HP
Technical Assistance
HYDROLOGY PROJECT

VOLUME 10
SURFACE WATER PROTOCOLS

OPERATION MANUAL

Table of Contents

PROTOCOLS FOR VARIOUS HIS ACTIVITIES

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
(A)	**HIS Observation Network**				
1.	A standing order from every DDPC detailing all observation stations [SRG/ ARG/FCS/GD(SQ)] which form HIS network from which specified type of data are to be observed at specified frequencies and reporting in prescribed formats.	One time (March 2002)	Manager DDPC (S9)	Manager SDPC (S11)	HIS network as agreed upon under HP Prescribed forms (formats) enclosed.
2.	Availability of authenticated information on important characteristics (latitude/longitudes from 1:50,000 scale toposheets, Basin-Zone/Independent river/Tributary, state, district, station category, date of establishment, offices etc.) of all stations in SWDES databases	One time (March 2002)	Manager DDPC (S9)	Manager SDPC (S11)	
(B1)	**Data Collection – SRG Stations**				
1.	Observation at 0830 hrs. and its recording in field note book	Daily	Hydromet Observer (M1)	Assist. Hydrologist (S5)	Job description: Ref. No. F1
2.	Preparation and submission of monthly record in prescribed format to the SDDPC	By Day 1 after the month of observation	Hydromet Observer (M1)	Assist. Hydrologist (S5)	Observational details: Ref. No. F4 Technical details: Ref. No. D3
(B2)	**Data Collection – ARG Stations**				
1.	Observation of SRG at 0830 hrs. and its recording in field note book	Daily	Hydromet Observer (M1)	Assist. Hydrologist (S5)	Job description: Ref. No. F1
2.	Replacement of chart in ARG at 0830 hrs.	Daily	Hydromet Observer (M1)	Assist. Hydrologist (S5)	Observational details: Ref. No. F5
3.	Tabulation of ARG chart and its filing	Daily	Hydromet Observer (M1)	Assist. Hydrologist (S5)	Technical details: Ref. No. D3
4.	Preparation and submission of monthly records in prescribed format to the SDDPC	By Day 1 after the month of observation	Hydromet Observer (M1)	Assist. Hydrologist (S5)	
(B3)	**Data Collection – FCS Stations**				
1.	Observation of all climate variables at 0830 hrs. and 1730 hrs. and their recording in field note book. Various climate variables are: Minimum and Maximum temperatures, dry and wet bulb	Twice-daily at synoptic hours 0830 and 1730 hrs.	Senior Hydromet. Observer (M2)	Assistant Hydrologist (S5)	Job description: Ref. No. F1 Observational details: Ref. No. F6 Technical details: Ref. No. D3

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
	temperatures, average and instantaneous wind speed, wind direction, pan evaporation, pan water temperature				
2.	Replacement of charts in autographic equipment like ARG, hygrograph and thermograph at 0830 hrs.	Daily	Senior Hydromet. Observer (M2)	Assistant Hydrologist (S5)	
3.	Insertion of chart in sunshine recorder before Sunrise and its removal after Sunset	Daily	Senior Hydromet. Observer (M2)	Assistant Hydrologist (S5)	
4.	Tabulation of autographic charts and their filing	Daily	Senior Hydromet. Observer (M2)	Assistant Hydrologist (S5)	
5.	Preparation and submission of monthly records in prescribed format to the SDDPC	By Day 1 after month of observation	Senior Hydromet. Observer (M2)	Assistant Hydrologist (S5)	
(B4)	**Data Collection – GD(SQ) Stations**				
1.	Observation of water levels by staff gauge and its recording in field note book	At prescribed frequency Ref. No. D5	Gauge Reader (S2)	Observer (S3)	Job description: Ref. No. F1 Observational details: Ref. No. F8
2.	Replacement of charts from autographic recorders or downloading of data from digital water level recorders (AWLRs/DWLRs) including replacement of batteries etc.	At prescribed frequency Ref. No. D5	Gauge Reader (S2)	Observer (S3)	Technical details: Ref. No. D2 & D4
3.	Observation of concurrent stage-discharge data (emphasis on covering different stages)	At prescribed frequency Ref. No. D6	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Job description: Ref. No. F1 Observational details: Ref. No. F9 Technical details: Ref. No. D2 & D4
4.	Observation of suspended sediment (only for GDS type of stations)	At prescribed frequency Ref. No. D8	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Job description: Ref. No. F1 Observational details: Ref. No. F12
5.	Observation of bed material and bed load	At prescribed frequency Ref. No. D9	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Technical details: Ref. No. D7

