaction between the University and the Institute was also discussed at these meetings and possibility of scientific and technical interaction for mutual benefit is being explored.

#### **2.5 Working Groups**

As decided by the Governing Body at its 9th meeting held in March 1981, 8 working groups one for each priority area of research were constituted with Director of the Institute as Chairman and members drawn from various academic and research institutions and field organisations. The membership of the 8 working groups are given in Appendix-V. The working groups provide a close co-ordination of the Institute with the organisations represented and interaction with National Institute of Hydrology in its research activities. These groups also review the research work being carried out and advise on further studies to be taken up in each area of research.

Meetings of all the 8 working groups were held as given in Appendix-VI. At these meetings, the research work carried out by the Institute till that date was discussed and suggestions made by various members were noted for incorporating in the further research programme of the Institute.

#### **2.6 High Level Technical Committee on Hydrology**

The responsibilities of the Indian National Committee for International Hydrological Programme were transferred from DST/CSIR to Ministry of Irrigation in 1982. The High Level Technical Committee on Hydrology (HILTECH) was formed as a successor body with wider functions and broader compositions. The Secretariate of this Committee (HYDCOM Division) stands attached to the National Institute of Hydrology. The Institute is maintaining this Division at present at Delhi. Some functional responsibilities are being handled by the Scientists of the Institute at Roorkee. The main functions of HILTECH are to collect state of hydrological research in the country and to disseminate it; identify the areas of hydrology which need immediate attention; encourage national institutions to take up research, sponsor research and promote education and training programmes; foster collaboration with other countries, and co-ordinate effective participation by India in International Hydrology Programme of UNESCO and Operational Hydrology Programme of WMO, to disseminate information and improve standards to advise Central and State Government agencies, to carry out technical scrutiny of schemes and research programme of National Institute of Hydrology and examine its



expansion proposals. The membership of this Committee is drawn from various organisations in the country having interest in monitoring, evaluation, analysis and utilisation of Water Resources as is presented in Appendix-VII.

The third and fourth meetings of the HILTECH were held on November 12, 1984 and December 20, 1984 respectively.

## **2.7 Consultative Committee/Tripartite Review Committee for UNDP Project**

The UNDP project for establishment of NIH became operational in March 1979 with UNESCO as the executing agency. The immediate objectives of the project were to assist the organisational set up of the National Institute of Hydrology, to assist the Government in the definition and elaboration of the research programme including problems of water potential and utilisation, transfer of surplus water to deficit areas, and ground water storage of surplus waters; to train its scientific personnel and to provide equipment for research and data collection.

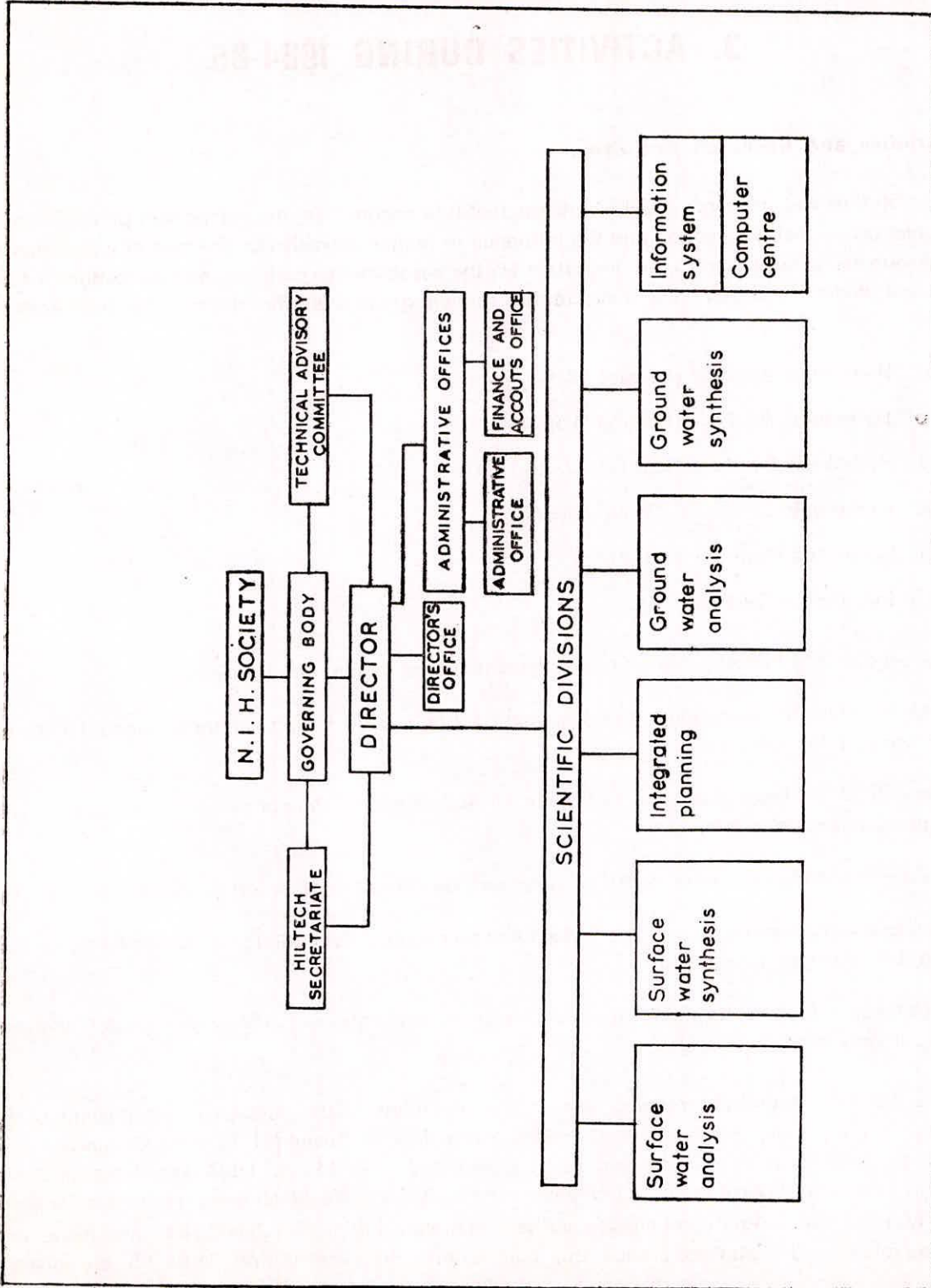
The Institute is required to conduct systematic and scientific research in pure and applied hydrology which constitute the basic tool for effective utilisation of surface and ground water resources and for providing detailed and accurate estimates for basin-wise plans indicating water potential available. The Institute's main objective is to develop methodology to improve the present practices and apply the latest techniques for development of available water resources and plan for their utilisation in an optimal manner.

The project has a provision of Consultative/Tripartite Review Committee. The constitution of this Committee is given in Appendix-VIII. The Final Tripartite Review Meeting of the UNDP Project IND/74/045—National Institute of Hydrology was held under the Chairmanship of Secretary (Irrigation) on 4th December 1984 at the National Institute of Hydrology, Roorkee. During their visit, the Chairman and members of the Committee went round the Computer Centre and other facilities of the Institute and expressed their appreciation at the development of the infrastructural facilities and various activities. During the course of the meeting, the Chairman and representatives of Department of Economic Affairs, UNDP and UNESCO have recorded their appreciation of the Institutional arrangements in implementing the planned activities and achieving the envisaged objectives of the project.

## **2.8 Institute Personnel**

The Institute has six scientific divisions and two units of administration and finance. The organisational structure of the Institute is presented in Chart-I. There were 21 scientists, 20 scientific supporting staff and 31 administrative and other supporting staff.

During this period, Dr. Satish Chandra has joined the Institute as Director on deputation from University of Roorkee and took over on May 30, 1984. Dr. S.M. Seth, Scientist 'F' in the Institute was looking after the current duties of the Director till that date. The advertisements for the vacant posts in the Institute at all levels were issued and for most of the posts the selections have also been held. Recruitment for one post of Scientist 'F', two posts of Scientists 'E', two posts of Scientist 'C', 5 posts of Scientist 'B' and 23 other posts of supporting technical and non-technical staff was relaxed by the Government of India, and one Scientists 'C', 4 Scientist 'B' and 14 others have already joined. One Scientist 'C', one Scientist 'B' and 9 others are likely to join soon. Recruitment of Scientist 'F' and 'E' is under process. As soon as the ban on recruitment is lifted, the other vacant posts will also be filled. It is expected that most of the vacant posts will be filled soon. The staff position as on 31.3.1984 and 31.3.1985 are given in Appendix-IX. The staff available in the Institute during the year is given in Appendix-X.



NATIONAL INSTITUTE OF HYDROLOGY ROORKEE ORGANISATIONAL STRUCTURE

### 3. ACTIVITIES DURING 1984-85

#### 3.1 Studies and Research Activities

The studies and research activities of the Institute encompass the component processes of the hydrologist cycle, their interaction and the influence of human activities on the quantity and quality of water resources. These studies are important for the assessment, planning and utilisation of surface and ground water resources. The Institute has following six scientific divisions to deal with these activities :

- (a) Hydrologic Analysis (Surface Water),
- (b) Hydrologic Analysis (Ground Water),
- (c) Hydrologic Synthesis (Surface Water),
- (d) Hydrologic Synthesis (Ground Water),
- (e) Integrated Planning, and
- (f) Information System.

The studies and research carried out in these divisions include the following :

- (a) Research involving development of systematic procedures including computer oriented procedures for use by field agencies,
- (b) Theoretical and basic studies in hydrology for understanding the component processes of hydrologic cycle and their interactions,
- (c) Studies involving measuring techniques, as well as data collection and processing procedures,
- (d) Development of standardised and systematic procedures for hydrologic analysis and synthesis and their documentation, and
- (e) Assistance and advice to field organisations in the application of procedures through sponsored consultancy research projects.

Upto 1984 the activities, keeping in view the constraints in the process of establishment, were confined to eight priority areas as per the recommendations of Technical Advisory Committee. The technical studies and research proposed to be completed upto March, 1984 was lagging behind. During this year, efforts were made to complete almost all the tasks which were required to be carried out upto March 1984. Additional studies and research were initiated in July 1984, and have mostly been completed. The studies carried out and reports prepared during 1984-85 are given in

Appendix-XI. The progress of work in the six divisions is as follows:

*(A) Hydrologic Analysis (Surface Water)*

The research activities in this division were carried out mainly in the area of hydrometeorology, hydrologic routing and stochastic hydrology. The methods for estimation of design storm were reviewed and a technical note has been prepared. A Manual giving guidelines for processing of precipitation data both for climatological purposes and real time use, has been prepared. The review notes for different methods of regional flood frequency analysis and partial duration series models have been completed. User's Manuals have been prepared for frequency analysis, multiple linear regression analysis and polynomial regression analysis and a case study on application of Thomas Fiering model has been completed. Different techniques on hydrologic routing have been reviewed and Users' Manuals for rating curve analysis and Muskingum Cunge rating procedure have been prepared. A case study for rating curve development for gauging sites at Narmada river has also been completed.

New problems in the areas of atmospheric-land surface modelling, hydrometeorology of hydrological droughts, effects of flood plain and channel processes on flood routing, stochastic data processing and forecasting models have been taken up.

*(B) Hydrologic Synthesis (Surface Water)*

The activities in this division mainly deal with three aspects viz., (i) unit hydrograph studies, (ii) hydrologic routing, and (iii) watershed modelling. Comparative study of unit hydrograph procedures including a case study and User's Manual on Unit hydrograph derivation and User's Manual on Model Parameter Evaluation using Catchment Characteristics have been completed. In the area of hydrologic routing a review note and User's Manual on hydrologic flood routing have been completed. In the area of watershed modelling a case study has been done and a review note has been prepared on comparative study of components of watershed models.

Besides these, a Manual on hydrologic water balance and review note on overland flow have also been completed. Study on dam break problem including case study using computer programme has been taken up and is in progress.

New problems in the areas of regional unit hydrograph studies, comparative performance of watershed model components, flash flood studies, hydrologic water balance and urban watershed modelling have been taken up.

*(C) Hydrologic Analysis (Ground Water)*

A basic study has been carried out to analyse unsteady flow to a multiaquifer flowing well using discrete kernel approach. A critical review of seepage studies by tracer technique has been carried out for assessing seepage losses from Deoban Canal. Using analytical method, interference of parallel canals has been studied. Emphasis has been given on the existing parallel canals of Lower Ganga Canal (LGC) system. Study has been initiated to assess recharge to ground water due to rainfall and different methods available for estimation of recharge have been reviewed. A review has been conducted for the study of hydrogeological parameters in alluvial and hard rock areas. Suitability of existing methods of evaluation of hydrogeological parameters from pump test data have also been studied. A study to find a suitable diameter and depth of large-diameter well in hard rock area is under progress. Analysis of flow to large-diameter well tapping multiple aquifers has been carried

out. A review of hydrological soil classification based on effective soil depth, soil texture of surface and sub-surface layer, clay content, infiltration rate, soil permeability and soil drainability has been done.

Preparation of a manual for agricultural drainage has been taken up.

*(D) Hydrologic Synthesis (Ground Water)*

In the area of ground water studies, a basic study of ground water balance as a lumped system has to be conducted before taking up a study on distributed simulation of ground water system. A manual for ground water balance has been prepared for the purpose. A technical note on regional Aquifer Simulation studies has been prepared. This is based on AQUIFEM-1, a Finite Element Aquifer Model developed at MIT and implemented on VAX-11/780 computer system. It was adopted with suitable modifications to a typical study area treating the aquifer as a single layer system. Earlier, Tyson Weber Model was used for this study. User's Manuals for Tyson Weber Model as well as AQUIFEM (modified version) have been prepared. Technical notes on artificial recharge to ground water and estimation of crop water requirement have also been completed. A status report on Hydrological studies carried out in India is being prepared.

