



**STANDARD OPERATING PROCEDURE FOR
TECHNICAL STANDARD AND RESEARCH DIVISION
(Revision Version 2.0)**

**National Center for Hydrology and Meteorology
Royal Government of Bhutan
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1. Standard Operating Procedure (SOP)

1.1 Title

Standard Operating Procedure (SOP) for Technical Standard and Research Division (TSRD) hereafter referred to as SOP 2023 for TSRD.

1.2 Objective

The main objective of the SOP is to provide standard linkages within section and unit to fulfill the Division mandates in fulfilling the vision, mandate and functions of the Centre

1.3 Effective

This revised SOP 2023 for TSRD would come into effect from 1st July 2023

2. Mandate, Function and Structure of TSRD

2.1 Mandate

The Technical Standard and Research Division (TSRD) is mandated to coordinate research and publications, calibration of instruments, standardization of hydro-meteorological data and related observations

TSRD was created to oversee and develop necessary standards in line with regulatory requirements of WMO and ICAO for operation of hydrology, meteorological, aviation and cryosphere data collection and services. Use and adoption of standard hydro-meteorological equipment, method of measurements and standardization of data is very important for scientific works and investigation. The Centre needs to develop standard, technical regulation and methods and follow a number of regulatory requirements including the quality of hydro-meteorological and related environment data that are shared with users and exchanged with international organizations

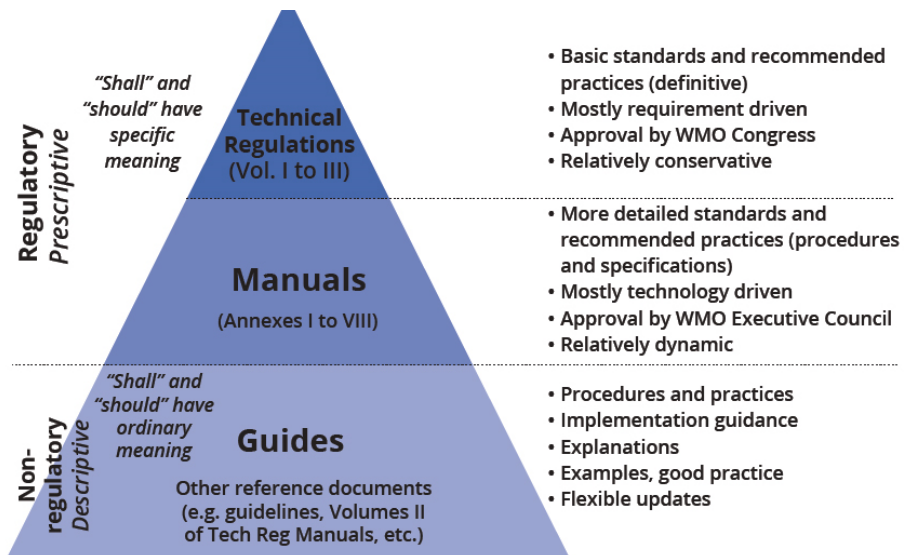


Figure 1: WMO Technical Regulations and other guidance material (Source WMO)

2.2 Functions of TSRD

- Develop and establish operational policies, guidelines and other relevant standards pertaining to hydro-meteorological instruments, observations and statistics;
- Develop and promote national standards for methods, procedures, techniques and practices in hydrology, meteorology and operational hydrology in coordination with relevant regulatory agencies and Technical Regulations, guidelines and manuals of WMO and ICAO;
- Develop Technical Manuals for Operational Hydrology, Meteorology and Cryosphere observations;
- Develop competency framework and training manuals for operational hydrology, meteorology and cryosphere in coordination with other divisions;
- Carry out calibrations of hydro-met instruments and equipment;
- Coordinate and conduct research improvements to existing standards, technical manuals and guidelines;

- g) Coordinate research on new science and technologies with technical divisions and external agencies;
- h) Provide research clearance on the field of hydrology, meteorology and cryosphere sciences;
- i) Provide technical sanction for works and procurement of goods and services;
- j) Publication of research journal, technical manual and related reports.
- k) Compliance monitoring of standards and quality assurance for observation and data collection in the field of hydrology, meteorology and cryosphere.