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
6.	Preparation of WQ samples	At prescribed frequency Ref. No. D11	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Job description: Ref. No. F1 Observational details: Ref. No. F13
7.	Observation/field determination of WQ parameters and despatch to the designated laboratories	At prescribed frequency Ref. No. D11	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Technical details: Ref. No. D10
8.	Preparation and submission of all monthly records to the SDDPC	By Day 1 after the month of observation	Observation (S3)	Asst. Hydrologist (S5)	Preferable to submit fortnightly within the month.
(B5)	Data **Collection – Routine maintenance of station**				
1.	Maintenance of meteorological (SRG/ARG/ FCS) stations	As per requirement	Hydromet. Observer (M1/M2)	Asst. Hydrologist (S5)	Observational details: Ref. No. 7
2.	Maintenance of hydrometric (GDSQ) stations	As per requirement	Helper (S1) Gauge Reader (S2) Observer (S3)	Observer (S3)	Observational details: Ref. No. 11
3.	Technical recommendations about the health of equipment, routine maintenance, requirement and possibility of introduction of new equipment	Every five years	Hydrological Equipment Manager (S7)	Manager DDPC (S9) Manager SDPC (S6)	Job description: Ref. No. F1
(B6)	Data Collection – Inspection of Stations				
1.	Routine Inspection of meteorological (SRG/ARG/FCS) stations	To be completed before onset of monsoon	Asst. Hydrologist (S5)	Manager SDDPC (S6)	Observational details: Ref. No. F7
2.	Inspection by IMD inspectors – submission of inspection report	Once in 3 years	IMD inspectors	IMD State Met. Centres	
3.	Implementation of IMD inspection report and submission of action taken report to SDPC and IMD	Once in 3 years	Manager SDDPC (S6)	Manager DDPC (S9)	
4.	Routine Inspection of key and other hydrometric (GDSQ) stations and submission of station-wise inspection reports	As prescribed: Ref. No. F10	Assist. Hydrologist (S5) Manager SDDPC (S6) Manager DDPC	Manager DDPC (S9)	Observational details: Ref. No. F10

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
			(S9)		
5.	Submission of action taken report to Manager SDPC (S12)	Yearly (well before monsoon)	Assist. Hydrologist (S5) Manager SDDPC (S6)	Manager DDPC (S9)	
(C)	**Data entry and primary validations at SDDPCs**				
1.	Receipt and record of receipt of data manuscripts coming from the field stations	By Day 5 after the month of observation	Assist. Hydrologist (S5)	Manager SDDPC (S6)	Operational details: Ref. No. O8
2.	Feedback to the field stations for the non-receipt or incomplete information	By Day 10 after the month of observation	Assist. Hydrologist (S5)	Manager SDDPC (S6)	
3.	Entry of all data in SWDES together with the required data entry checks	By Day 10 after the month of observation	DPC Assistant (S4)	Assist. Hydrologist (S5)	Operational details: Ref. No. O5 & O10
4.	Entry of all data in SWDES together with the required data entry checks	By Day 10 after the month of observation	Assist. Hydrologist (S5)	Manager SDDPC (S6)	
5.	Feedback to the observers for incorrect computations or inconsistent data in the manuscript	By Day 10 after the month of observation	Assist. Hydrologist (S5)	Manager SDDPC (S6)	
6.	Dispatch and record of dispatch of incremental data in SWDES database to DDPC	By Day 10 after the month of observation	Assist. Hydrologist (S5)	Manager SDDPC (S6)	Operational details: Ref. No. O8
7.	Maintaining a system for regular backups and checking for virus	10 daily	Assist. Hydrologist (S5)	Manager SDDPC (S6)	Operational details: Ref. No. O8
(D)	**Secondary validation and analysis of data at DDPCs**				
1.	Receipt and record of receipt of incremental SWDES data coming from SDDPCs	By Day 15 after the month of observation	DPC Assistant (S4)	Assist. Hydrologist (S5)	Operational details: Ref. No. O8
2.	Thorough scrutiny of incoming data in SWDES databases for completeness and correctness and its organisation in basin-wise HYMOS databases	By Day 20 after the month of observation	DPC Assistant (S4)	Assist. Hydrologist (S5)	

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
3.	Feedback to the SDDPCs for the non-receipt or incomplete or incorrect data in SWDES databases	By Day 20 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	
4.	Dispatch and record of dispatch of (field) data in SWDES database (only if they are complete and perfect) to SDPC.	By Day 20 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	
5.	Secondary validation of all types of data for the month on the basis of information on the same process from the correlated adjoining stations	By Day 25 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	Operational details: Ref. No. O2 & O10
6.	Correction and completion of data series wherever required and possible	By Day 25 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	
7.	Establishing relations (like stage-discharge & discharge-sediment relationships) and computation of derived data (such as computed discharge and sediment concentration and sediment loads).	By Day 25 of the month after end of monsoon/non-monsoon periods	Assist. Hydrologist (S5)	Manager DDPC (S9)	
8.	Compilation of time series at large time intervals (10-daily, monthly, yearly) for the purpose of validation.	By Day 25 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	
9.	Feedback to the SDDPCs for incomplete or ineffective data validation, if so found in the review.	By Day 25 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	
10.	Dispatch of incremental (processed) data set in HYMOS database(s) to SDPC/RDPC alongwith a validation report on the corrected or estimated data in the processed data set	By Day 30 after the month of observation	Assist. Hydrologist (S5)	Manager DDPC (S9)	Operational details: Ref. No. O8
11.	Maintaining a system for regular backups and checking for virus	10 daily	Assist. Hydrologist (S5)	Manager DDPC (S9)	Operational details: Ref. No. O8
(E)	**WQ Analysis, data entry and validation at WQ laboratories (II and II+)**				
1.	Coordination with Level I labs regarding field sampling and analysis	Continuous process	Assist. Chemist (Q2)	Chemist (Q3)	Operational details: Ref. No. O2
2.	Upkeep of all WQ testing equipment and	Continuous	Chemist (Q3)	Head of	Operational details: Ref. No. O1