*(E) Integrated Planning*

CREAMS and DOSAG models developed in USA for Water Quality Modelling have been implemented on VAX-11/780 computer system. Testing with Indian data will be carried out soon. The testing of SIMYLD II (with modifications) was carried out using data of Bhakra Beas System and an operation study for this system has been completed. A review note has been prepared on optimization and programming techniques as applied to reservoir operation study. User's Manuals for preparation of Routing Curve/Working Tables for reservoir operation and a manual on computation of reservoir capacity have been completed. Case studies using HEC-5 and SIMYLD II are being taken up for DVC Reservoir System and Reservoir System in Chambal basin. A manual for yield analysis is also being taken up.

*(F) Information System*

The management of computer centre with VAX-11/780 computer system and its peripherals form one of the main activities of this division. Efforts have been made to obtain hydrologic data and computer programmes on magnetic tapes. At present the division has 15 magnetic tapes from foreign institutions on which HEC programmes and other useful programmes have been stored. Scientists of NIH too have developed some programmes which have been also stored on magnetic tapes. A documentation for these programmes has been prepared. The development of Management Information System (MIS) for NIH is under process which is likely to be completed by 1986-87. A mailing list of the experts related to hydrology has been prepared. All books, journals and reports available at NIH Library have been documented. A video cassette player with 212 video cassettes of lectures on hydrology and water resources have been acquired. Monthly pay rolls of NIH employees are prepared using computer.

### **3.2 Physical Facilities**

The Institute has been functioning in its own premises (Jal Vigyan Bhawan) since December 1982. Since the accommodation available in the Jal Vigyan Bhawan was not sufficient, an extension

by four bays on two floors covering an area of 315 square metres has been approved by the Ministry and the work of construction has been entrusted to the University of Roorkee.

The Computer Centre till January 1985 continued at 102 Vigyan Kunj premises made available by University of Roorkee on rental basis. The civil and electrical works relating to site preparation have been carried out by the University of Roorkee and the shifting of the computer system and the air conditioning system were carried out by M/s Computer Maintenance Corporation Ltd., New Delhi and M/s Universal Refrigeration Corporation, Faridabad respectively. Necessary action for the installation of UPS and battery bank is being initiated. Orders have been placed for the procurement of 125 KVA Diesel generating set which will serve as a stand-by unit for running of the computer system in case of power failure. Action towards the precautionary measures against fire hazard for the computer system has also been taken up by providing smoke detectors and fire extinguishers.

The construction of a single storey Experts' Hostel was entrusted to the University of Roorkee as a deposit work. The construction of this Hostel is nearing completion and is expected to become operational from May 1985. To initiate Laboratory oriented studies, a Laboratory Block has been planned. The construction of this block was also entrusted to the University and the work started in May 1984. This block is expected to be completed and become operational by August 1985.

The tubewell which was drilled by the Central Ground Water Board has been made operational by the installation of pumping equipment and with the construction of water supply mains by the University of Roorkee. The laying of distributary grid for the various buildings in the campus has also been entrusted to the University of Roorkee. Brick on Edge roads have been laid after preparing the final layout plan for the campus. The University of Roorkee was requested for the construction of entrance gates, street lighting in the campus and the sewerage system for the campus. This work is expected to be completed in next six months.

The Uttar Pradesh State Electricity Board has provided a feeder and 250 KVA load through a sub-station in the Institute's premises. High tension side has been completed by installing a step down transformer and the regular power supply was provided to the Institute since August 1984. The work relating to low tension side was entrusted to UPSEB and it is expected that the work will be completed soon.

### **3.3 Computer Centre**

The VAX-11/780 computer system is operational in this Institute since October, 1982. This is a fourth generation 32-bit architecture, multiuser, multiprogramming and time sharing system. The hardware and software configuration of the system as available in the Institute are given in Appendix XII (a).

Since October, 1983 the maintenance of the computer system has been assigned to M/s Computer Maintenance Corporation Ltd. The computer system has now been shifted to its new premises at Jal Vigyan Bhawan where it is operational since February 1985.

With a view to enhance the capabilities of the computer system, a number of computer peripherals such as additional video terminals, additional memory, card reader, multiplexer, line printer, digitizer etc. were ordered by UNESCO under the UNDP project. Out of these equipments memory and multiplexer have already been received and will be installed in the system soon and the rest of the components are expected to arrive by June 1985.

The scientists and scientific staff are using the computer system through four interactive terminals for research and sponsored consultancy projects and the utilisation is nearly 70 percent. The Institute has also extended the computer facilities on payment basis to Government, semi-government and other organisations. During the year, CEERI, Pilani ; EIL, New Delhi ; SERC, Roorkee ; Electrical and Communication Engineering Department, Roorkee made use of these facilities.

### **3.4 Library**

The library of the Institute has been functioning since 1980. It has a wide collection of books, reports publications and journals in the areas of Hydrology, Water Resources and allied disciplines. During the year under report, library procured 326 books and subscribed to 25 Foreign and 15 Indian Journals. At the end of March 1985 the library had 2737 books, 1418 reports, 911 papers, 182 ISI standards, 30 Microfiche and 654 maps.

A computer based library information system has been developed for dissemination of books available in the library. The scientists were kept informed by latest collection in the library by bringing out 'Hydrology Documentation Bulletin' from January 1984.

### **3.5 UNDP Project**

In June 1977, the UNDP project IND/74/045 was approved for setting up of the National Institute of Hydrology at Roorkee with UNESCO as the executing agency. The project effectively came into operation in February 1979 after the joining of the Director. The initial budget for the project was U.S. \$ 790,350 which was increased to U.S. \$ 913,716. In December 1982, the Mid-Term Tripartite Review Meeting was held and at this meeting an additional provision of U.S. \$ 75,000 was approved under the equipment component. To facilitate the utilisation of the funds and to fulfil the objectives envisaged in the project document, the project was extended from February 1984 until December 1984.

The project has three components namely, visit of Consultants and Chief Technical Advisor, training of Scientists and study tours ; and purchase of essential equipment. All the visits of Consultants Chief Technical Advisor (CTA) have taken place including one visit of CTA at the time of Final Tripartite Review meeting of the project, held in December 1984. Sixteen Scientists have already completed their training, by the end of the year. One scientist will complete his training by April 1985 making a total of seventeen scientists trained under the project. The balance funds available under this head were utilised for the purchase of essential equipment and computer peripherals by inter-component transfer of funds. Purchase order of all the equipment requisitioned were placed by UNESCO before the expiry of the project period.

The list of equipment received under the project including those that are ordered and likely to be received soon is given in Appendix XII(a). The equipment purchased through grants in aid by the Government of India are given in Appendix XII(b). The Scientists who have been trained under the project were required to submit a technical report of their training. The list of 17 scientists trained under the project is given in Appendix XIII.

### **3.6 Consultancy**

There are two consultancy projects under investigation at the Institute sponsored by Narmada Cell of the Ministry and the National Water Development Agency. The work on the two projects is under

progress. Besides these a consultancy project for ground water availability studies for Sone Canal Command has been referred by WAPCOS. The work on this project is yet to start. The progress of work on the other two projects is as follows:

(1) *Narmada Design Flood Studies Sponsored by Narmada Cell, Ministry of Irrigation and Power Department of Irrigation*

Design Flood Studies for Narmada basin upto Narmada Sagar and Sardar Sarovar were taken up by the Institute during 1981. Besides using Statistical approach of frequency analysis, the unit hydrograph and design storm approach were also used with the help of HEC-1 flood hydrograph package for the estimation of design flood at Narmada Sagar and Sardar Sarovar.

Using the design storms recommended by India Meteorological Department, Central Water Commission and Dam Review Panel (on the suggestion of World Bank Expert), studies for estimation of tentative design flood at Narmada Sagar and Sardar Sarovar are being carried out.

(2) *Water Availability Studies at Three Sites on Mahanadi River*

Water availability studies of Mahanadi River sponsored by the National Water Development Agency (NWDA) were taken up with the main objective of obtaining long term yield series at 3 sites on Mahanadi using available stream flow data, rainfall data and other information.

Director had detailed discussions with Director-General, NWDA to formulate a plan for carrying out the studies as proposed and execute it according to a scheduled time frame. Accordingly, one Assistant Engineer and one Supervisor are working with the Scientists of NIH and carrying out analysis and studies.

### 3.7 High Level Technical Committee on Hydrology (HILTECH)

The High Level Technical Committee on Hydrology has been functioning since August 18, 1982. Recommendations made by the HILTECH are considered by the Governing Body of the National Institute of Hydrology. The Secretariat for this Committee is the HYDCOM Division of the National Institute of Hydrology which was located in New Delhi during the period of this report. The Secretariate also functions as the secretariate of the Asian Regional Coordinating Committee on Hydrology (ARCCOH). The 3rd and 4th meetings of the HILTECH were held on 12th November 1984 and 20th December 1984 respectively under the Chairmanship of Shri Pritam Singh, Chairman, Central Water Commission. The Committee appointed the following sub-committees and panels to carry out specific functions. These are as follows:

(a) Sub-Committee

- (i) Technician Training
- (ii) Constitution of Hydrology Panels
- (iii) Manpower requirements
- (iv) Draft Country Programme
- (v) P.G. Level Courses
- (vi) Interaction between research organisations, universities and user agencies.



- (b) Expert Review Group for IHP Phase-III Plan
- (c) Editorial Advisory Board of Hydrology Review Journal
- (d) Panels

- (i) Education and Training
- (ii) Surface Water
- (iii) Ground Water
- (iv) Hydrometeorology
- (v) Water Quality Erosion and Sedimentation
- (vi) Snow and Ice
- (vii) Water Resources Systems

- (e) Steering Committee to consider proposals for funding of research projects, seminar and symposia and courses.

The following courses, workshops and seminars were sponsored by the HILTECH :

- (i) A national workshop on the 'High Flow Range Forecasting' held on 10 September 1984 at I.I.T., Delhi.
- (ii) A national seminar on 'Hydrology' Annual Convention of Association of Hydrologists of India, Pune, June 29 to July 2, 1984.
- (iii) A symposium on 'Hydrological Analysis of Catchments with Inadequate Data', Annual Session of Indian Association of Hydrologists, New Delhi, August 29, 1984.
- (iv) International workshop on 'Rural Hydrogeology and Hydraulics in Fissured Basement Zones' University of Roorkee, Roorkee March 15 to 24, 1985.

The Committee organised an International workshop on 'Exchange of Experiences in Operational Application of Mathematical Models in Developing Countries, at Indian Institute of Technology, Delhi from February 26 to March 1, 1985.

The Committee has also sponsored the following seminar, workshop and course during the year :

- (1) 'International Workshop on Alluvial River Problems' Department of Civil Engineering University of Roorkee, October 1985.
- (2) Course on 'Stochastic Methods in Hydrology and Water Resources and their Computer Aided Applications in Planning' at Indian Institute of Technology, Kharagpur, June 1985.
- (3) Symposium on 'Inadequacies of Existing Runoff Formulae for Surface and Subsurface Drainage'. Indian Association of Hydrologists, Chandigarh, October 1985.
- (4) Seminar on 'Hydrology' with a colloquium on Impact on Water Resources on Agriculture, Association of Hydrologists of India, Hissar June 1985.

The Committee has nominated two candidates each for the UNESCO sponsored courses in Hydrology in USSR and Hungary. Out of these one candidate was selected for further studies in USSR.

Professor Subhash Chander, Member of HILTECH represented India on the Consultative meeting to consider major regional project on water resources held in Malaysia from 3rd to 5th December 1984.

The first meeting of the Editorial Advisory Board for Hydrology Review was held in August 1984 at which it was decided that the Hydrology Review which had been published upto 1980 only, be brought up to date. It was decided that two issues may be published to cover the backlog. One issue of the Hydrology Review may include the activities for the year 1981, 1982 and 1983 and another issue will be devoted only to the activities during 1984. The Secretariate was advised to take up the publication of the 1985 issue also simultaneously so that in the first half of 1985 the first issue can be brought out.

During the year, the copies of the 1980 issue of the Hydrology Review which could not be sent during 1983-84 were sent to the various agencies. The material for the combined issue of 1981-83 is ready and will be sent to the press soon. The 1984 issue is also in the final stages and will be sent to the press soon. It is expected that by August these two issues will be brought out and the issue of 1985 in one volume is proposed to be brought out by November 1985. From the year 1986 it is proposed to bring out two issues of the Hydrology Review per year.

At the Second Meeting of ARCCOH held in January, 1983 it was decided to formulate a Major Regional Project. A Working Group consisting of Nepal, USSR, China, Pakistan, Malaysia and India was formed. This working group met in September 1983 at Delhi and considered the draft proposals received. This draft was considered by the Steering Committee meetings in September 1983 and March 1984 at New Delhi and Kathmandu respectively. Unesco General Conference approved in principle the project and a Consultative meeting was held at Kuala Lumpur, Malaysia to initiate the MRP in Asia. This meeting was attended by Dr. Subhash Chander as a representative from India.

It was also decided at the 2nd meeting of ARCCOH to prepare a directory indicating education, training and research facilities and expertise concerning hydrology in Asian regions. The Directory is being compiled based on the questionnaires received from ARCCOH countries. The Directory would be published soon. The ARCCOH Secretariate has also brought out a Newsletter which would be published in April 1985. This would be a quarterly publication. Actions on other resolutions of the ARCCOH are in progress.

During the year, Shri K.K. Framji, Secretary-General I.C.I.D. was nominated as a member of the Committee. He attended the third and fourth meeting of the Committee during November and December 1984. Dr. Satish Chandra who was a member of the Committee joined as Director, NIH and is a member of the Committee in that capacity.

Shri Pritam Singh, Chairman, Central Water Commission and Chairman, HILTECH retired on December 31, 1984. The Committee placed on record their deep appreciation and gratitude for the guidance and support provided by him for an effective functioning of the HILTECH.