2.3 Structure

Technical Standard and Research Division (TSRD) has two Sections as follows:

- a. Technical Planning and Standard Section (TPSS)
- b. Research Coordination and Publication Section (RCPS)

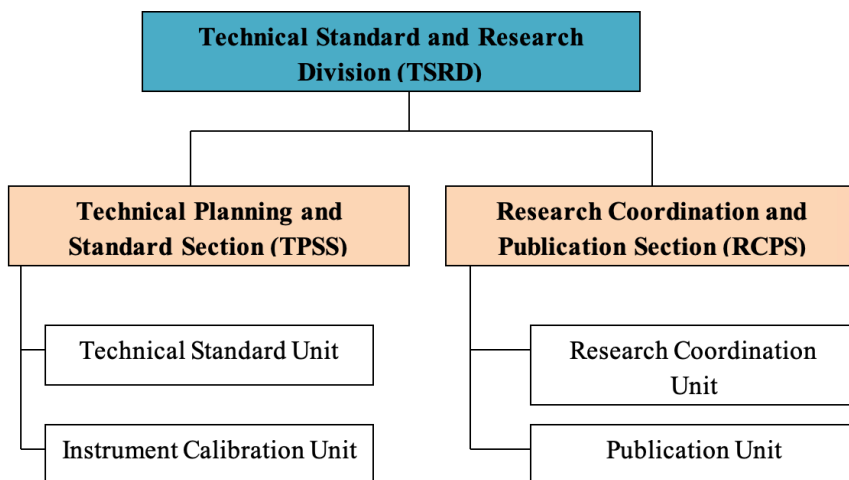


Figure 2: Organogram of Technical Standard and Research Division

3. Technical Planning and Standard Section (TPSS)

Functions of TPSS:

- a. Review WMO, ICAO and other technical regulations, technical manuals, Guidelines and related documents pertaining to hydro-meteorological instrumentation, and observations and statistics;
- b. Develop national technical regulations, manuals and guidelines and related documents in consultation with the regulatory agencies pertaining to hydro-meteorological instrumentation, and observations and statistics in Bhutan;
- c. Promote and implement national standards for methods, procedures, techniques and practices in hydrology, meteorology and operational hydrology;
- d. Provide technical sanction for the implementation of works and procurement of goods and services;
- e. Develop Technical Manuals for Operational Hydrology, Meteorology and Cryosphere observations;
- f. Develop training manuals for operational hydrology, meteorology and cryosphere
- g. Establish and carryout instrumentation and calibration of hydro-met instruments and accessories.

3.1 Develop handbook for operational hydrology

Action	Time	Operator	Output/Result
Review of the hydrology related documents	6 months	Designated officer	- Guidelines for operational hydrology is developed and printed for references
Design and planning	1 week	Designated officer	
Process with the development of a draft	6 months	Designated officer	

Share with relevant officer for commenting and further discussion	3 weeks	Designated officer	
Incorporate comments and further discussion	2 weeks	Designated officer	
Document review	2 weeks	Designated officer	
Submit for final approval from approving committee	1 week	Reviewing committee	
Send for printing and publication	1 week	Designated officer	

3.2 Develop handbook for meteorology observation

Action	Time	Operator	Output/Result
Review of the meteorological related documents	6 months	Designated officer	- Handbook for meteorology observation developed and printed for references
Design and planning	1 week	Designated officer	
Process with the development of a draft	6 months	Designated officer	
Share with relevant officer for commenting and further discussion	3 weeks	Designated officer	
Incorporate comments and further discussion	2 weeks	Designated officer	
Document review	2 weeks	Designated officer	
Submit for final	1 week	Reviewing	

approval from approving committee		committee	
Send for printing and publication	1 week	Designated officer	

3.3 Technical sanction for works

Action	Time	Operator	Output/Result
Receive and review the proposal and check for the availability and within approved budget	Within 3 days	Engineer	<ul style="list-style-type: none"> Review the proposal, Incorporate recommendations Accord or redirect the technical sanction Works carried out as per the approved drawing and within the allocated budget
Check the detail cost estimate, rate quoted, cost analysis is carried out as per the BSR rate and arithmetical errors	5 days	Engineer	
Check for the approved brand and technical specification as per the standard accepted	1 day	Engineer	
Review the drawings as per the standard and prescribed rules	1 day	Engineer	
Accord approval or reject the proposal based on the review and return back to the concern user with justification and recommendations	1 day	Engineer	

Monitor and quality control during construction and verify during takeover if as per the approved drawing and specification	As and when required	Engineer	
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3.4 Technical sanction for procurement of Goods and service