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
	availability of required consumables	process		Laboratory (Q5)	
3.	Receipt and recording of receipt of WQ samples arriving from various observation stations	As per sampling frequency	Assist. Chemist (Q2)	Chemist (Q3)	Job description: Ref. No. F1
4.	Submission of report to the concerned DDPC on the late or non-receipt of WQ samples as per the sampling schedule and frequency	Monthly	Assist. Chemist (Q2)	Chemist (Q3)	Operational details: Ref. No. O2
5.	Analysis of WQ samples for the required parameters as per the approved monitoring objectives including with-in lab. AQC for every batch of samples received	Within the allowed time period of analysis	Assist. Chemist (Q2)	Chemist (Q3)	Operational details: Ref. No. O3 Technical details: Ref. No. D12
6.	Entry of WQ analysis results in SWDES	On the day of sample analysis itself	Assist. Chemist (Q2)	Chemist (Q3)	
7.	Validation of WQ data & re-analysis of samples, if required	Within a week of the analysis	Assist. Chemist (Q2)	Chemist (Q3)	
8.	Dispatch of incremental WQ data to SDPC/RDPC	By Day 30 after the month of observation	Assist. Chemist (Q2)	Chemist (Q3)	
9.	Dispatch of incremental WQ data to SDPC/RDPC	Every year	Assist. Chemist (Q2)	Chemist (Q3)	Operational details: Ref. No. O4 Technical details: Ref. No. D12
10.	Dispatch of incremental WQ data to SDPC/RDPC	10 daily	Assist. Chemist (Q2)	Chemist (Q3)	Operational details: Ref. No. O8
(F)	**Hydrological validation and finalisation of data at SDPCs**				
1.	An standing order from SDPC detailing the data entry and types of data validation, analysis and reporting to be carried out on a regular and time bound basis by all SDDPCs, DDPCs and SDPC	One time (March 2002)	Manager SDPC (S11)	Manager SDSC (S12)	
2.	Ensure availability of comprehensive inventory of all historical data available with agency and its availability in SWDES databases (after adequate scrutiny)	One time (March 2002)	Manager DDPCs (S9) SDPC (S11)	Manager SDSC	This is most essential for the DSCs to be in a position to disseminate historical data in electronic form to the users
3.	Ensure availability of comprehensive inventory of all historical data available	By Day 30 after the month of	DPC Assistant (S4)	Hydrologist (S7)	Operational details: Ref. No. O8

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
	with agency and its availability in SWDES databases (after adequate scrutiny)	observation			
4.	Thorough scrutiny of incoming (field) data in SWDES databases for completeness	By Day 35 after the month of observation	DPC Assistant (S4)	Hydrologist (S7)	
5.	Submission and record of submission of (field) data from complete SWDES databases to SDSC	By Day 35 after the month of observation	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O8
6.	Receipt and record of receipt of incremental (processed) data in HYMOS databases coming from DDPCs	By Day 30 after the month of observation	Hydrologist (S7)	Manager SDPC (S11)	
7.	Feedback to the DDPCs for the non-receipt or incomplete (processed) data in HYMOS databases	By Day 35 after the month of observation	Hydrologist (S7)	Manager SDPC (S11)	
8.	Review of the validation reports submitted by DDPCs and review of (processed) data sets on random sample basis (about 5%). Identify sources of errors and make corrections if required and possible. Apprise DDPCs if the error(s) were due to inefficient data validation.	By Day 55 after the month of observation	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O2 and O10
9.	Submission and record of submission of (processed) data from HYMOS databases to SDSC	By Day 60 after the month of observation	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O8
10.	Hydrological validation for selected basins/sub-basins on daily or ten-daily basis and making note of any inconsistencies found	Twice a year (by January 15 and July 15)	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O7 and O10 Bi-annual: For monsoon (June – Nov.) and non-monsoon periods (Dec. – May)
11.	Publishing water year books	Yearly	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O7
12.	Maintaining a system for regular backups and checking for virus	Weekly	IT Expert (I1)	DB Administrator (I2)	Operational details: Ref. No. O8
(G)	Inter-agency data validation				
1.	Document the details on specific stations, data types and the frequency of data that are needed to be exchanged by one	One time	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O10