### **3.8 Participation in Conferences and Symposia and Publications by Scientific Staff**

The Scientists and scientific staff of NIH participated in the seminars/symposia, workshops and courses and presented papers during the year under report as given in Appendix-XIV.

A number of papers were also published by the scientists in professional journals. The list of papers published are given in appendix-XV.

### **3.9 Visitors**

Shri M. G. Padhye, Chairman, Governing Body and Secretary (Irrigation), Govt. of India visited the Institute on December 4, 1984 at the time of Final Tripartite Review/Consultative Committee meeting. He inspected the Computer Centre and Jal Vigyan Bhavan. Besides him, a number of eminent visitors from within the country and abroad visited the Institute and some of them delivered lectures to the scientific staff of the Institute. A list of the visitors is given in Appendix-XVI.

### **3.10 Recreation and Welfare Activities**

A recreation club was started in February 1981 to provide recreational facilities for the staff and to provide cultural activities. During the year, the Institute provided an UPTRON Colour TV set as a recreational facility to the club. The club has a library section where Hindi and English magazines and books are available for use by members. During the year, two social get-togethers and cultural functions were organized. The annual games have been conducted covering various outdoor and indoor games.

### **3.11 Newsletter**

The publication of a quarterly newsletter was started from January 1984. During the year under report, four issues of the newsletter have been published in April, July and October 1984 and in January 1985. Governing Body of the Institute has assigned the title of the newsletter as 'JAL VIGYAN SAMACHAR'. As such, this title is being used from January 1985 issue of the newsletter.

These newsletters report on the studies and research that are being carried out in the Institute including the reports brought out and scientific papers published by the scientists. Besides these, the plan, programme and progress of the Institute are furnished in the newsletter. Information of general interest to the hydrologic community are also covered.

The newsletters were circulated to members of various bodies of the Institute and Central, State Government organisations and academic institutions. This has been found to be very effective forum for interaction with the hydrologic community, and field organisations.

### **3.12 Use of Hindi**

In accordance with the official language policy of the Government, efforts were made by the Institute during the year towards the implementation of various provisions of the official language Act, 1963 and the rules framed thereunder. An official language implementation committee has been formed in this office in October '84 and the progress made in regard to use of Hindi is being reviewed periodically in the meetings of the committee.

1. Efforts were also made to implement the suggestions given by Hindi Salahkar Samiti of the Ministry of Irrigation from time to time.

All the letters received in Hindi were also replied in Hindi. During the year 1984-85 the Institute received 58 letters in Hindi out of which 55 letters were replied in Hindi. Office orders, and circulars meant for group D employees are issued in Hindi only.

2. Annual report of NIH is being published bilingually in English and in Hindi. During the year 1981-85 the Institute placed the Hindi edition of the annual report in the meeting of Hindi Salahkar Samiti.

3. One post of Hindi Translator has already been released by the Governing Body of the Institute and the recruitment is in process.

4. All the officers and members of the staff in the Institute possess working knowledge of Hindi which enables them to do day to day work in Hindi.

5. A Hindi fortnight was observed in the Institute from 19th November, 1984 to 1st December, 1984. During this fortnight the rules relating to progressive use of official language were explained to the employees and a Hindi Essay competition was also organised. The scientists were advised to write research papers for publication in magazines in Hindi.

## **4.0 FINANCE AND ACCOUNTS**

During the year under review the Government of India, Ministry of Irrigation and Power provided an amount of Rs. 40 lakhs as Grant-in-aid to the Institute. In addition, grant-in-aid of Rs. 1.88 lakhs was released for the Hydcom Division (Secretariate of High Level Technical Committee on Hydrology) which has been transferred to NIH from CSIR w.e.f. 1-4-83. The actual expenditure of the Institute during the year was 39.54 lakhs and 1.83 lakhs on Hydcom Division. The accounts of the Institute for the year have been audited by M/s Satyendra and Co., Chartered Accountant, Roorkee and a copy of audited statement of account consisting of receipt and payments accounts, income and expenditure account and the balance sheet as on 31st March, 1985 duly certified by the auditors is given at Appendix XVII. It will be seen from the auditors report that additions worth Rs. 8.46 lakhs were made to the fixed assets of the Institute during the year. The replies to the auditor's observations have been submitted separately to the Governing Body of the Institute.

## **5.0 ACKNOWLEDGEMENTS**

The different activities of the Institute have progressed well under the blessings of the President of the Society and direction and guidance from Chairman of the Governing Body and Technical Advisory Committee and members of the Society, Governing Body and TAC. Support and help from UNDP, UNESCO, Department of Economic Affairs and from officers of Ministry of Irrigation and Power, Department of Irrigation, Central Water Commission, India Meteorological Department, University of Roorkee and several other Central and State Government organisations is gratefully acknowledged. Whatever has been achieved by the Institute since its establishment, in particular during the year under report, would not have been possible without their help and guidance. The Institute also acknowledges the help and cooperation received from members of working group and scientists and engineers from many academic and research organisations.

**A P P E N D I C E S**

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## APPENDIX—I

### NATIONAL INSTITUTE OF HYDROLOGY SOCIETY

PRESIDENT : Union Minister for Irrigation  
Govt. of India,  
Shram Shakti Bhawan,  
NEW DELHI-110001.

#### MEMBERS

Member,  
Planning Commission,  
Yojna Bhawan,  
NEW DELHI-110001

Minister in-charge of Irrigation,  
Govt. of Haryana,  
CHANDIGARH

Minister in-charge of Irrigation,  
Govt. of Uttar Pradesh,  
LUCKNOW

Minister in-charge of Irrigation,  
Govt. of Punjab,  
CHANDIGARH

Minister in-charge of Irrigation,  
Govt. of Bihar,  
PATNA

Minister in-charge of Irrigation,  
Govt. of West Bengal,  
Writer's Building,  
Dalhousee Square,  
CALCUTTA

Minister in-charge of Irrigation,  
Govt. of Orissa,  
BHUBANESWAR

Minister in-charge of Irrigation,  
Govt. of Maharashtra,  
Mantralaya,  
BOMBAY

Minister in-charge of Irrigation,  
Govt. of Madhya Pradesh,  
BHOPAL

Vice-Chancellor,  
University of Roorkee,  
ROORKEE

Chairman,  
Brahmaputra Board,  
X-4, Hauz Khas,  
NEW DELHI

Sri K.V. Krishnamurthy  
(Expired on 1-2-1985),  
Consulting Engineer & Editor,  
Water World,  
B-1, L.S.C., J. Block, Saket,  
NEW DELHI-110017

Shri S.C. Sharma,  
Director,  
Gujarat Water Resources  
Development Corpn. Ltd.,  
Panchayat Bhawan,  
Sector No. 17,  
GANDHINAGAR-383017

Secretary to Govt. of India,  
Ministry of Energy,  
Shram Shakti Bhawan,  
NEW DELHI-110001

Minister in-charge of Irrigation,  
Govt. of Andhra Pradesh,  
HYDERABAD

Minister in-charge of Irrigation,  
Govt. of Kerala,  
TRIVANDRUM

Director-General,  
National Water Development Agency,  
Annexe Behind CSMRS Building,  
NEW DELHI-110016

Chairman,  
Narmada Control Authority,  
Vasant Vihar,  
NEW DELHI-110057

Sri J.A. Murray,  
Retd. Chief Engineer,  
P.W.D., A.P.,  
H. No. 3-3-319/8/8,  
Srinagar Colony,  
HYDERABAD-500873

Sri Hari Mohan,  
Retd. Engineer-in-Chief,  
Irrigation Dept.,  
Uttar Pradesh,  
C-26/2-G, Wazir Hassan Road,  
LUCKNOW-226001

Prof. Subhash Chander,  
Civil Engineering Department,  
I.I.T., Delhi,  
NEW DELHI-110016

Dr. Satish Chandra (upto 29-5-84)  
Professor, School of Hydrology,  
University of Roorkee,  
ROORKEE

Dr. R.K. Bora,  
Professor & Head,  
Civil Engineering Department  
Assam Engineering College,  
GAUHATI

Secretary to Govt. of India,  
Department of Civil Aviation,  
Sarada Patel Bhawan,  
NEW DELHI-110001

Secretary to Govt. of India,  
Department of Expenditure,  
Ministry of Finance,  
(or his nominee),  
NEW DELHI-110001

Secretary to Govt. of India,  
Ministry of Works and Housing,  
Nirman Bhawan,  
NEW DELHI-110002

Secretary to Govt. of India,  
Planning Commission,  
Yojna Bhavan,  
NEW DELHI-110001

Chairman,  
Central Water Commission,  
Sewa Bhawan, R.K. Puram,  
NEW DELHI-110066

Member (Water Resources),  
Central Water Commission,  
Sewa Bhawan, R.K. Puram,  
NEW DELHI-110066

Member (Floods),  
Central Water Commission,  
Sewa Bhawan, R.K. Puram,  
NEW DELHI-110066

Chairman,  
Central Electricity Authority,  
Sewa Bhawan, R.K. Puram,  
NEW DELHI-110066

Joint Secretary (Admn.)  
Ministry of Irrigation,  
Shram Shakti Bhawan,  
NEW DELHI-110001

Dr. P.S. Rao,  
Indian Institute of Management,  
BANGALORE-560027

Secretary of Govt. of India,  
Department of Science & Technology,  
Technology Bhawan,  
NEW DELHI-110029

Director-General,  
India Meteorological Department,  
Lodi Road,  
NEW DELHI

Director General,  
Geological Survey of India,  
Chowringee Road,  
CALCUTTA

Secretary,  
India National Committee of  
International Hydrological Programme,  
(HYDCOM) A unit of NIH  
NEW DELHI

Secretary to Govt. of India,  
Ministry of Irrigation,  
Shram Shakti Bhawan,  
NEW DELHI-110001

Chairman,  
Central Ground Water Board,  
Krishi Bhawan,  
Dr. Rajendra Prasad Road,  
NEW DELHI

Joint Secretary (Ganga Basin)  
Ministry of Irrigation,  
Shram Shakti Bhawan,  
NEW DELHI-110001

Commissioner (Indus Basin),  
Ministry of Irrigation,  
Shram Shakti Bhawan,  
NEW DELHI-110001

Director,  
National Institute of Hydrology,  
ROORKEE

## APPENDIX—II

### GOVERNING BODY

CHAIRMAN	Secretary to Government of India, Ministry of Irrigation and Power, Shram Shakti Bhawan, NEW DELHI
VICE-CHAIRMAN	Vice-Chancellor, University of Roorkee, ROORKEE
MEMBER-SECRETARY	Director, National Institute of Hydrology, ROORKEE

### MEMBERS

Secretary, Government of India, Department of Power, (or his nominee)	Secretary, Planning Commission, Govt. of India, (or his nominee)
Secretary, Government of India, Department of Civil Aviation, (or his nominee)	Secretary, Department of Science & Technology, Government of India, (or his nominee)
Secretary, Government of India, Ministry of Works & Housing, (or his nominee)	Chairman, Central Water Commission, (or his nominee)
Secretary, Department of Expenditure, Ministry of Finance, (or his nominee)	Chairman, Central Electricity Authority, (or his nominee)
Chairman, Central Ground Water Board, Krishi Bhavan, NEW DELHI	Director-General, India Meteorological Department, Lodi Road, NEW DELHI

## APPENDIX—III

### TECHNICAL ADVISORY COMMITTEE

#### CHAIRMAN

Chairman,  
Central Water Commission,  
NEW DELHI

#### CONVENER

Director,  
National Institute of Hydrology,  
ROORKEE

#### MEMBERS

Member (Water Resources),  
Central Water Commission,  
NEW DELHI

Member (Floods),  
Central Water Commission,  
NEW DELHI

Chairman,  
Central Ground Water Board,  
NEW DELHI

A Representative of India  
Meteorological Department,  
NEW DELHI

Director,  
Central Water & Power  
Research Station,  
PUNE

Representative of Department of  
Science & Technology,  
Govt. of India,  
NEW DELHI

Dr. Subhash Chander,  
Professor,  
Civil Engineering Department  
Indian Institute of Technology,  
NEW DELHI

Dr. Satish Chandra (upto 29-5-1984)  
Professor and Co-ordinator  
School of Hydrology,  
University of Roorkee,  
ROORKEE

Dr. A.S. Chawla (after 29-5-1984),  
Professor,  
WRDTC  
University of Roorkee,  
ROORKEE

Shri J.F. Mistry,  
Secretary (Irrigation),  
Gujarat Govt.,  
GANDHINAGAR

Shri G.S. Ghanekar,  
Chief Engineer (Irrigation),  
Maharashtra Govt.,  
BOMBAY

TECHNICAL ADVISORY COMMITTEE  
CO-ORDINATION COMMITTEE

- CHAIRMAN** : Dr. Bharat Singh,  
Vice-Chancellor,  
University of Roorkee,  
ROORKEE
- VICE-CHAIRMAN** : Director,  
National Institute of Hydrology,  
ROORKEE
- MEMBER-SECRETARY** : Chief Administrative Officer,  
National Institute of Hydrology,  
ROORKEE
- MEMBERS** : Co-ordinator,  
School of Hydrology,  
University of Roorkee,  
ROORKEE
- Director of Works,  
University of Roorkee,  
ROORKEE
- Dr. S.M. Seth,  
Scientist 'F'  
National Institute of Hydrology,  
ROORKEE
-

## APPENDIX—V

### MEMBERSHIP OF WORKING GROUPS

#### I. HYDROLOGICAL ANALYSIS OF STREAMS FLOWS IN A BASIN

CHAIRMAN	—Director, NIH, Roorkee	
CONVENER	—Divisional Head, S.W. Analysis	
MEMBERS	(i) Nominee of Central Water Commission (CWC) New Delhi	Director, Hydrology II
	(ii) Nominee of Hydrological Observations, CWC New Delhi	
	(iii) Nominee of Chief Engineer, Irrigation Department, Karnataka, Bangalore	Special Officer (Hydrology) Office of Chief Engineer (WRDO)
	(iv) Dr. S. K. Sapolia, I.I.T., Delhi	
	(v) Dr. K. N. Mutreja, U.P. Irrigation Department, Roorkee	
	(vi) Dr. S. Ramaseshan, I.I.T., Kanpur	
	(vii) Nominee of Chairman Brahmaputra Board, Gauhati	
	(viii) Shri N. K. Goel, Scientist-in-charge, N.I.H., Roorkee	Member-Secretary