Action	Time	Operator	Output/Result
Receive and review the proposal	3 days	Engineer	<ul style="list-style-type: none"> - Technical sanction approved or rejected - Best brand and services are approved - Proper cost analysis and are achieved
Review the specification of the goods and services if it's as per the approved standard	1 day	Engineer	
Check for detail estimates and cost analysis and price quoted	3 days	Engineer	
Monitoring the goods and services procured are as per the approved standards	When required	Engineer	

3.5 Standardization of hydro-meteorological and cryosphere observational equipment

Action	Time	Operator	Output/Result
Review the documents related to the observational	1 months	Engineer	<ul style="list-style-type: none"> -Desktop studies -come up with list of equipment

equipment			
Conduct instrument inter-comparisons	1 months	Engineer	-check for different instruments and select the best fit for our system
Established their interoperability and compatibility of data	1 month	Engineer	-select for best instruments -Standard document for observational equipment prepared
Checked for associated uncertainties	1 month	Engineer	
Prepare standard documents with recommended list of equipment	3 months	Engineer	

3.6 Develop training manuals for operational hydrology

Action	Time	Operator	Output/Result
Define your audience and review the other international manuals	3 months	Engineer	-know your audience targeted and related documents and manuals reviewed
Plan your content and start organizing	2 months	Engineer	-User is able to quickly find specific content and topics. -organize and categorize the topics in your training manual
Determine content presentation format	1 month	Engineer	-Can figure out ways to deliver your content
Develop content,	6 months	Engineer	-start developing the

assemble and deliver the manual			manuals
Track feedback and keep your content updated	1 month	Engineer	-feedbacks and suggestion incorporated
Submit for approval and publication	1 month	Engineer	-Training manual developed

3.7 Develop training manuals for operational Meteorology

Action	Time	Operator	Output/Result
Define your audience and review the other international manuals	3 months	Engineer	-know your audience targeted and related documents and manuals reviewed
Plan your content and start organizing	2 months	Engineer	-User is able to quickly find specific content and topics. -organize and categorize the topics in your training manual
Determine content presentation format	1 month	Engineer	-Can figure out ways to deliver your content
Develop content, assemble and deliver the manual	6 months	Engineer	-start developing the manuals

Track feedback and keep your content updated	1 month	Engineer	-feedbacks and suggestion incorporated
Submit for approval and publication	1 month	Engineer	-Training manual developed

3.8 Calibration of Barometer

Refer separate SOP for Pressure and Temperature Calibration

3.9 Calibration of Thermometer

Refer separate SOP for Pressure and Temperature Calibration

3.10 Calibration for Humidity Sensor

Action	Time	Operator	Output/Result
Physical examination of the humidity sensors like dry and wet thermometer	10 minutes	Calibrator/ Technician	-possible bubbles breaks and proper condition of the sensors
Setting up the calibration room	30minutes	Calibrator/ Technician	-Stabilized the room temperatures
Setting up of the standard thermometers and setting the required temperatures	30 minutes	Calibrator/ Technician	-standard sensors ready for comparison of the field equipment

Calibration of the equipment	2 hours	Calibrator/ Technician	-calibration done
Carry out the Correction	30 minutes	Calibrator/ Technician	-correction applied if any
Preparation of the result and certificate	1 hours	Calibrator/ Technician	-certificate generated

3.11 Carry out field inspections and audit for hydro-met equipment and stations

Action	Time	Operator	Output/Result
Plan for the field visit	1 week	Engineer	- Technical report with recommendations and feedbacks
Field visit for inspection and auditing	3 weeks	Engineer	
Prepare technical reports and submission to management	3 weeks	Engineer	

4. Research Coordination and Publication Section (RCPS)

Function of RCPS:

- a. Coordinate and facilitate implementation of research works on hydrology, Meteorology and Cryosphere in collaboration with technical divisions;
- b. Review the proposal and issue research clearance pertaining to hydrology, meteorology and cryosphere sciences in Bhutan;
- c. Liaise with national and external universities and institutes for implementation of research on hydrology, meteorology and cryosphere and climate change issues.
- d. Coordinate and carry out research and applications of new science and technologies in collaboration with technical divisions and external agencies/universities/institute;

- e. Coordinate and plan research activities in consultation with technical divisions;
- f. Co-ordinate the publication of Hydro-meteorological Journals and other publications;
- g. Manage and share knowledge and information on research and related studies.