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
	agency with another for carrying out inter-agency validation.				
2.	Joint approval to the process of data exchange and inter-agency validation by the concerned agencies	One time	Manager SDPC (S11)	Competent Authority	[Manager SDSC (S12)/Secretary WRD]
3.	Regular request/dispatch of data (through SDSC) agreed to be exchanged for inter-agency validation by owner agency to the other agencies	Twice a year (By Jan 15 and July 15)	Hydrologist (S7)	Manager SDPC (S11)	Bi-annual: For Monsoon (June – Nov.) and Non-monsoon periods (Dec. – May)
4.	Validation of data with respect to inter-agency consistency	Twice a year (By Jan 31 and July 31)	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O10
5.	Exchange of inter-agency validation draft reports among concerned agencies	Twice a year (By Jan 31 and July 31)	Hydrologist (S7)	Manager SDPC (S11)	
6.	Joint meetings for finalising the inter-agency data validation reports	Twice a year (By Feb 15 and August 15)	Hydrologist (S7)	Manager SDPC (S11)	
7.	Correction/completion of data on the basis of approved inter-agency data validation report and submitting the action taken report	Twice a year (By Feb 28 and August 31)	Hydrologist (S7)	Manager SDPC (S11)	Operational details: Ref. No. O10
8.	Submission and record of submission of corrected data (if any) to the SDSC, as result of hydrological validation & inter-agency validation	Twice a year (By Feb 28 and August 31)	Hydrologist (S7)	Manager SDPC (S11)	
(H)	Data Communication				
1.	Availability of communication facilities at SDDPCs and DDPCs PSTN dial-up facility and internet connectivity with email	To be ensured by June 2002 and to be continued in future	Manager DDPC (S9)	Manager SDSC (S12)	This facility at SDDPCs is to be available as far as the agency's polices provide for it.
2.	Availability of communication facilities at SDPCs LAN to communicate with SDSC (in case it is in the same building)	To be ensured by June 2002 and to be continued in future	IT Expert (I1) and DB Administrator (I2)	Manager SDPC (S11)	

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
	PSTN dial-up facility: minimum one dedicated line (may be on sharable basis with SDSC) and internet connectivity with email ISDN dial-up facility and ISDN internet connectivity (on sharable basis with SDSC)				
3.	Availability of communication facilities at SDSCs LAN to communicate with SDPC (in case it is in the same building) PSTN dial-up facility: minimum one dedicated line (may be on sharable basis with SDPC) and internet connectivity with email ISDN dial-up facility and ISDN internet connectivity (on sharable basis with SDPC)	To be ensured by June 2002 and to be continued in future	IT Expert (I1) and DB Administrator (I2)	Manager SDSC (S12)	
4.	Availability of communication facilities at DSCs for communicating with the data users **Option A (Preferred):** Bought out space on external web-server with control for uploading and maintaining web-site **Option B:** Local web-server : Leased line with leased line modem and infrastructure for running web server	To be ensured by June 2002 and to be continued in future	IT Expert (I1) and DB Administrator (I2)	Manager SDSC (S12)	
(I)	**Data Storage and dissemination**				

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
1.	Documentation of the data dissemination policy of the agency	One time (June 2002)	Agencies	HLTG/ PCS	Draft model policy (CWC); Observations/agreement by individual agencies
2.	Approval of the data dissemination policy	One time (June 2002)	Manager SDSC	PCS	Approval by respective competent authorities
3.	Establish administration for incoming and outgoing data streams and management of databases at DSC and securing them from unauthorised use and loss.	July 2002 – Sept. 2002	ROLTA/ Consultants	Manager SDSC (S12)	Operational details: Ref. No. O9
4.	Receipt and record of receipt of field data in SWDES databases for SDPC	By day 35 after the month of observation	IT Expert (I1)	DB Administrator (I2)	
5.	Feedback to the SDPC for the non-receipt or incomplete or incorrect data in SWDES databases	By day 35 after the month of observation	IT Expert (I1)	DB Administrator (I2)	
6.	Receipt and record of receipt of (processed) data as transfer databases from SDPC.	By day 60 after the month of observation	IT Expert (I1)	DB Administrator (I2)	
7.	Feedback to the SDPC for the non-receipt or incomplete transfer databases	By day 60 after the month of observation	IT Expert (I1)	DB Administrator (I2)	
8.	Receipt and record of receipt of corrected data (if any) from the SDPC, as result of inter-agency validation.	As and when required	IT Expert (I1)	DB Administrator (I2)	
9.	Updating databases of DSC in light of new data from the DPCs	Every month	DB Administrator (I2)	Manager SDSC (S12)	Operational details: Ref. No. O9
10.	Assisting SDPC in sending and receiving data from other SDPCs through respective SDSCs	As and when required	IT Expert (I1)	DB Administrator (I2)	
11.	Updating of catalogue and its dissemination	Monthly after updating of databases	DB Administrator (I2)	Manager SDSC (S12)	
12.	Process requests of the hydrological data users and supply data to the users	Within a time frame on receipt of requests	DB Administrator (I2)	Manager SDSC (S12)	
13.	Maintaining agency's HIS web-site and the on-line catalogue	Continuous process	IT Expert (I1)	DB Administrator (I2)	