#### II. WATER BALANCE OF RIVER BASINS

CHAIRMAN	—Director, NIH, Roorkee	
CONVENER	—Divisional Head, Ground Water Analysis	
MEMBERS	(i) Nominee of Central, Water Commission (CWC), New Delhi	Director (NWP)
	(ii) Nominee of Central, Ground Water Board, New Delhi	Chief Engineer (Minor Irrigation)
	(iii) Nominee of India, Meteorological Deptt., New Delhi	Meteorologist-I, Office of Deputy Director General of Meteorology, (Hydrometeorology)
	(iv) Nominee of Water Technology Centre, New Delhi	
	(v) Nominee of Planning Commission, New Delhi	Joint Adviser (I & CAD) or alternate Deputy Adviser (I & CAD)

- (vi) Nominee of Chief Engineer, Govt. of Gujarat, Gandhinagar
- (vii) Nominee of Director, UP Irrigation Research Institute, Roorkee Research Officer  
(Ground Water)
- (viii) Dr. B.P. Singh, Professor, Department of Physics, U.O.R., Roorkee
- (ix) Dr. R.D. Verma, Professor, Civil Engg., Madan Mohan Malviya Regional Engg. College, Jaipur
- (x) Nominee of Brahmaputra Board, Gauhati
- (xi) Dr. R. Singh, School of Hydrology, U.O.R., Roorkee
- (xii) Shri A.K. Bhar, Scientist-in-charge, N.I.H., Roorkee Member-Secretary

### III. WATERSHED MODELS INCLUDING THOSE FOR SNOWFED BASINS AND BASINS WITH LIMITED DATA

**CHAIRMAN** —Director, NIH, Roorkee

**CONVENER** —Divisional Head, Ground Water Analysis

- MEMBERS**
- (i) Nominee of Central Water Commission (CWC), New Delhi. Director, Hydrology-I
- (ii) Nominee of Chief Engineer (I), Govt. of Maharashtra. Executive Engineer, Water Resources Division
- (iii) Nominee of Central Water & Power Research Station. Pune. Senior Research Officer, Central Water & Power Research Station
- (iv) Nominee of Bhakra Beas Management Board, Chandigarh. Executive Engineer (Hydrology), Bhakra Beas Management Board
- (v) Director, Central Soil Water Conservation Research & Training Institute, Dehradun.
- (vi) Dr. P.B. Sharma, Senior Scientist (Hydrology), Water Technology Centre, Indian Agriculture Research Institute, New Delhi.
- (vii) Dr. B.S. Mathur, School of Hydrology, U.O.R., Roorkee.
- (viii) Dr. S.M. Seth, Scientist 'F', N.I.H., Roorkee.
- (ix) Shri Bhaskar Datta, Scientist-in-charge, N.I.H., Roorkee. Member-Secretary



IV. METHOD OF OPERATION OF A SYSTEM OF RESERVOIRS TAKING INTO CONSIDERATION THE EFFECT OF IRRIGATION, FLOOD CONTROL & POWER GENERATION

CHAIRMAN	—Director, NIH, Roorkee	
CONVENER	—Divisional Head, Ground Water Synthesis	
MEMBERS	(i) Nominee of Central Water Commission (CWC), New Delhi.	Sr. System Planner (GBWS)
	(ii) Nominee of Central Electricity Authority, New Delhi.	Director, Hydroelectric (Planning) Directorate
	(iii) Nominee of Bhakra Beas Management Board, Chandigarh.	Member (Irrigation)
	(iv) Nominee of Damodar Valley Corporation, Calcutta-700027.	Chief Engineer (Civil)
	(v) Dr. G.N. Yoganasimhan, Professor, WRDTC, U. O. R., Roorkee.	
	(vi) Dr. A. Sunder, I.I.M., Bangalore.	
	(vii) Dr. S. Ramaseshan, Professor, Civil Engineering Deptt., I. I. T., Kanpur.	
	(viii) Dr. S.M. Seth, Scientist 'F', N.I.H., Roorkee.	
	(ix) Shri P.P. Agarwal, Chief Engineer, M. P. River Valley Project, Dehradun.	
	(x) Director-General, N.W.D.A., New Delhi.	
	(xi) Shri S.R.B. Dhason, Scientist-in-charge, N.I.H., Roorkee.	Member-Secretary

V. EVOLUTION OF MATHEMATICAL MODELS FOR STORM PRECIPITATION FOR FLOOD ESTIMATION

CHAIRMAN	—Director, NIH, Roorkee	
CONVENER	—Divisional Head, S.W. Analysis	
MEMBERS	(i) Nominee of Central Water Commission, New Delhi	Director Hydrology-I
	(ii) Nominee of India Meteorological Deptt., New Delhi	Meteorologist (I)
	(iii) Nominee of Indian Institute of Tropical Meteorology, Pune	Scientist Emeritus
	(iv) Prof. Subhash Chander, Civil Engineering Deptt., I.I.T., New Delhi	
	(v) Nominee of Research Design & Standards Organisation, Lucknow	Joint Director (B&F)
	(vi) Nominee of Brahmaputra Board	
	(vii) Shri K.S. Ramasastri, Scientist-in-charge, N.I.H., Roorkee	Member-Secretary

VI(A). EVOLUTION OF METHODOLOGIES FOR FLOOD ESTIMATION,  
FORECASTING & CONTROL (SMALL CATCHMENTS)

CHAIRMAN —Director, N.I.H., Roorkee

CONVENER —Divisional Head, S.W. Synthesis

MEMBERS

(i)	Nominee of Central Water Commission, New Delhi	Director (FCM)
(ii)	Nominee of India Meteorological Deptt., New Delhi	Meteorologist Gr. I
(iii)	Nominee of Research Designs & Standards Organisation, Lucknow	Joint Director (B&F)
(iv)	Nominee of Forest Research Institute, Dehradun	Officer-in-charge
(v)	Dr. Subhash Chander, Professor, Deptt. of Civi Engg., I.I.T., New Delhi	
(vi)	Dr. R.J. Garde, Professor, Deptt. of Civil Engg., U.O.R., Roorkee	
(vii)	Dr. B.S. Mathur, Reader, School of Hydrology, U.O.R, Roorkee	
(viii)	Shri R.D. Singh, Scientist-in-charge, N.I.H., Roorkee	Member-Secretary

VI(B). EVOLUTION OF METHODOLOGIES FOR FLOOD ESTIMATION,  
FORECASTING & CONTROL (LARGE CATCHMENTS)

CHAIRMAN —Director, NIH, Roorkee

CONVENER —Divisional Head, S.W. Synthesis

MEMBERS

(i)	Nominee of Central Water Commission, New Delhi	Dy. Director, Flood Forecasting (Planning & Development)
(ii)	Nominee of Brahmaputra Flood Control Commission, Gauhati	
(iii)	Nominee of Ganga Flood Control Commission, Patna	Member (C)
(iv)	Nominee of India Meteorological Deptt., New Delhi	Director (Hydromet.)
(v)	Nominee of Chief Engineer (Irrigation), Patna	Chief Engineer (I)
(vi)	Dr. Subhash Chander, Professor in Civil Engg., I.I.T., New Delhi	
(vii)	Dr. R.J. Garde, Professor in Civil Engg., U.O.R., Roorkee	
(viii)	Nominee of Central Electricity Authority, Sewa Bhawan, New Delhi	
(ix)	Shri M.E. Haque, School of Hydrology, U.O.R., Roorkee	
(x)	Shri M. Perumal, Scientist-in-Charge, N.I.H., Roorkee	Member-Secretary

## VII. METHODOLOGY FOR GROUNDWATER ESTIMATION AND DEVELOPMENT

- CHAIRMAN** —Director, NIH, Roorkee
- CONVENER** —Divisional Head, Ground Water Synthesis
- MEMBERS**
- (i) Nominee of Central Ground Water Board, New Delhi. Chief Hydrogeologist
  - (ii) Nominee of Engineer-in-Chief, Punjab Irrigation Deptt., Chandigarh. Director, Water Research Directorate
  - (iii) Nominee of Engineer-in-Chief, U. P. Irrigation Deptt., Lucknow.
  - (iv) Nominee of Chief Engineer, Andhra Pradesh Irrigation Deptt., Hyderabad.
  - (v) Dr. V. Lakshminarayana, Professor in Civil Engg., I.I.T., Kanpur.
  - (vi) Dr. B.B.S. Singhal, Professor, Deptt. of Earth Sciences, U.O.R., Roorkee.
  - (vii) Dr. A.S. Chawla, Professor, WRDTC, U.O.R., Roorkee.
  - (viii) Dr. D. Kashyap, Reader, School of Hydrology, U.O.R., Roorkee.
  - (ix) Shri S.C. Sharma, Gujarat Water Research Development Corporation, Ltd., Gandhinagar.
  - (x) Shri D.K. Dutt, Technical Chief (WR), Rural Elect. Corpn., New Delhi.
  - (xi) Dr. S.R. Singh, Deptt. of Soil & Water Engg., Punjab Agricultural University, Ludhiana, (Punjab).
  - (xii) Dr. G.C. Mishra, Scientist 'E', NIH, Roorkee.
  - (xiii) Shri A.K. Bhar, Scientist-in-charge, NIH, Roorkee. Member-Secretary.

## VIII. STUDY OF EXTREME STORMS AND FLOODS AND THEIR IMPLICATION IN HYDROLOGIC SYNTHESIS

- CHAIRMAN** —Director, N.I.H., Roorkee
- CONVENER** —Divisional Head, S.W. Analysis
- MEMBERS**
- (i) Nominee of Central Water Commission, New Delhi Director (Hydrology-I)
  - (ii) Nominee of India Meteorological Deptt., New Delhi Meteorologist Gr. I
  - (iii) Nominee of Indian Institute of Tropical Meteorology, Pune Assistant Director
  - (iv) Nominee of Chief Engineer, Gujarat
  - (v) Nominee of Brahmaputra Board, Gauhati
  - (vi) Dr. R.D. Verma, Proessor, Deptt. of Civil Engg., M.M. Malviya Regional Engineering College, Jaipur
  - (vii) Dr. D.K. Srivastava, School of Hydrology, U O.R., Roorkee
  - (viii) Shri K.S. Ramasastri, Scientist 'C', N.I.H., Roorkee
  - (ix) Dr. K.K.S. Bhatia, Scientist-in-charge, N.I.H., Roorkee Member-Secretary

## APPENDIX—VI

### WORKING GROUP MEETINGS

Working Group No.	Title	Date of Meeting
I	Hydrologic Analysis of Streamflows in a Basin	25.6.1984
II	Water Balance of River Basins	28.6.1984
III	Watershed Models including those for Snowfed Basins and Basins with Limited Data	29.6.1984
IV	Method of Operation of Systems of Reservoirs taking into consideration the effect of Irrigation, Flood Control and Power Generation	26.6.1984
VI (a, b)	Evolution of Methodologies for Flood Estimation Forecasting and Control-Small Catchments	21.7.1984
	Evolution of Methodologies for Flood Estimation Forecasting and Control-Large Catchments	
VII	Methodology for Ground Water Estimation and Development	27.6.1984
VIII	Study of Extreme Storms and Floods and their Implications in Hydrologic Synthesis	7.7.1984

## APPENDIX—VII

### MEMBERS OF HIGH LEVEL TECHNICAL COMMITTEE ON HYDROLOGY

1. Chairman,  
Central Water Commission  
and Chairman, HLTCH,  
Sewa Bhawan, R.K. Puram,  
New Delhi-110066.
2. Director,  
National Institute of Hydrology,  
University of Roorkee Campus, Roorkee.
3. Chairman,  
Central Ground Water Board,  
Krishi Bhawan, Room No. 236-A,  
New Delhi-110001.
4. Director General,  
Indian Council of Agricultural Research,  
Krishi Bhawan,  
New Delhi-110001.
5. Director General  
CSIR, Rafi Marg,  
New Delhi-110001.
6. Director General,  
Geological Survey of India,  
27 Jawaharlal Nehru Marg,  
CALCUTTA-700016.
7. Director General of Meteorology,  
IMD, Lodhi Road,  
New Delhi-110003.
8. Chairman,  
Central Board for Prevention and  
Control of Water Pollution,  
5th & 6th Floor, Skylark,  
60, Nehru Place,  
New Delhi-110019.
9. Chairman,  
Central Electricity Authority,  
Ministry of Energy,  
Sewa Bhawan, North Wing,  
R.K. Puram,  
New Delhi-110066.
10. President,  
Forest Research Institute and College,  
P.O. New Forest,  
Dehradun-248006.
11. Adviser, CPH EED,  
Ministry of Works & Housing,  
Nirman Bhawan,  
New Delhi.
12. Shri K.K. Framji,  
Secretary-General,  
International Commission on  
Irrigation & Drainage,  
New Delhi-110021.  
(w.e.f. Oct. 1, 1984)
13. Director,  
National Remote Sensing Agency,  
No. 43, Sardar Patel Road,  
Post Box No. 1519,  
Secundrabad-500003.
14. Chairman,  
Narmada Conrtal Authority,  
B-4/15, Vasant Vihar,  
New Delhi-110057.
15. Engineer-In-Chief,  
Irrigation Department (U.P.)  
1, Canal Colony,  
Lucknow-226001.
16. Chief Engineer,  
(Water Resources) and Joint Secretary,  
Deptt. of Irrigation,  
Govt. of Maharashtra,  
Mantralaya, Bombay-400032.
17. Chairman  
Brahmaputra Board,  
Silpukhuri,  
Gauhati-781003.
18. Dr. Subhash Chander,  
Deptt. of Civil Engg.  
Indian Institute of Technology,  
Hauz Khas, New Delhi-110016.