4.1 Coordinate and plan research activities within technical division

Action	Time	Operator	Output/Result
Call for research proposal from different service division	Any time	Engineer/ Designated officer	- Research proposal from different service division received
Coordinate in resources arrangements for carrying out the research activities	Daily	Engineer/ Designated officer	- Required resources made available
Liaise with national, external universities and institutes for implementation of research if required	Daily	Engineer/ Designated officer	- Linked with national and external institutions for guidance, review and recommendations
Coordinate in research approval and send for publication	Daily	Engineer/ Designated officer	- Research approved and published

4.2 Development of research clearance guidelines

Action	Time	Operator	Output/Result
Review the regional and international guidelines	3 months	Designated Engineer	- Guidelines developed for providing research clearance
Develop draft guidelines	6 months	Designated Engineer	
Share the draft with relevant expert for comments, recommendations and suggestion	2 months	Designated Engineer	
Review the draft incorporating the expert's comments and suggestion	1 month	Designated Engineer	
Finalized the guidelines and send for approval from approving committee	1 month	Designated Engineer	
Send for printing, publications and binding to booklets	1 week	Designated Engineer	

4.3 Research clearance process

Action	Time	Operator	Output/ Result
Receive research proposal on science of hydrology, climatology, meteorology and cryosphere	any time	Focal Officer	Research clearance issued

Review the proposal as per the guidelines	1 months	Focal Officer	
Circulate proposal to Centre's Research and Publication Committee for review and comments	1 months	Focal officer	
Seek additional comments and justification from the proponent (person/institute submitted proposal)	1 month	Focal Officer	
Revised proposal submitted to the Research and Publication Committee for review and comments	1 month	Focal Officer	
Final proposal submitted to the Centre for approval	1 week	Focal Officer	
Clearance issued to the proponent	1 week	Focal Officer	

4.4 Liaise with national, external universities and institutes for implementation of research

Action	Time	Operator	Output/Result
Explore the national or external universities and institutes for collaboration platforms and networking	3 months	Designated officer	- Best universities or institutions with required capacities best suited to our requirements selected
Develop and submitting	6 months	Designated officer	- The list of program or activities

proposal			developed and submitted for approval
Formalized the institution relationship and sign agreements or MoU commitment to outreach activities	3 months	Designated officer	- Agreements or MoU signed for collaborations
Coordinate in implementing the programs and research activities between the agreed institutions	Daily	Designated officer	- Program implemented

4.5 Publication Bhutan Hydro-met Journal

Action	Time	Operator	Output/Result
Notify division for submission of paper and title to be published in Bhutan Hydro-met Journal	July - August	Engineer	Bhutan Hydro-meteorological Journal published
Received draft papers from Divisions	September - December	Engineer	
Submit papers to the Editor Committee for review and comments.	January-February	Engineer	
Publication and printing	February-March	Engineer	

Launching	23 March (WMO Day)	Engineer	
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4.6 Publication NCHM Annual Report

Action	Time	Operator	Output/Result
Focal officer to update the content of Annual Report	July - May	Engineer	NCHM Annual Report published
Receive draft Annual Report	May	Engineer	
Submit draft Annual Report to Editor for review and comments	May-June	Engineer	
Publication and printing	June	Engineer	

4.7 Manage and share knowledge and information on research and related studies

Action	Time	Operator	Output/Result
Review and research for what knowledge and information needed to be shared	Daily	Designated officer	-suggest what needed to be shared
Coordinate who will share the knowledge and information	As and when needed	Designated officer	-find right person to share the information

Arrange or create a Knowledge-Sharing Environment or platform	As and when needed	Designated officer	-select proper medium
Collect feedback and suggestion for improvement	As and when needed	Designated officer	-know what need to improved

5. SOP for Common Services under the Division

5.1 Planning, organizing meetings, submitting proposals for Divisional fiscal year Budget, Five Year Plan(s), APT, and update status on Budget.

Action	Time Frame	Operator	Outcome/result
a) Prepare budget proposal in coordination with Division upon instruction from the management.	2-3 weeks	Budget focal	- Proposed budget for the Division through detail cost estimate, justification and write up
b) Report budget balance statement, prepare mid-term budget report and submit as per the template.	1-2 weeks	Budget focal in collaboration with accounts section.	- Submitted budget utilization report, mid-term report and re-appropriated depending on the need of the Division.

c) Prepare APT in coordination with Head and NCHM APT focal and keep track of division activities in line with APT.	1-2 weeks	APT focal	- APT submitted
d) Prepare and update (planned) five-year plan activities pertaining to the Division	2-3 weeks	FYP focal	- Updated Division timely to keep Divisional activities on track with FYP.

6. Amendment and Revision

This SOP will be review and update from time to time and submit to the management for approval



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