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
14.	Distributing anti-virus updates to all the lower level DPCs	Monthly or earlier (if available)	IT Expert (I1)	DB Administrator (I2)	
15.	Assisting all lower level DPCs to enter into AMC for computers	Continuous	DB Administrator (I2)	Manager SDSC (S12)	
(J)	**HIS Training**				
1.	Assess training requirements and arrange for training courses for hydro-meteorological observers through IMD	Bi-annually	Manager DDPCS (S9)/Manager SDPC (S11) and IMD	Manager SDSC (S12)	
2.	Apprise IMD about observance of standard observational procedures and seek to fill gaps, if any, through additional training	Annually	Manager SDPC (S11)	Manager SDSC (S12) and IMD	IMD to make a forum of C.E.s and itself so as to meet annually and discuss such reports
3.	Assess training requirements for hydrological observers and on advanced equipment like DWLRs etc.	Bi-annually	Manager DDPCS (S9)/Manager SDPC (S11)	Manager SDSC (S12)	
4.	Prepare plans and provide requisite training in-house through the ToTs on hydrometry	As per requirement	Manager DDPCS (S9)/Manager SDPC (S11)	Manager SDSC (S12)	
5.	Arrange for refresher courses for ToTs on hydrometry through NWA.	As per requirement	NWA	Manager SDSC (S12) and NWA	
6.	Apprise NWA about observance of standard observational procedures and seek to fill gaps, if any, through additional training	Annually	Manager SDPC (S11)	Manager SDSC (S12) and NWA	NWA to make a forum of CEs and itself so as to meet annually and discuss such reports
7.	Assess training requirement for WQ sampling and analysis	Bi-annually	Manager DDPCS (S9)/Manager SDPC (S11)	Manager SDSC (S12)	
8.	Prepare plans and provide requisite training in-house through the ToTs on WQ sampling and analysis	As per requirement	Manager DDPCS (S9)/Manager SDPC (S11)	Manager SDSC (S12)	
9.	Apprise identified laborator(ies) as CTI on WQ (CPCB proposed as CTI) about observance of standard sampling and analytical procedures and seek to fill gaps, if any, through additional training	Annually	Manager SDPC (S11)	Manager SDSC (S12) (S12) and Head of CTI on WQ	CTI on WQ to make a forum of C.E.s and itself so as to meet annually and discuss such reports

	Component/Details of activities	Time Frame	Responsibility	Supervision	References/Remarks
10.	Assess training requirements for SWDES and HYMOS at SDDPCs/DDPCs and SDPC	Bi-annually	Manager DDPCS (S9)/Manager SDPC (S11)	Manager SDSC (S12)	
11.	Arrange in-house training courses on SWDES through ToTs on SWDES	As per requirement	SWDES Trainer and Manager SDPC (S11)	Manager SDSC (S12)	
12.	Arrange for training courses on HYMOS by NWA and NIH	As per requirement	NWA and NIH	Manager SDSC (S12) and NWA and NIH	NWA/NIH to chalk out training calendar for HIS training every year
13.	Apprise NWA and NIH about implementation of SWDES and HYMOS and seek to fill gaps, if any, through additional training	Annually	Manager SDPC (S11)	Manager SDSC (S12) and NWA and NIH	NWA/NIH to make a forum of C.E.s and NWA/NIH so as to meet annually and discuss such reports
(K)	**HIS Management**				
1.	Ensure availability of required number and type of staff for various HIS activities at Field stations, WQ labs and at SDDPCs/ DDPCs/SDPC and SDSC	Continuous process	Manager SDPC (S11) and Manager SDSC (S12)	Secretary WR	Staff requirement: Ref. No. D3
2.	Ensure availability of required equipment and consumables at Field stations and at SDDPCs/DDPCs/SDPC and SDSC and at WQ laboratories	Continuous process	Manager SDDPCs (S6)/ DDPCs (S9) and SDPC (S11)	Manager SDSC (S12)	Details: Ref. No. F11
3.	Ensure availability of required training support for various HIS activities	Continuous process	Manager SDPC (S11)	Manager SDSC (S12)	
4.	Ensure adequate interaction with potential HDUs (HDUG meetings) and document and consider their feedback	Every 6 months	Manager SDPC (S11)	Manager SDSC (S12)	Technical details: Ref. Nos. D1 ToR for HDUG: Ref. No. F2
5.	Ensure required budgetary support for all operational, maintenance activities (AMC provisions for computers and all other major equipment including WQ equipment) of HIS and for any further improvements needed in the system	Continuous process	Manager SDPC (S11) /Manager SDSC (S12)	Secretary WR	
6.	Participation in and promotion of inter-agency coordination meetings so as to ensure continuance of uniform HIS standards and tools (specially Software)	Continuous process	Manager SDSCs (S12)/Secretaries WR of states	Secretary MoWR, GoI	GoI to create a forum (like HIS-TS) represented by central and state agencies for ensuring such coordination in future