19. **Dr. Satish Chandra,**  
**Professor of Hydrology,**  
**University of Roorkee,**  
**Roorkee-247667.**  
**(Took over as Director,**  
**NIH on 30.5.1984).**
20. **Shri R. Kuppaswamy,**  
**Chief Engineer,**  
**PWD Ground Water,**  
**Chepauk,**  
**Madras-600005**  
**(Tamil Nadu).**
21. **Director,**  
**State Water Investigation,**  
**Directorate,**  
**Sech. Bhawan, III Floor,**  
**Bidhan Nagar,**  
**Calcutta-700064 (West Bengal).**
22. **Director,**  
**Snow & Avalanche Study,**  
**Establishment,**  
**Defence Research & Development**  
**Organisation,**  
**Manali (H.P.)**  
**(w.e.f. Feb. 2, 1984).**
23. **Chief Engineer,**  
**Ground Water PWD,**  
**Chepauk,**  
**Madras-600005**  
**(Tamil Nadu).**
24. **Senior Scientist,**  
**Hydcom Division,**  
**National Institute of Hydrology,**  
**West Block I,**  
**R.K. Puram,**  
**New Delhi-110066.**

**APPENDIX—VIII****CONSULTATIVE/TRIPARTITE COMMITTEE**

<b>CHIARMAN</b>	Shri M. G. Padhye Secretary to Govt. of India, Ministry of Irrigation & Power, Department of Irrigation, Shram Shakti Bhawan, Rafi Marg, NEW DELHI-110001.
<b>MEMBER-SECRETARY</b>	Director National Institute of Hydrology, ROORKEE.
<b>MEMBERS</b>	Joint Secretary (Ganga Basin) Ministry of Irrigation & Power, Department of Irrigation, Shram Shakti Bhawan, Rafi Marg, NEW DELHI-110001.  Joint Secretary (Administration) Ministry of Irrigation & Power, Shram Shakti Bhawan, Rafi Marg, NEW DELHI-110001.  The Financial Adviser Ministry of Irrigation & Power, Department of Irrigation, Shram Shakti Bhawan, Rafi Marg, NEW DELHI-110001.  Representative of Ministry of Finance, Govt. of India, Department of Economic Affairs, NEW DELHI.  Resident Representative UNDP, 55 Lodi Estate, NEW DELHI.  Director UNESCO, Regional Office, 15, Jor Bagh, NEW DELHI.
<b>SPECIAL INVITEE</b>	Dr. U. Maniak Chief Technical Adviser of NIH/UNDP Project, Leichtweiss Institute for Water Research, Technical University Braunehweig, 33, Braunschweig, F. R., GERMANY.

**APPENDIX—IX**

**POSITION OF STAFF OF NIH AS ON 1.4.1984 & 31.3.1985**

Sl. No.	Description	Existing 1.4.84	As on 31.3.85	Remarks
1.	Director	—	1	
2.	Scientist 'F'	1	1	
3.	Scientist 'E'	2	2	
4.	Scientist 'C'	6	7	
5.	Scientist 'B'	12	12	
6.	Senior Research Assistant	7	11	
7.	Research Assistant/Technical Assistant	5	4	
8.	Draftsman	—	1	
9.	Tracer	2	1	
10.	Laboratory Assistant	2*	1+2*	
11.	Computer Operator	2	2	
12.	Mechanic	1+1**	4+1**	
13.	Chief Administrative Officer	1	1	
14.	Finance Officer	1	1	
15.	Senior Personal Assistant	1	1	
16.	P.A. cum Admn. Asstt.	2	3	
17.	Upper Division Clerk	4	4	
18.	Stenographer	2	2	
19.	Lower Division Clerk	7+1**	7+1**	
20.	LDC (Telex)	—	1	
21.	Photocopier Operator	—	1	
22.	Ammonia Print Operator	—	1	
23.	Driver	2	2	
24.	Messenger-cum-Chowkidar	8	7	
25.	Mali	1	1	
26.	Safai Karamchari	1	1	
HYDCOM DIVISION, NEW DELHI				
27.	Scientist 'C'	1	1	
28.	Sr. Research Assistant	1	—	
29.	Upper Division Clerk	1	—	
30.	Lower Division Clerk	1	1+1**	
31.	Peon	1**	1**	

Note : \* Horticulture Assistant      1  
           and SLA (Stores)                1  
           \*\* Ad hoc



**APPENDIX--X****INSTITUTE PERSONNEL****DIRECTOR**

Dr. Satish Chandra w.e.f. 30.5.1984

**SCIENTIST 'F'**

Dr. S.M. Seth

**SCIENTIST 'E'**

Dr. G.C. Mishra

Dr. P.V. Seethapathi

**SCIENTIST 'C'**

Shri K.S. Ramasastry

Shri K. Ethirajan

Shri A.K. Bhar

Shri B. Datta

Dr. K.K.S. Bhatia

Shri A.K. Sikka

Shri B. Soni

w.e.f. 23.10.1984

**SCIENTIST 'B'**

Shri A.B. Palaniappan

Shri Ramesh Prasad

upto 26.12.1984

Shri S.R.B. Dhason

Shri B. Soni

upto 22.10.1984

Shri M. Perumal

Shri R.D. Singh

Shri A.G. Chachadi

Shri S.K. Jain

Shri N.K. Goel

Shri V.K. Lohani

Shri Gautam Roy

upto 14.1.1985

Shri Anand Prakash

upto 18.6.1984

Smt. Deepa Karwade

w.e.f. 31.10.1984

Shri Lalit Kumar

w.e.f. 19.12.1984

Shri D.K. Raghu

w.e.f. 1.12.1984

Shri V.C. Goel

w.e.f. 14.11.1984

**SENIOR RESEARCH ASSISTANT**

Shri A.T. Jayaseelan

Shri U.C. Kothiyari

Mrs. Asha Sinha  
Mrs. P. Nirupma  
Shri S.K. Verma  
Shri Pratap Singh  
Dr. (Mrs) Rama Devi Mehta  
Shri Rajeev Agarwal w.e.f. 13.2.1985  
Dr. C.K. Jain w.e.f. 16.2.1985  
Km. Anuradha Bhatia w.e.f. 15.2.1985  
Shri Anil Kumar Garg w.e.f. 16.2.1985

**RESEARCH ASSISTANT/TECHNICAL ASSISTANT**

Shri J.M. Rathore  
Shri Pankaj Garg  
Shri Rajan Vatsa  
Shri S.K. Agarwal upto 6.12.1984  
Miss. Vibha Jain

**DRAFTSMAN**

Narendra Kumar w.e.f. 13.2.1985

**TRACER**

Shri Rakesh Kumar Garg  
Shri Narendra Kumar upto 12.2.1985

**SLA (STORES)**

Shri Tanveer Ahmed

**COMPUTER OPERATOR**

Shri R.D. Sharma  
Mrs. Veer Bala Goel

**MECHANIC**

Shri C.P. Singh  
Shri Jamil Ahmed w.e.f. 22.2.1985  
Shri Rajiv Goel w.e.f. 1.3.1985  
Shri Lal Singh w.e.f. 8.3.1985

**HORTICULTURAL ASSISTANT**

Shri Sukh Pal Singh

**LINE MAN**

Shri M.B.D. Sharma

**LAB. ASSISTANT**

Shri M.P. Singh w.e.f. 30.3.1985

**CHIEF ADMINISTRATIVE OFFICER**

Shri Y.P. Sareen

**FINANCE OFFICER**

Shri R.R. Agarwal

**SENIOR PERSONAL ASSISTANT**

Shri S.S. Kanwar

**P.A. CUM-ADMN. ASSISTANT**

Shri Rajesh Goel

Shri S.P. Singh

Shri A.K. Chatterjee

w.e.f. 13.2.1985

**UPPER DIVISION CLERK**

Shri A.P. Chamoli

Shri H.K. Arora

Shri Dharam Pal

Shri S.C. Gulati

w.e.f. 30.5.1984

**STENOGRAPHER**

Shri A.K. Chatterjee

upto 13.2.1985

Miss. Mary Dias

Shri N.I. Siddique

w.e.f. 12.2.1985

**LOWER DIVISION CLERK**

Shri P.V.K. Nair

Shri S.P. Sharma

Shri Rajneesh Kumar Goel

Shri Surendra Pal Singh

Shri Yogendra Kumar

Shri Vinay Kumar Srivastava

Shri Amar Singh Mehra

Shri T.M. Khan

on ad hoc

**L.D.C. (TELEX)**

Shri S.P. Modi

w.e.f. 1.3.1985

**DRIVER**

Shri S.P. Rai

Shri Paltu Ram

**AMMONIA PRINT OPERATOR**

Shri Surendra Pal

w.e.f. 1.3.1985

**PHOTOCOPIER OPERATOR**

Shri Mam Chand

w.e.f. 1.3.1985

**MESSENGER**

Shri Madan Singh

Shri Mam Chand

upto 28.2.1985

Shri Om Prakash  
Shri Vijay Kumar

**MESSENGER-CUM-CHOWKIDAR**

Shri Amar Singh  
Shri Jagdish Pathak

**CHOWKIDAR**

Shri Puran Chand  
Shri Ranjit Singh

**MALI**

Shri Man Bodh Pathak

**SWEEPER**

Shri Rakesh Kumar

**HYDCOM DIVISION**

Dr. P.S. Datta  
Shri Rajendra Sharma  
Shri S.S. Majumdar  
Shri A.S. Kotwal  
Shri S.S. Bakshi  
Shri Amarjeet Singh

Sc. 'C'

S.R.A. upto Dec. 25, 1984

U.D.C. upto May 22, 1984

L.D.C.

L.D.C. (Ad hoc)

Peon (Ad hoc)

## APPENDIX—XI

### STUDIES AND RESEARCH CARRIED OUT DURING 1984-85

#### REVIEW NOTES

1. Regional Flood Frequency Analysis
2. Partial Duration Series Models
3. Hydraulic Routing Techniques
4. Overland Flow
5. Hydrologic Flood Routing including Data Requirements
6. Comparative Study of Components of Watershed Models
7. Optimization and Programming Techniques
8. Study of Hydrogeological Parameters
9. Rainfall Recharge
10. Hydrologic Soil Classification
11. Seepage from Canals using Tracer Techniques
12. Hydrogeological Parameters in Hard Rock Areas
13. Hydrological Parameters in Drainage Study
14. Data Collection and Transmission System

#### TECHNICAL NOTES

15. Design Storm Estimation
16. Unsteady Flow to a Multiaquifer Flowing Well
17. Regional Aquifer Simulation
18. Artificial Recharge
19. Water Requirement of Crops

#### USER'S MANUALS

20. Frequency Analysis
21. Multiple Linear Regression
22. Polynomial Regression
23. Rating Curve Analysis
24. Muskingum Cunge Routing Procedure
25. Unit Hydrograph Derivation
26. Model Parameter Evaluation Using Catchment Characteristics
27. Hydrologic Flood Routing
28. Preparation of Routing Curve/Working Table
29. Finite Element Ground Water Model
30. Tyson Weber Ground Water Model

## MANUALS

31. Agricultural Drainage
32. Groundwater Balance
33. Reservoir Capacity Computation
34. Processing of Precipitation Data
35. Hydrologic Water Balance

## CASE STUDIES

36. Rating Curves for Gauging Sites on Narmada River
  37. Comparative Study of Unit Hydrograph Procedures
  38. Application of Thomas Fiering Model
-

## APPENDIX XII(a)

### EQUIPMENT UNDER UNDP PROJECT

#### (I) Equipment Received

##### A. Computer System

###### (i) Basic equipment including

- VAX-11/780 CPU
- 512 Kb of ECC MOS memory
- REMO3 disc drive with mass bus adopter
- TEE 16 magnetic tape transport unit with mass bus adopter
- DZ 11 A asynchronous multiplexer
- Console sub-system consisting of :
  - \* LSI 11 microcomputer
  - \* RX Oi floppy drive
  - \* LA 120 DECWRITER interactive terminal
- Mounting cabinets
- VAX/VMS operating system

###### (ii) Battery back-up for MOS memory

###### (iii) Floating point accelerator

###### (iv) 67 Mb disc drive

###### (v) Magnetic tape drive

###### (vi) LA 120 matrix printer

###### (vii) Network link microprocessor

###### (viii) RMO3 disc cartridges (11 Nos.)

###### (ix) CRT terminal VT 100 AB

###### (x) Advanced video Options for VT 100 CRT terminal

###### (xi) Emulex CS 21/F Communication Multiplexer

###### (xii) Additional memory (1 unit of 512 Kb and 2 units of 256 Kb each)

##### B. Computer Facilities

###### (i) CRT terminal VT 105 Graphic

###### (ii) Tektronix Colour Graphic Terminal

###### (iii) ADM 3A Video Terminal

###### (iv) Calcomp-31 Colour Graphic System

###### (v) Uninterrupted power supply and spares with battery packs

##### C. Calculators

###### (i) Pocket Calculators

###### (ii) Programmable Calculators

**D. Visual Communication**

- (i)* Video cassette player and Colour TV monitor
- (ii)* Hydrologic Engineering Centre, USA Video tapes on Hydrologic topics (214 Nos.)

**E. Documentation**

- (i)* Nashua plain paper copier
- (ii)* IBM electric typewriter
- (iii)* Microfische reader
- (iv)* Mini talk book and memoscriber
- (v)* Minolta photocopier
- (vi)* Drawing equipment
- (vii)* Olympia Electric Typewriter
- (viii)* Photographic system with Camera, Lenses and Flash unit

**F. Field and Laboratory Related**

- (i)* Soil Moisture Neutron Probe
- (ii)* Automated Raingauges with Accessories
- (iii)* Digital Planimeter
- (iv)* Environmental Laboratory
- (v)* Turbidimeter
- (vi)* Digital pH meter

**(II) Equipment Ordered and yet to be Received**

**A. Computer System Related**

- (i)* ADM 220 Video terminals (9 Nos.)
- (ii)* RMO 3 disc packs (4 Nos.)
- (iii)* Line printer
- (iv)* Card reader
- (v)* Digitizer system
- (vi)* PRO 325 personal computer

**B. Visual Communication**

- (i)* Video cassette recorder and Video camera

**C. Field and Laboratory Related**

- (i)* Automated Hydrologic Station
- (ii)* Oscilloscope



**APPENDIX XII(b)**

**EQUIPMENT PURCHASED OUT OF GRANTS-IN-AID**

1.	Digital Multimeter	
2.	Power Supply	
3.	Bred Board	
4.	Mirror Stereoscope	
5.	Magna Scope	
6.	Raingauge Non-recording	
7.	Stevenson's Screen	
8.	Open Pan Evaporimeter	
9.	Thermohygraph	
10.	Water Stage Recorder	
11.	Recording Raingauge	
12.	Cup Counter Anemometer	
13.	Wind Vane	
14.	Audiovisual Equipment	
15.	Carpenter Tools	
16.	Workshop Tools	
17.	Network 332 Electronic Typewriter	
18.	Drawing Equipment	
19.	Fans and Heaters	
20.	Prestosign Boards	
21.	Air Conditioners	
		USA, UK
		USA
		USA
		USA
		Canada USA
14.	Reservoir Operation	USA, UK
15.	Inigation Planning	USA, UK
16.	Drought Estimation	USA, UK
17.	Water Quality Modelling and Sedimentation	USA, UK

APPENDIX— XIII

SCIENTISTS TRAINED AND ABSTRACTS OF REPORTS OF TRAINING  
UNDER UNDP PROJECT

(A) Scientists Trained under UNDP/UNESCO Fellowship

Sl. No.	Name of Fellow	Specialisation	Duration (man months)	Country
1.	Vidya Sagar	Computer Science	4	USA
2.	Ramesh Prasad	Computer Science	3	USA
3.	Bhupendra Soni	Watershed Simulation by Mathematical Models	7	Netherlands USA
4.	Seethapathi, P.V.	Aquifer System Simulation	5	USA, FRG
5.	Dhasan, S.R.B.	Water Resources Planning and Simulation	5	USA
6.	Ramasastri, K S.	Hydrometeorology	5	USA, Canada UK, USSR
7.	Bhar, A.K.	Remote Sensing Application in Hydrology	5	USA
8.	Palaniappan, A.B.	Flood Routing	5	USA
9.	Datta Bhaskar	Rainfall-Runoff Modelling	5	Japan
10.	Goel, N.K.	Time Series Analysis	5	USA
11.	Ethirajan, K.	Irrigation & Water Use Management	5	USA
12.	Perumal, M.	Hydrologic Forecasting	5	USA
13.	Chachadi, A.G.	Geohydrology	5	USA, FRG, Sweden
14.	Jain, S.K.	Reservoir Operation	5	USA, UK
15.	Lohani, V.K.	Irrigation Planning	5	USA
16.	Sikka, A.K.	Drought Estimation	5	USA
17.	Bhatia, K.K.S.	Water Quality Modelling and Sedimentation	5	Canada, USA

**APPENDIX—XIV**

**SEMINAR/SYMPOSIA, WORKSHOP AND COURSES ATTENDED**

(A) SEMINAR/SYMPOSIA

Sl.No.	Persons Attended	Seminar/Symposia
1.	Dr. Satish Chandra Dr. S.M. Seth (General Rapporteur) Dr. G.C. Mishra Dr. P.V. Seethapathi Shri K.S. Ramasastry Shri K. Ethirajan Shri B. Soni Shri S.R.B. Dhason Shri R.D. Singh Shri N.K. Goel	54th Annual Session of Central Board of Irrigation and Power and Symposium of Indian Association of Hydrologists, Vigyan Bhawan, New Delhi, August 27-29, 1984.
2.	Dr. Satish Chandra (Co-Chairman) Dr. S.M. Seth Shri B. Datta Shri M. Perumal	Workshop on 'Newer Techniques in Real Time High Flow Forecasting', Indian Institute of Technology, New Delhi, October 31, 1984.
3.	Dr. Satish Chandra Dr. S.M. Seth Shri K.S. Ramasastry Shri Bhaskar Datta Shri M. Perumal Shri R.D. Singh Shri N.K. Goel	National Seminar on 'Real Time Hydrological Forecasting' Jointly organised by CWC and CBIP, New Delhi, October 31, 1984.
4.	Dr. Satish Chandra Dr. S.M. Seth Dr. P.V. Seethapathi	Seminar on 'Application of Systems Analysis Techniques for the Development of Water Resources'; Jointly organised by CBIP and CWC, New Delhi, January 9 and 10, 1985.
5.	Dr. Satish Chandra Dr. G.C. Mishra (General Rapporteur) Shri V.K. Lohani	Seminar on 'Irrigation Water Management', The Institution of Engineers (India), Roorkee Local Centre, January 12 and 13, 1985.
6.	Shri K. Ethirajan	Seminar on 'Computer and Industry', The Institution of Engineers (India), Allahabad, Jan. 5 & 6, 1985.
7.	Shri V.K. Lohani	National Seminar on 'Modernisation of Canal Irrigation', Indian Water Resources Society, Lucknow, December 14 & 15, 1984.
8.	Dr. Satish Chandra Dr. S.M. Seth Shri B. Soni Shri R.D. Singh	Annual Research Session of Central Board of Irrigation & Power, Aurangabad, February 3 to 5, 1985.
9.	Dr. Satish Chandra (Session Chairman) Dr. S.M. Seth (General Rapporteur) Shri Bhaskar Datta Shri S.R.B. Dhason	International Workshop on 'Exchange of Experiences in Operational Application of Mathematical Models in Developing Countries'; IIT Delhi, February 26 to March 1, 1985.
10.	Shri K. Ethirajan	National Symposium on Formulation and Appraisal of Irrigation Projects, Patna, March 28 to 30, 1985.

(B) WORKSHOPS/TRAINING COURSE ATTENDED

Sl.No.	Persons Attended	Workshop/Training Course
1.	Shri R.D. Singh	Training Course on 'Sacramento Model', Central Water Commission, April 2-19, 1984.
2.	Shri S.R.B. Dhason	Workshop on 'System Engineering for Water Resources Development and Reservoir Operation', Central Water Commission, New Delhi, December 27, 1984 to January 8, 1985.
3.	Shri V.K. Lohani	Workshop on 'Artificial Recharge on Groundwater', Central Ground Water Board, Ahmedabad, January 14 to 24, 1985.

## APPENDIX XV

### PAPERS PUBLISHED IN JOURNALS AND PRESENTED AT SEMINARS/SYMPOSIA

1. BHATIA, K.K.S. and SETH, S.M. : 'Water Quality Modelling Objectives and Data Requirement'. Proceedings of Seminar on Hydrology, Association of Hydrologists of India, Pune, July/August, 1984.
2. CHACHADI, A.G. and MISHRA, G.C. : 'Steady Flow to a Large Diameter Well Influenced by a River and an Impervious Boundary'. Proceedings of 52nd Annual R & D Session, CBIP, Aurangabad, February 1985.
3. CHANDRA, SATISH and SETH, S.M. : 'Hydrological Forecasting Computer Applications'. Proceedings of National Seminar on Real Time Hydrological Forecasting, New Delhi, October 1984.
4. DATTA, BHASKAR and SETH, S.M. : 'Simulation of Daily Runoff of River Chhota-Tawa at Ginnore using Tank Model'. 52nd Annual R & D Session, CBIP, Aurangabad, February 1985.
5. DATTA, BHASKAR and SETH, S.M. : 'Application of Tank Model for Flood and Daily Runoff Analysis to some Basins in India'. Proceedings of the International Workshop on Exchange of Experience in Operational Applications of Mathematical Models (Surface Water) in Developing Countries, I.I.T., New Delhi, February 26-March 1, 1985.
6. DHASON, S.R.B. and SETH, S.M. : 'Flood Routing through Multipurpose Reservoir'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data, Indian Association of Hydrologists, New Delhi, August 1984.
7. ETHIRAJAN, K. : 'A Microcomputer Control System for Irrigation Management'. Proceedings of Seminar on Computer and Industry. The Institution of Engineers (India), Allahabad Subcentre, Allahabad, January 1985.
8. ETHIRAJAN, K. : 'Field Water Balance Synthesis of an Irrigated Area'. Proceedings of 52nd Annual R & D Session, CBIP, Aurangabad, February 1985.
9. ETHIRAJAN, K. : 'Economic Optimisation of Irrigation Demand'. Proceedings of the National Symposium on Formation and Appraisal of Irrigation Projects, Patna, March 28-30, 1985.
10. GOEL, N.K.; BHATIA, K.K.S. and SETH, S.M. : 'Application of Thomas-Fiering Model for Monthly Streamflow Generation in Chaliyar River Basin'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data. Indian Association of Hydrologists, New Delhi, August 1984.
11. GOEL, N.K. and CHANDRA, SUBHASH : 'Flood Stage Forecasting by ARMA Models'. Proceedings of National Seminar on Real Time Hydrological Forecasting, CWC and CBIP, New Delhi, October 1984.
12. GOEL, V.C.; BANSAL, V.K.; SINHVAL, H. and KHATRI, K.N. : 'Development of a Micro-processor-based Short-range Seismic Telemetry System'. Proceedings of International Seminar on Exploration Geophysics, Hyderabad, October, 1984.

13. LOHANI, V.K. : 'A Computer Programme for Irrigation Scheduling of Soyabean'. Proceedings of Seminar on Irrigation Water Management. The Institution of Engineers (India), Roorkee Local Centre, Roorkee, January 1985.
14. MISHRA, G.C. and CHACHADI, A.G. : 'Analysis of Flow to a Large-diameter Well Near a River and Estimation of Storage Coefficient'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data. Indian Association of Hydrologists, New Delhi, August 1984.
15. MISHRA, G.C. : 'Optimal Position of Augmentation Tubewells', Proceedings of Fourth Congress of APD-IAHR, Chiang Mai, Thailand, September 1984.
16. PALANIAPPAN, A.B. and SETH, S.M. : 'Gate Operation Studies for Flood Moderation using Upstream Flow Data for Dharoi Dam on Sabarmati River'. Proceedings of Seminar on Real Time Hydrological Forecasting. CWC and CBIP, New Delhi, October 1984.
17. PERUMAL, M. and SETH, S.M. : 'On the Mathematics of Storage Routine—A Comment', Journal of Hydrology, Vol. 73, pp. 389-394, 1984.
18. PERUMAL, MUTHIAH ; SINGH, R.D. and SETH S.M. : 'Real Time Forecasting using Discrete Linear Equal Reservoir Cascade Model'. Proceedings of National Seminar on Real Time Hydrological Forecasting. CWC and CBIP, New Delhi, October 1984.
19. RAMASASTRI, K.S. and SETH, S.M. : 'Normal Ratio and Distance Power Method for Estimation of Missing Rainfall Data—A Case Study'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data, Indian Association of Hydrologists, New Delhi, August 1984.
20. RAMASASTRI, K.S. and SETH, S.M. : 'Application of HEC-1 Model for Flood Forecasting—Mortakka to Garudeshwar Reach of River Narmada'. Proceedings of National Seminar on Real Time Hydrological Forecasting. CWC and CBIP, New Delhi, October 1984.
21. SEETHAPATHI, P.V. : 'Regional Aquifer Modelling in Areas with Limited Data'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data, Indian Association of Hydrologists, New Delhi, August, 1984.
22. SEETHAPATHI, P.V. : 'Effects of Clay Inclusions on Aquifer Parameters'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data. Indian Association of Hydrologists, New Delhi, August 1984.
23. SEETHAPATHI, P.V. : 'Flow Towards Partially Penetrating Wells with Storage in Confined Aquifers'. Proceedings of 52nd Annual R & D Session, CBIP, Aurangabad, February 1985.
24. SIKKA, A.K. and SEETHAPATHI, P.V. : 'Soil Moisture as a Parameter in Drought Quantification—A Review'. 'Proceedings of Seminar on Hydrology, Association of Hydrologists of India' Pune, July/August 1984.
25. SINGH, R.D. and SETH, S.M. : 'Regional Unit Hydrograph Study for Godavari Sub-basin using Clark Model' 'Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data. Indian Association of Hydrologists, New Delhi, August 1984.

26. SINGH R.D., and SETH, S.M. : 'Frequency Analysis using Wakeby Distribution'. Proceedings of 52nd Annual R & D Session, CBIP, Aurangabad, February 1985.
27. SINHA, ASHA and SETH, S.M. : 'Application of Nash Model for Unit Hydrograph Analysis using Lumped and Multiple Input Approaches'. Proceedings of Fourth Congress of APD-IAHR, Chiang Mai, Thailand, September 11-13, 1984.
28. SONI, B. : 'Estimation of Daily Runoff by Betson Model'. Proceedings of Symposium on Hydrologic Analysis for Planning of Projects with Inadequate Data. Indian Association of Hydrologists, New Delhi, August 1984.
29. SONI, B. : 'Allocation of Land and Water Using Goal Programming—A Case Study'. Proceedings of Fourth Congress of APD-IAHR, Chiang Mai, Thailand, September 1984.
30. SONI, B. : 'Simulation of Peak Flow of Kasurnala by USGS Model'. Proceedings of 52nd Annual R & D Session CBIP, Aurangabad, February 1985.
31. SONI, B. and GOEL, N.K. : 'Probable Rainfall for Integrated Planning—A mixed Distribution Approach'. Proceedings of Seminar on Hydrology, Association of Hydrologists of India, Pune, July 29 to August 2, 1984.