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	across various states and agencies and upgradation required in future				
7.	Monitor and review HIS performance on the basis of the above listed factors and take remedial measures, if required	Continuous process	Manager SDPC (S11) and Manager SDSC (S12)	Secretary WR	HIS-TS to evolve a reporting procedure and reports to be discussed annually

References:

Ref. No. D1   HIS Design Manual - V1: Hydrological Information System
Ref. No. D2   HIS Design Manual - V2: Sampling procedure
Ref. No. D3   HIS Design Manual - V3: Hydro-meteorology
Ref. No. D4   HIS Design Manual - V4: Hydrometry
Ref. No. D5   HIS Design Manual - V4: Hydrometry - Section 5.2: Stage measurement frequency
Ref. No. D6   HIS Design Manual - V4: Hydrometry - Section 5.3: Current meter measurement frequency
Ref. No. D7   HIS Design Manual - V5: Sediment transport measurements
Ref. No. D8   HIS Design Manual - V5: Sediment transport measurements - Section 5.2: Suspended sediment measurement frequency
Ref. No. D9   HIS Design Manual - V5: Sediment transport measurements - Section 5.3: Bed load measurement frequency
Ref. No. D10   HIS Design Manual - V6: Water quality sampling
Ref. No. D11   HIS Design Manual - V6: Water quality sampling - Section 4.2: Network density, sampling frequency and parameter
Ref. No. D12   HIS Design Manual - V7: Water quality analysis - Section 8.3: Quality control/Quality control programme

Ref. No. F1   HIS Field Manual - V1: HIS - Part I: Job description
Ref. No. F2   HIS Field Manual - V1: HIS - Part II: ToR for HDUG
Ref. No. F3   HIS Field Manual - V1: HIS - Part III: Data need assessment
Ref. No. F4   HIS Field Manual - V3: Hydro-meteorology - Part II: SRG - Operation and maintenance
Ref. No. F5   HIS Field Manual - V3: Hydro-meteorology - Part III: ARG - Operation and maintenance
Ref. No. F6   HIS Field Manual - V3: Hydro-meteorology - Part IV: FCS - Operation and maintenance
Ref. No. F7   HIS Field Manual - V3: Hydro-meteorology - Part II to V
Ref. No. F8   HIS Field Manual - V4: Hydrometry - Part II: River stage observation
Ref. No. F9   HIS Field Manual - V4: Hydrometry - Part III to VI: Flow measurement by different techniques
Ref. No. F10   HIS Field Manual - V4: Hydrometry - Part VII: Field inspection and audits
Ref. No. F11   HIS Field Manual - V4: Hydrometry - Part VIII: Maintenance and calibration
Ref. No. F12   HIS Field Manual - V5: Sediment transport measurements: Suspended load meas., bed material sampling and sediment analysis
Ref. No. F13   HIS Field Manual - V6: Water quality sampling

Ref. No. O1   HIS Operation Manual - V7: WQ Analysis - Section 2: Analysis protocols

Ref. No. O2   HIS Operation Manual - V7: WQ Analysis - Section 3: Sample analysis
Ref. No. O3   HIS Operation Manual - V7: WQ Analysis - Section 4: Recommended analytical procedures
Ref. No. O4   HIS Operation Manual - V7: WQ Analysis - Section 5: Analysis results
Ref. No. O5   HIS Operation Manual - V8: Data processing and analysis - Part I - Data entry and primary processing
Ref. No. O2   HIS Operation Manual - V8: Data processing and analysis - Part II - Secondary processing
Ref. No. O7   HIS Operation Manual - V8: Data processing and analysis - Part III - Final processing and analysis
Ref. No. O8   HIS Operation Manual - V8: Data processing and analysis - Part IV: Data management
Ref. No. O9   HIS Operation Manual - V9: Data processing and analysis - Data transfer, storage and dissemination
Ref. No. O10   Summary of procedures for SW data validation under HIS (Circulated to members of HLTG-SW during 9th meeting on 29/11/2000)