## VISITORS

**Visitors from Abroad**

- Dr. Nemeč, Director, Hydrology Division, MMO, Geneva.  
 Dr. Douglas James, Director, Utah Water Research Lab., London, Utah, U.S.A.  
 Dr. M. Sugawars, Tokyo, Japan.  
 Dr. J.E. Nash, Professor, University College, Galway, Ireland.  
 Mr. Moench, Borkley Professional Programme, U.S.A.  
 Dr. K.P. Singh, Principal Scientist, Urbana, U.S.A.  
 Mr. David Ford, HEC, Davis, U.S.A.  
 Dr. U. Maniak, CTA, UNDP Project.  
 Dr. R. Dzhamalov, Scientist, USSR Academy of Science.  
 Dr. Omar Scraj Abu - Rizaiza, Civil Engineering Department, KAAU, Jeddah, Saudi Arabia.  
 Dr. Y.C. Sud, Physical Scientist NASA/Goddard Space Flight Centre, Greenbelt, U.S.A.  
 Mr. Jan-Erik Gustafsson, Royal Institute of Technology, Stockholm, Sweden.

**UNESCO**

- Mr. L.A. Mandalia, New Delhi.  
 Mr. V. Moustafaev, Paris.  
 Dr. M.S. Alam, New Delhi.

**UNDP**

- Mr. Saul Cooper C.T.A.  
 Mr. J.L. Arora, New Delhi.

**Visitors from Central Government**

- Shri M.G. Padhye, Secretary, Department of Irrigation, New Delhi.  
 Shri D.M. Telang, Additional Secretary, Department of Irrigation, New Delhi.  
 Shri M.A. Chitale, Joint Secretary (Ganga Basin), Department of Irrigation, New Delhi.  
 Shri Gokhul Prasad, Director-General, NWDA, New Delhi.  
 Shri M.P. Singhal, Group G.M. Rites, New Delhi.  
 Shri H.G. Prasanna, Deputy G.M., ONGC, Dehradun.  
 Dr. S.C. Chakravarty, I.S.R.O., Head Quarters, Bangalore.

**Visitors from States**

- Shri T. Hanumantha Rao, Director, A.P. Engineering Research Institute, Hyderabad.  
 Shri P.N. Gupta, Chief Conservator of Forests, Lucknow.  
 Shri P.P. Agarwal, Chief Engineer, Level I, Irrigation Department, Dehradun.

**Visitors from other Organisations**

- Dr. Subhash Chander, I.I.T., Delhi.  
 Dr. Lakshmi Narayana, I.I.T., Kanpur.  
 Dr. Jagjit Singh, Adviser Coal India Ltd., New Delhi.  
 Dr. C.L. Singh, B.H.U., Varanasi.



## APPENDIX—XVII

314, Ram Nagar  
ROORKEE-247667  
Phone : 2829

SATYENDRA & CO.  
Chartered Accountants

6th July 1985

Ref. No .....

The Chairman  
Governing Body  
National Institute of Hydrology  
University of Roorkee Campus  
Roorkee (U.P.).

Dear Sir,

**Sub : Audit of Accounts of National Institute of Hydrology for the year  
ended 31st March 1985.**

We have completed the audit of the accounts of National Institute of Hydrology, for the year ended 31st March, 1985 and are enclosing herewith four copies of the Balance Sheet as at 31st March, 1985, and Income and Expenditure Account and Receipts and Payments Accounts the year ended on that date. One copy of the accounts are to be returned to us for our record after the same has been approved by the Governing Body.

Our observations on the accounts are detailed as below :

**1. Working Results**

During the year under audit the net revenue expenditure incurred by the Institute works out to Rs. 24,61,870.44 as against Rs. 19,53,422.58 in the previous year. The net revenue expenditure has been shown as deduction in the Balance Sheet from the Grant-in-aids received from Government of India, Ministry of Irrigation, New Delhi.

**2. Assets Fund Account**

A sum of Rs. 15,32,179.58 has been transferred to Asset Fund Account from Grant-in-aid Account being cost of acquisition of fixed and other assets during the year under audit. The details are as under.

		<i>Amount (Rs.)</i>
(a) Increase in fixed Assets	(+)	8,46,147.97
(b) Increase in Building work-in-progress	(+)	5,65,084.01
(c) Increase in advances	(+)	1,47,212.70
(d) Decrease in Deposits	(-)	18,720.00
(e) Increase in prepaid expenses	(+)	4,532.00
(f) Decrease in due from U.O.R.	(-)	12,077.10
		<hr/> <b>Rs. 15,32,179.58</b> <hr/>

### 3. Transfer Deed of Land

The transfer deed of land measuring 6.5 acres on which administrative building of the Institute has been constructed has executed on 5.9.84.

### 4. Addition to Fixed Assets

During the year under audit a sum of Rs. 8,46,147.97 has been spent on addition to various fixed assets as per details given in schedule 'A' forming part of these accounts. These addition may be approved.

### 5. Building Work-in-Progress

A sum of Rs. 29,90,997.79 has been spent upto 31st March, 1985 on the construction of the Guest House and Laboratory Block of the Institute, which is still in progress.

The details are as under :

	<i>Amount (Rs.)</i>
(a) Advance with UOR	18,50,053.00
(b) Steel and Cement with UOR	2,10,229.38
(c) Material at site with UOR	2,30,715.41
Total Rs.	<u>22,90,997.79</u>

### 6. Buildings

A sum of Rs. 3,83,366.70 has been capitalised as at 31st March 1985, of Administrative Building, Pump House, Water line and other building works. The details are as under.

	<i>Amount (Rs.)</i>
(a) Payment of final bill of Administrative Building	23,731.10
(b) Construction of Sub-station and Pump House including pumping equipments	2,43,489.00
(c) New Water Pipe line	91,198.00
(d) Minor Building works (Computer Room, Library Room)	24,948.60
Total Rs.	<u>3,83,366.70</u>

### 7. Advances to Others Rs. 7,94,848.60

A sum of Rs. 7,94,848.60 is outstanding as at 31st March, 1985. The details of the aforesaid outstanding advances given in Schedule-D forming part of accounts. The detailed observations are under.

#### (a) Advance to U.P.S.E.B. Rs. 589,757.00

(1) This includes a sum of Rs. 4,95,454.00 given as advance to Uttar Pradesh State Electricity Board for erecting a sub-station of 250 kW. We have been explained that work has been completed and amount could not be adjusted in the absence of final bill.

(2) A sum of Rs. 11,388.00 has been given as advance to Uttar Pradesh State Electricity Board for temporary, connections of line to the Administrative Building. Amount could not be adjusted in the absence of final bill.

(3) A sum of Rs. 82,915.00 has been given as advance to Utter Pradesh State Electricity Board for L.T. site preparation. We have been explained that the work is still to be started.

*(b) Advance for Cement Rs. 31,000.00*

A sum of Rs. 31,000.00 is due from M/s Associated Cement Company, Kanpur. It has been refunded by M/s. Associated Cement Company in the year 1985-1986.

*(c) Advance for Soil Thermometer Rs. 1,070.60*

A sum of Rs. 1,070.60 has been given to M/s. Paul Instruments Co. Jind for soil Thermometers.

*(d) Advance for Airconditioning Spare Parts Rs. 563.00*

A sum of Rs. 563.00 has been given to M/s. Hindustan Refrigeration Stores, New Delhi for air conditioning spare parts.

*(e) Advance for Metrological Instruments Rs. 35,367.00*

A sum of Rs. 35,367.00 has been given to I.M.D. Pune for Metrological Instruments.

*(f) Advance for Journals Rs. 5,682.60*

A sum of Rs. 5,682.60 has been given to I.S.I., New Delhi for purchase of Journals.

*(g) Advance for Society Meeting Rs. 3,215.00*

A sum of Rs. 3,215.00 has been given to India International Centre, New Delhi for Society meeting.

*(h) Advance for MAPS Rs. 5,098.00*

A sum of Rs. 5,098.00 has been given to Survey of India, Dehradun for Maps. The above advance is being adjusted during the year 1985-86.

*(i) Advance for Electronic Instruments Rs. 40,434.80*

A sum of Rs. 40,434.80 has been given to M/s. Bhartiya Scientific Corporation, New Delhi for Electronic Instruments.

*(j) Advance for Remote Sensing Equipments Rs. 54,079.60*

A sum of Rs. 54,079.60 has been given to M/s. Octo Meck Engineers for remote sensing equipments.

*(k) Advance for Satellite Data Rs. 12,980.00*

A sum of Rs. 12,980.00 has been given to N.R.S.A., Secunderabad for satellite data.

**8. Deposits**

A sum of Rs. 1,04,050.00 is deposited as at 31st March, 1985 with various parties. The details of the aforesaid amount are given in schedule 'C' forming part of the accounts.

**9. International Hydrological Programme**

As per the Fourteenth Meeting of the Governing Body of National Institute of Hydrology on 9th July 1982, it was decided to transfer the CSIR Unit of the Indian National Committee for International Hydrological Programme to the National Institute of Hydrology.

During the year under audit, a sum of Rs. 1,88,000.00 has been received and the net revenue expenditure incurred by the Institute works out to Rs. 1,83,038.31. The net revenue expenditure has been shown as a deduction in the Balance Sheet from the Grant-in-aid received from Government of India, Ministry of Irrigation, New Delhi.

**10. Receipt from Computer Hire Charges Rs. 73,281.26**

The hire charges on account of computer has been accounted for on cash basis.

**11. Receipts from Sponsored Project Narmada & NWDA Rs. 76,768.69**

During the year under audit, the accounts of sponsored project (Narmada Project) has been kept separate from the accounts of National Institute of Hydrology.

During the year, under audit a sum of Rs. 2,50,130.00 from Narmada Project account and a sum of Rs. 22,846.58 from N.W.D.A. Project account have been received on account of estimated expenses. It was later on decided that the amount recoverable on account of overhead and consultancy charges may be kept in the project accounts and as such a sum of Rs. 1,96,207.89 of Narmada Project and a sum of Rs. 11,423.29 of N.W.D.A. Project have been re-transferred to the above project accounts.

**12. NIH CPF Accounts**

During the year under audit, separate accounts of CPF has been kept.

**13. Repair and Maintenance**

It includes an expenditure of Rs. 3,60,000.00 on account of maintenance and warranty charges paid to Computer Maintenance Corporation, New Delhi for the period from October 1984 to October 1985. Prepaid expenses has not been segregated as per the past practice.

**14. Accounts**

The Society has been maintaining accounts on "Single Entry System" as prevalent in Government Departments. The system adopted by the Society creates difficulties in furnishing complete informations at the time of preparation of various statements and finalisation of accounts.

We, therefore, suggest that the accounts must be maintained on "Double Entry System" as adopted by commercial organisation.

As per past practice, the Balance Sheet and Income and Expenditure Accounts has been prepared on accrual basis of accounting whereas the utilisation certificate has been prepared on the basis of actual receipts and payment. In view of this the unspent balance of Grant-in-aid from Government of India as shown in the Balance Sheet differs with the Figures shown in utilisation certificate.

Before we conclude our report, we would like to place on record the cooperation extended to us by the office bearers during the course of our audit.

Yours faithfully,  
for Satyendra & Co.,  
Chartered Accountants,

Sd/-  
(S.K. Gupta)  
Partner.

AS AT 31.3.84	LIABILITIES	AMOUNT Rs.	P.	AMOUNT Rs.	P.	AS AT 31.4.1984	ASSETS	AMOUNT Rs.	P.	AMOUNT Rs.	P.
	GRANT-IN-AID FROM GOVT. OF INDIA, MINISTRY OF IRRIGATION & POWER, NEW DELHI :					31,41,602.40	FIXED ASSETS (AT COST)				
							As per Schedule 'A'			39,87,750.37	
10,24,390.50	Balance brought forward from previous year 4,28,872.76					17,25,913.78	BUILDING WORK-IN-PROGRESS As per Schedule 'B'			22,90,997.79	
	Add :										
	Received from Govt. of India, Ministry of Irrigation & Power, New Delhi	40,00,000.00		44,28,872.76		6,47,635.90	ADVANCES TO UOR AND OTHERS As per Schedule 'D'			7,94,848.60	
35,00,000.00											
45,24,390.50	Less :					—	Prepaid expenses			4,532.00	
	(a) Cost of acquisition of fixed and other assets transferred to Asset Fund A/c 15,32,179.58					1,22,770.00	DEPOSITS As per Schedule 'C'			1,04,050.00	
(—) 21,42,095.16											
	(b) Transferred to Income & Expenditure A/c to meet the excess of the expen- diture over Income for the year 24,61,870.44			(—) 39,94,050.02	4,34,822.74	11,739.10 338.00	Due from DGS & D Due from UOR			— —	
(—) 19,53,422.58							CASH AND BANK BALANCES				
4,28,872.76						9,614.04 3,500.00	Cash in Hand Imprest with Divisional Heads			26,983.64 3,700.00	
	Grant-in-aid from Govt. of India, Ministry of Irrigation & Power, New Delhi for International Hydrological Programme					5,80,774.31	Balance in SB A/c with SBI Roorkee			6,07,532.30	
						2,01,859.24	Balance in SB A/c with IOB Roorkee (CPF)			—	

AS AT 31.3.84	LIABILITIES	AMOUNT		AMOUNT		AS AT 31.4.1984	ASSETS		AMOUNT		AMOUNT	
		Rs.	P.	Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
	Balance brought forward from previous year		76,475.49									
2,00,000.00	Received during this year		1,88,000.00	2,64,475.49								
	Less :											
(—)	Transferred to Income & Expenditure to meet the Excess of Expenditure over Income for the year	(—)	1,83,038.31	81,437.18								
76,475.49												
35,06,152.97	<b>ASSETS FUND ACCOUNT</b> Balance brought forward from previous year		56,48,248.13									
	Add :											
21,42,095.16	Transferred from Grant-in-aid.		15,32,179.58	71,80,427.71	71,80,427.71							
56,48,248.13												
2,03,209.24	<b>CONTRIBUTORY PROVIDENT FUND ACCOUNT</b> Liabilities for Expenses As per Schedule 'E'											
88,941.15			1,23,707.07	1,23,707.07								
64,45,746.77												
		TOTAL	Rs.	78,20,394.70	64,45,746.77		TOTAL	Rs.	78,20,394.70			

Place : Roorkee  
Date : 6th July, 1985.

(Seal)  
SATYENDRA & CO.  
Chartered Accountants.

As per our report of even date Annexed  
FOR SATYENDRA & CO.  
Chartered Accountants

Sd/-  
(S.K. Gupta)  
Partner

Sd/-  
(R.R. Agarwal)  
FINANCE OFFICER

Sd/-  
(Satish Chandra)  
DIRECTOR

SATYENDRA & CO.,  
Chartered Accountants  
314, Ram Nagar, ROORKEE

NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED  
31st MARCH, 1985

PREVIOUS YEAR	EXPENDITURE	AMOUNT		PREVIOUS YEAR	INCOME	AMOUNT	
		Rs.	P.			Rs.	P.
13,32,857.81	Salaries, Wages and Allowances	15,38,577.95		—	Hire Charges of Computer	73,281.26	
28,779.20	Travelling and Conveyance	61,950.35		00,34,531.06	Interest on Savings Deposits	38,020.06	
2,08,998.78	Office Expenses	1,51,638.08					
—	Repair and Maintenance	6,07,573.32					
80,276.78	Printing and Stationery	93,996.32					
11,221.60	Postage & Telegrams	16,563.00		1,447.05	Miscellaneous Receipt	5,345.80	
	<b>Payments to Auditors :</b>						
2,000.00	Audit Fee	2,500.00					
861.00	Other Expenses	1,005.00	3,505.00	40,000.00	Deposits for computer charges	15,000.00	
	(Previous Year)	—		1,26,104.21	Receipts from sponsored project A/c in recoupment of expenditure incurred on Narmada Project & NWDA during the year 1981-82, 1982-83 & 1983-84.	76,768.69	
4,70,193.10	Local Cost of UNDP Project	45,274.00					
49,081.05	Computer Expenses	581.10					
3,900.00	Grant-in-aid/Subsidies	9,737.50					
5,960.75	Hospitality Expenses	10,538.40					
—	Advertisement Expenses	33,316.80					
22,829.83	Miscellaneous Expenses	29,367.15		19,53,422.58	Transferred from Grant-in-aid account to meet the expenditure for the year of National Institute of Hydrology.	24,61,870.44	
1,365.00	Consultancy charges	—					
23,457.30	Newspapers and Periodicals	31,352.10					
1,586.70	T.A. to candidates	7,699.10					
9,136.00	Interest on CPF	28,616.08					
1,23,524.51	Expenditure on HYDCOM (IHP)	1,83,038.31		1,23,524.51	Transferred from Grant-in-aid account to meet the expenditure for the year of IHP	1,83,038.31	
<u>22,79,029.41</u>		<u>Total Rs. 28,53,324.56</u>		<u>22,79,029.41</u>		<u>Total Rs. 28,53,324.56</u>	

Place : Roorkee  
Date : 6th July, 1985.

As per our Report of even date Annexed  
FOR SATYENDRA & CO.  
Chartered Accountants

Sd/-  
(R.R. Agarwal)  
FINANCE OFFICER

Sd/-  
(Satish Chandra)  
DIRECTOR

(Seal)  
SATYENDRA & CO.,  
Chartered Accountants.

Sd/-  
(S.K. Gupta)  
Partner

SATYENDRA & CO.,  
Chartered Accountants  
314, Ram Nagar, ROORKEE

NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
RECEIPTS & PAYMENTS ACCOUNT FOR THE YEAR ENDED  
31st MARCH, 1985

PREVIOUS YEAR (Rs.)	RECEIPTS	AMOUNT		PREVIOUS YEAR (Rs.)	PAYMENTS	AMOUNT	
		Rs.	P.			Rs.	P.
	<b>Cash &amp; Bank Balances</b>						
13,024.30	Cash in hand	00,09,614.04		13,20,637.01	Salaries, Wages & Allowances		15,07,495.68
10,93,497.75	Savings Deposit with SBI, Roorkee	5,80,774.31		28877.20	Travelling & Conveyance		61,950.35
3,000.00	Imprest with Div. Heads	3,500.00		1,03,186.68	Office Expenses		1,42,021.23
35,00,000.00	Grant-in-aid received from Government of India, Ministry of Irrigation.	40,00,000.00		80,276.78	Printing & Stationery		93,996.32
2,00,000.00	Grant-in-aid received from Govt. of India, Ministry of Irrigation for Intenational Hydrological Programme	1,88,000.00		11,221.60	Postage and Telegrams		15,458.00
34,844.06	Interest on Savings Deposits	38,020.06		2,361.00	<b>Payment to Auditors</b>		
40,000.00	Deposit for Computer Services	15,000.00		—	(i) Audit Fee 2,500/-		3,505.00
—	Receipt from computer hire charges.	73,281.26		36,395.87	(ii) Other Expenses 1,005/-		
1,123.80	Recovery of House Rent	4.00		93,446.18	Maintenance Expenses		6,07,573.32
519.85	Recovery of Electrical & Water charges	—		80,155.69	Furniture & Fixtures		1,26,257.03
1,062.00	Recovery of Income Tax Deducted at source.	—		23,457.30	Office Equipment		1,62,503.23
—	Refund of Deposits from UOR	15,000.00		—	Library Books		64,371.27
1,355.75	Miscellaneous Receipts	5,345.80		25,869.83	Journals & Periodicals		31,352.10
—	Recoveries of due from UOR	338.00		1,365.00	Advertisement		33,316.80
—	Recoveries of due from DGS&D	11,739.10		3,900.00	Miscellaneous expenpes		29,367.15
—	Recoveries of NIH Recreation Club.	6.00		1,586.70	Consultancy Fees		—
72,937.63	Recoveries of CPF (employees)	43.00		5,960.75	Grant-in-aid and Subsidies		9,737.50
1,335.00	Advance to Employees	—		1,36,935.36	T.A. to Candidates		7,699.10
2,500.00	Refund by SAIL, Ghaziabad	—		1,18,260.81	Hospitality		10,538.40
				—	Machinery & Equipment		1,09,649.74
				4,70,193.10	Hydcom Unit (International)		1,83,703.86
				14,75,230.00	Pre-paid Expenses		4,532.00
				1,47,989.32	Local Cost of UNDP Project		45,274.00
				—	Advances to UOR, Roorkee		4,44,823.00
				1,71,162.74	Advances to Others		1,44,541.70
				78,624.03	Advances to Employees		2,401.00
				7,543.00	Buildings		5,03,627.71
					Remittances CPF Deposits into Bank		1,350.00
					Other remittances		2,975.65

( xxxx )



PREVIOUS YEAR (Rs.)	RECEIPTS	AMOUNT		PREVIOUS YEAR (Rs.)	PAYMENTS	AMOUNT	
		Rs.	P.			Rs.	P.
1,26,104.21	Receipt in recoupment of expenditure incurred on Narmada Project during the year 1981-82, 1982-83 and 1983-84.			13,733.00	Interest on CPF		28,616.08
				49,081.05	Computer charges		581.10
				10,000.00	Other Deposits		—
			76,768.69		<b>Closing Balances</b>		
				9,614.04	Cash-in-hand		26,983.64
				3,500.00	Imprest with Div. Heads		3,700.00
				5,80,774.31	Savings Deposit with SBI, Roorkee.		6,07,532.30
<u>50,91,304.35</u>		<u>Total Rs.</u>	<u>50,17,434.26</u>	<u>50,91,304.35</u>		<u>Total Rs.</u>	<u>50,17,434.26</u>

Place : Roorkee  
Date : 6th July, 1985.

(Seal)  
SATYENDRA & CO.,  
Chartered Accountants.

As per our Report of even date Annexed  
FOR SATYENDRA & CO.  
Chartered Accountants  
Sd/-  
(S.K. Gupta)  
Partner

Sd/-  
(R.R. Agarwal)  
FINANCE OFFICER

Sd/-  
(Satish Chandra)  
DIRECTOR

SATYENDRA & CO.  
Chartered Accountants  
314, Ram Nagar, Roorkee-247667  
Phone : 2829

Ref. No.....

**SCHEDULE-A**

NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
SCHEDULE OF FIXED ASSETS AS AT 31ST MARCH, 1985

Sl. No.	Particulars	Cost as on 1.4.84 (Rs.)	Addition during the Year (Rs.)	Total (Rs.) Balance as at 31.3.85	As at 31.3.84 (Rs.)
1.	Buildings	19,45,407.74	3,83,366.70	23,28,774.44	19,45,407.74
2.	Furniture & Fixture	1,52,798.97	1,26,257.03	2,79,056.00	1,52,798.97
3.	Office Equipments	2,11,073.71	1,62,503.23	3,73,576.94	2,11,073.71
4.	Computer Machinery	1,82,816.00	—	1,82,816.00	1,82,816.00
5.	Vehicles	1,28,292.00	—	1,28,292.00	1,28,292.00
6.	Library Books	3,17,485.62	64,371.27	3,81,856.89	3,17,485.62
7.	Machinery & Equipments	2,03,728.36	1,09,649.74	3,13,378.10	2,03,728.36
	Total	31,41,602.40	8,46,147.97	39,87,750.37	31,41,602.40

(Seal)

Sd/-

SATYENDRA & CO.  
Chartered Accountants

314, Ram Nagar  
ROORKEE-247667  
Phone : 2829

SATYENDRA & CO.  
Chartered Accountants

Ref. No... .. NATIONAL INSTITUTE OF HYDROLOGY  
ROORKEE

**SCHEDULE 'B'**

**BREAK UP OF BUILDING WORK IN PROGRESS  
AS ON 31ST MARCH, 1985**

1. Advance with U.O.R. as on 31st March, 1985	Rs. 18,50,053.00
2. Steel and Cement with U.O.R. as on 31st March, 1985	Rs. 2,10,229.38
3. Materials at site (Steel) with University of Roorkee	Rs. 2,30,715.41
	<hr/>
Total	Rs. 22,90,997.79

314, Ram Nagar  
ROORKEE-247667  
Phone : 2829

SATYENDRA & CO.  
Chartered Accountants

Ref. No.....

**SCHEDULE 'C'**

NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
SCHEDULE OF DEPOSITS AS AT 31-3-85

Sl. No.	Particulars	Amount as at 31.3.85		Amount as at 31.3.84	
		Rs.	P.	Rs.	P.
1.	Deposit with UOR, Roorkee for Computer charges		5,000.00		20,000.00
2.	OYT Deposit		11,720.00		15,440.00
3.	Security Deposit for purchase of petrol		1,000.00		1,000.00
4.	Fixed Deposit with State Bank of India Excise Security purpose		55,500.00		55,500.00
5.	Deposit for GAS cylinder		350.00		350.00
6.	Deposit with U.P. State Electricity Board in connection with new building power connection		12,000.00		12,000.00
7.	Deposit with U.P.S.E.B. for Sub-Station		8,480.00		8,480.00
8.	Security deposit of Telex		10,000.00		10,000.00
	Total		<u>Rs. 1,04,050.00</u>		<u>1,22,770.00</u>

**SCHEDULE 'D'****NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
SCHEDULE OF ADVANCES AS ON 31-3-85**

		Amount	
		Rs.	P.
1.	Advance to U.P. S.E.B.		
	(a) Advance for Sub-Station	Rs. 4,95,454.00	
	(b) Advance for temporary connection	11,388.00	
	(c) Advance for L.T. site preparation	82,915.00	5,89,757.00
2.	Advance to M/s Associated Cement Co. Kanpur (Refundable)		31,000.00
3.	Advance to M/s Paul Instruments Co.		1,070.60
4.	Advance to M/s Hindustan Refrigeration Stores, New Delhi		563.00
5.	Advance to ISI, New Delhi		5,682.60
6.	Advance to I.M.D., Pune		35,367.00
7.	Advance to India International Centre, New Delhi		3,215.00
8.	Advance to Survey of India, Dehradun		5,098.00
9.	Advance to M/s Bhartiya Scientific Corpn., New Delhi		40,434.80
10.	Advance to M/s Octomech Engineers		54,079.60
11.	Advance to N.R.S.A. Secunderabad		12,980.00
12.	Excess Remittance of P.F.		270.00
13.	Advance to Employees :		
	Cycle Advance	1,486.00	
	Scooter Advance	12,105.00	
	Festival Advance	1,640.00	
	Fan Advance	100.00	15,331.00
			<u>7,94,848.60</u>

SCHEDULE 'E'

NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE  
SCHEDULE OF EXPENSES AS ON 31st MARCH 1985

Sl. No.	Heads of Account	Amount as on 31.3.85		Amount as on 31.3.84	
		Rs.	P.	Rs.	P.
	(A)				
1.	Maintenance of Car	1,921.35		—	
2.	Electricity Charges (Office)	5,336.50		3,800.00	
3.	Telephones	2,717.80		278.80	
4.	Salaries	1,01,560.27		74,393.00	
5.	Wages	3,915.00		—	
6.	Audit Fee	2,500.00		2,500.00	
7.	Income tax deducted at source	—		1,062.00	
8.	House rent (Staff)	4.00		1,123.80	
9.	Elect. / Water charges (Staff)	—		519.85	
10.	NIH Rec. Club Charges (Staff)	6.00		—	
11.	Telegram Charges	1,105.00		—	
12.	Provident Fund	43.00		—	
	Total (A)	1,19,108.92		83,677.45	
	(B)				
	Salaries IHP	4,271.75		4,683.70	
	Wages IHP	326.40		580.00	
	Total (B)	4,598.15		5,263.70	
	Grand Total (A+B) Rs.	1,23,707.07		88,941.15	