SUMMARY OF PROCEDURES
FOR SURFACE WATER
DATA VALIDATON

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	Divisional Data Processing Centre	State/Regional Data Processing Centre
	Data Entry and Primary Validation	Secondary Validation*	Hydrological Validation*
	Time Frame (After the month of observation)		
	Day 1 to 10	Day 15 to 30	Day 35 to 60**
Meteorological Data			
Daily Rainfall	1. Comparison of monthly totals and number of rainy days as in form and as entered 2. Graphical checking against upper warning and maximum limits 3. Qualitative graphical comparison against expected pattern of the daily/monthly rainfall in different seasons of the year	1. Graphical checking against upper warning & maximum limits for aggregated data at monthly/yearly time intervals 2. Graphical and tabular comparison with adequately correlated adjoining stations 3. Use spatial homogeneity test to flag spatially inconsistent observations and prepare fool proof support for whether such inconsistent behaviour is a result of incorrect observation only 4. Comparison on number of rainy days among correlated adjoining stations 5. Use of double mass analysis to detect shift in behaviour on long term basis	1. Qualitative comparison of basin/sub-basin rainfall with the resultant runoff on daily/ten-daily basis 2. Reasonableness of isolines on ten-daily/monthly intervals on a regional scale 3. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical and tabular comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Twice daily Rainfall	1. Comparison of monthly totals on morning and evening observations as in form and as entered 2. Same as for daily rainfall data	1. Conversion to daily rainfall 2. Same as for daily rainfall data	1. Already converted to daily rainfall 2. Same as for daily rainfall
Hourly Rainfall	1. Comparison of daily totals as in form and as entered 2. Comparison of monthly totals for each hour as in form and as entered 3. Graphical checking against upper	1. Graphical comparison with adequately correlated adjoining stations	1. Qualitative comparison of basin/sub-basin rainfall with the resultant runoff on hourly basis, provided adequate spatial representation is available on hourly rainfall and that the catchment

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	**Divisional Data Processing Centre**	**State/Regional Data Processing Centre**
	Data Entry and Primary Validation	**Secondary Validation***	**Hydrological Validation***
	Time Frame (After the month of observation)		
	Day 1 to 10	**Day 15 to 30**	**Day 35 to 60****
	warning and maximum limits 4. Qualitative graphical comparison of ARG chart with the computer generated chart 3. Comparison of daily rainfall obtained by SRG and ARG at the same station		area is not very large
Min. and Max. Temperatures and Dry and Wet Bulb Temperatures	1. Comparison of monthly average as in form and as entered 2. Graphical checking against upper/lower warning and minimum/maximum limits 3. Graphical checking against expected rate of rise and fall 4. Qualitative graphical comparison against expected pattern in different months of the year 5. Consistency check between min./max. temperature and the dry bulb temperature 6. Consistency check between dry and wet bulb temperatures	1. Graphical comparison with adequately correlated adjoining stations	1. Reasonableness of isolines on ten-daily/monthly intervals on a regional scale in light of influencing weather and physiographic factors 2. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Hourly Temperature	1. Graphical checking against upper/lower warning and minimum/maximum limits 2. Qualitative graphical comparison against expected diurnal and longer pattern in different months of the year 3. Graphical checking against expected	1. Graphical comparison with adequately correlated adjoining stations	

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	Divisional Data Processing Centre	State/Regional Data Processing Centre
	Data Entry and Primary Validation	Secondary Validation*	Hydrological Validation*
	Time Frame (After the month of observation)		
	Day 1 to 10	Day 15 to 30	Day 35 to 60**
	rate of rise and fall		
Relative Humidity	1. Comparison of monthly average as in form and as entered 2. Graphical checking against upper/lower warning and minimum/maximum limits 3. Graphical checking against expected rate of rise and fall 4. Qualitative graphical comparison against expected pattern in different months of the year 5. Consistency check between difference of dry and wet bulb temperatures and relative humidity	1. Graphical comparison with adequately correlated adjoining stations	1. Reasonableness of isolines on ten-daily/monthly intervals on a regional scale in light of influencing weather and physiographic factors 2. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Hourly Humidity	1. Graphical checking against upper/lower warning and minimum/maximum limits 2. Qualitative graphical comparison against expected diurnal and longer pattern in different months of the year 3. Graphical checking against expected rate of rise and fall 4. Qualitative graphical comparison with hourly temperature		
Instantaneous and Average Wind Speed	1. Comparison of monthly average as in form and as entered 2. Graphical checking against upper warning and maximum limits	1. Graphical comparison with adequately correlated adjoining stations	1. Reasonableness of velocity vectors on ten-daily/monthly intervals on a regional scale in light of influencing weather and physiographic factors

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	**Divisional Data Processing Centre**	**State/Regional Data Processing Centre**
	Data Entry and Primary Validation	**Secondary Validation***	**Hydrological Validation***
	Time Frame (After the month of observation)		
	Day 1 to 10	**Day 15 to 30**	**Day 35 to 60****
	3. Qualitative graphical comparison against expected pattern in different months of the year		2. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Wind Direction	1. Qualitative graphical comparison against expected pattern in different months of the year	1. Graphical comparison with adequately correlated adjoining stations	1. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Pan Evaporation	1. Comparison of monthly totals as in form and as entered 2. Graphical checking against upper warning and maximum limits 3. Qualitative graphical comparison against expected pattern in different months of the year	1. Graphical comparison with adequately correlated adjoining stations	1. Reasonableness of isolines on ten-daily/monthly intervals on a regional scale in light of influencing weather and physiographic factors 2. Inter-agency validation (between state and IMD and CWC and IMD), twice-a-year (by February & August), by graphical comparison of IMD station data with adequately correlated adjoining stations of state/CWC
Temperature of Pan Water	1. Comparison of monthly average as in form and as entered 2. Graphical checking against upper/lower warning and	1. Graphical comparison with adequately correlated adjoining stations	

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	**Divisional Data Processing Centre**	**State/Regional Data Processing Centre**
	Data Entry and Primary Validation	**Secondary Validation***	**Hydrological Validation***
	Time Frame (After the month of observation)		
	Day 1 to 10	**Day 15 to 30**	**Day 35 to 60****
	minimum/maximum limits 3. Graphical checking against expected rate of rise and fall 4. Qualitative graphical comparison against expected pattern in different months of the year		
Hydrological Data			
Water Level Data	1. Graphical checking against upper/lower warning and minimum/maximum limits 2. Graphical checking against expected rate of rise and fall 3. Qualitative graphical comparison against expected pattern in different months of the year 4. Comparison with entered stages as in stage-discharge data	1. Graphical comparison with adequately correlated adjoining stations in terms of pattern in general and nature and timing of peaks in particular	1. Inter-agency validation (between state and CWC), twice-a-year (by February & August), by graphical comparison of CWC station data with adequately correlated adjoining stations of state
Flow Measurement Data	1. Graphical checking of pre and post-monsoon cross-sections 2. Comparison of total discharge, area, top width and wetted perimeter as in form and as entered 3. Graphical checking of mean velocity profile and discharge distribution across the cross-section against the expected pattern	1. Graphical comparison of successive cross-sections on a station and along the river reach. 2. Review of roughness values, hydraulic radius and surface slope as a function of water level.	
Stage discharge data	1. Graphical checking of scatter plot against the expected behaviour of stage-discharge relationship	1. Establishment and validation of stage-discharge relationship 2. Review of stage-discharge	

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	**Divisional Data Processing Centre**	**State/Regional Data Processing Centre**
	Data Entry and Primary Validation	**Secondary Validation***	**Hydrological Validation***
	Time Frame (After the month of observation)		
	Day 1 to 10	**Day 15 to 30**	**Day 35 to 60****
		relationship in view of secondary validation of discharge data	
Discharge data		1. Graphical comparison with adequately correlated adjoining stations in terms of pattern in general nature and timing of peaks in particular 2. Checking on continuity of discharge or runoff volumes between stations on river reaches or around confluences	1. Qualitative comparison of basin/sub-basin rainfall with the resultant runoff on daily/ten-daily basis 2. Inter-agency validation (between state and CWC), twice-a-year (by February & August), by graphical comparison of CWC station data with adequately correlated adjoining stations of state/CWC
Temperature of River Water	1. Comparison of monthly average as in form and as entered 2. Graphical checking against upper/lower warning and minimum/maximum limits 3. Qualitative graphical comparison against expected pattern in different months of the year	1. Graphical comparison with adequately correlated adjoining stations	
Sediment Data			
Suspended Sediment Data	1. Graphical checking of scatter plot against the expected behaviour of discharge-sediment relationship in different seasons	1. Checking on similarity in sediment loads between stations on river reaches	1. Review of overall sediment transport mechanism over the basin/region 2. Inter-agency validation (between state and CWC), twice-a-year (by February & August), by checking on similarity in sediment loads at adequately correlated adjoining stations of state and CWC
Water Quality Data			

Item	Data validation activities and related details at various data processing centre		
	Sub-divisional Data Processing Centre	**Divisional Data Processing Centre**	**State/Regional Data Processing Centre**
	Data Entry and Primary Validation	**Secondary Validation***	**Hydrological Validation***
	Time Frame (After the month of observation)		
	Day 1 to 10	**Day 15 to 30**	**Day 35 to 60****
	1. Enter laboratory data into SWDES 2. Note results of automatic validation checks. 3. Repeat sample analysis for water quality parameters where validation fails. 4. Qualitative graphical comparison against expected pattern in different months of the year		1. Identification of outliers by statistical tests (Dixon's test and/or Rosner's test) 2. Qualitative graphical comparison against expected pattern in different months of the year 3. Qualitative comparison of basin/sub-basin parameter concentrations and loads (calculated from flow rates) 4. Inter-agency validation (between state CWC and (C/SPCB) by graphical comparison of station data
Within Laboratory AQC data	1. Update Shewart Charts with analysis results of laboratory control samples 2. Graphical checking against upper/lower warning and upper/lower control limits		
Inter-laboratory AQC Data	1. Enter Inter-laboratory AQC exercise results into SWDES and export/send to organising laboratory		

* - Data validation at Divisional and State/Regional Data Processing Centres include review of any validation procedure specified for the lower level(s)

** - Except for inter-agency validation. Inter-agency validation is to be completed by Aug. and Feb. for the data of Dec. to May and June to Nov. respectively

*** - Water quality data is entered at Water Quality Laboratories and after primary validation the data is sent directly to SDPCs/RDPCs and thus no processing is involved at DDPCs.

FORMS FOR
REPORTING OF FIELD DATA