

5 HYDROLOGICAL MONITORING PROTOCOL: Station Inspection

A. Purpose

The purpose of this protocol is to lay down clearly what are the operation and maintenance procedures for the Sediment Monitoring Stations. It should be followed as closely as possible so that any malfunctioning of the equipment will be minimized, irregularities about structures, stick gauges, housing etc. can be rectified in the shortest time possible.

Engineers who are taking charge of the stations should be familiarized with this manual and put into practice these procedure to ensure good and reliable data being collected and analyses.

B. Data Type and Equipment

Typically the following types of data are collected using the respective equipment or tools:

1. Manual Rainfall -Manual Rainfall Gauge
2. Manual Water-level -Stick Gauge
3. Float Discharge - Float and Stop Watch
4. Sediment Concentration - Samplers, Bottles, Filters, Sieves, Beakers
5. Continuous Water-level and Discharge - Water-Level Sensor, Recorder, Weir or Controlled Section
6. Continuous Rainfall - Rainfall Sensor, Recorder
7. Wind - Anemometer, Recorder
8. Temperature - Temperature Sensor, Recorder

C. Field Trips

SCHEDULE

Plan your visit schedule to the station according to the season:

- during monsoon: two weeks interval
- after monsoon : monthly interval

The reason for the time schedule difference for monsoon period is because that the water-level recorder is set to faster speed and the chart last only for two weeks. The rainfall recorder is also set to run at 20mm per hour during the monsoon period, and set back to 10mm per hour after the monsoon.

SPECIAL OPERATIONAL REQUIREMENTS BEFORE MONSOON STARTS

As a reminder, two things are necessary to be executed before the monsoon starts, i.e.

- set rainfall recorder chart to run at 20 mm/hour
- set water-level recorder chart to run at maximum of 2 weeks

D. Items to be taken

Items that are necessary to be carried during each field trip differs, depending on the nature of the trip. But in general, the following may be used as a check-list:

1. Laptop computer, with battery fully charged
2. Diskettes for file storage
3. Potentiometer for checking voltage of batteries
4. Water-level and rainfall charts to replace used charts
5. Ink cartridges for recorders
6. Inspection Form I
7. Standard tools: screw drivers, plier, keys, measuring tape, compass, lable tape, etc.
8. Spares parts
9. Other special items:
 - e.g. Form M if they are nearly used up
 - New and fully charged batteries if there might be batteries due for replacement.

This list is by no mean complete, you may design your own check list tailored to your stations.

E. Station Inspection and Checklist

Carry out inspection of the station at each field trip. This includes all equipment, tools, structures and the manual records of the observers.

In order to assist the station inspection routine and make a record of each item inspected, a station checklist included in the “Station Inspection and Evaluation Form” or Form I is to be used on each field visit to a station. Since it contains summary information regarding status of the station, it is very important in preparing subsequent field trips properly. Section F describes in detail the manner in which the first part of the Form I is to be filled during the visit.

F. Guide to Use Form I for Station Inspection

The following is a guide to the use of the Form I to be filled during a station inspection:

HEADERS

Fill in all the details regarding:

Station Name, State, Date, Observer's Name, Silt Analyst's Name.

The Station Inspection Check List' is meant for checking instruments and tools of the station. Here a tick on either one of the columns is expected. The condition refers to the state before any maintenance work has been carried during the particular trip. The meaning of G, M and B are:

G = Good, stands for very good condition

M = Medium, stands for a fair condition.

B = Bad, stands for poor condition.

Consider your response very carefully. Any response with B means some kind of action is required in the next trip.

If any kind of work has been carried out during the present trip, it has to be documented in the next column under "Work Executed in this trip/Remark". Tick "Y" if commonly executed works are done.

If any particular equipment is found to be "Bad" in the present trip and certain special items need to be brought along and installed in the next trip, then write these down under the column "Follow Up Work Required in Next Trip".

Put a dash line ' _____ ' across those questions asked which are not applicable to a particular station.

1. GENERAL

Housing:

Check the condition of the station housing.

Is the housing waterproof and dustproof?

Whether the floor is dirty or not?

The interior is generally tidy?

Surrounding:

The surrounding condition of the housing and weir and control section, whether there has been any slope failure that may affect the safety of the housing and the weir or the channel flow condition.

Sitling of Weir:

If there is a weir, check the level of silt behind the weir.

Clearance:

This refers to the nearest obstacle to affect the catch of the rainfall gauge. If there are new buildings, vegetation, etc around the vicinity of the station that is suspected to be an obstacle to the station.

The ideal situation is to have the angle from the top of the gauge to the top of the encircling objects to range from 30 degrees to no more than 45 degrees (WMO Standard).

For rough estimation in achieving the 30 degree standard, if a tree is of height H, then its distance from the top of the gauge should not be less than $2xH$.

Observer Readings

Check the manual records of the observer:

Legible?

Can you reasonably distinguish his writing. ?

Follow Notation?

Is the stick gauge reading to the nearest cm.?

Is rainfall reading is to the nearest 0.1 mm ?

Is bottle number given?

Is the float time measured in seconds?

Correct Date / Time?

Is the date of the last reading correct and the time measured to the nearest minute?

Attendance satisfactory?

In general does the observer not skip any data and does he measure at about half hourly intervals if there is a flood?

2. MANUAL RAIN GAUGE

Collecting Can:

Is the collecting can leaking?

3. AUTOMATIC RAIN GAUGE

Collector:

Is the sharp edge of the collector damaged?

Tipping Bucket:

Is the tipping bucket functioning properly?

To check, this the casing has to be opened up.

Pen/Drum:

Trace line clear and smooth?

Ink stock sufficient?

Ink Flow regular?

Pen cleaning necessary?

Housing:

Can it be opened smoothly, i.e. without disturbing the recording device of the recorder inside?

Cleaned?

Whether the sieves and tipping bucket of the collector have been cleaned in this trip? Try to clean these parts during all trips.

Clock Checked?

Check the clock if it is functioning well?

4. STICK GAUGE

Position:

Are the stick gauges positioned at about 3 times the value of maximum water head above the crest of the weir? Is the installed position subjected to turbulence?

WEIR AND STICK GAUGE DEFINITIONS

Range

Fill in the range of the stick gauge according to the separate attachment.

Check for:

Whether they are cleaned and all figures are legible?

Does the stick gauge faces a direction convenient enough for the observer to read?

Can the whole range of the stick gauge be read at all possible stages?

Is the stick gauge vertical and not affected by erosion?

Check particularly the lower part of each stick gauge, is it not embedded in sediment or vegetation?

The condition of the stick gauge can only be considered as "Good" if all the answers to the above are "yes".

Level Checked?

This check by precision survey leveling has to be made periodically, at least once a year even if the stick gauges appear to be standing. If you detect any soil movement or an inclining stick gauge, then the level has to be checked at once.

Cleaned?

Whether the sieves and tipping bucket of the collector was cleaned during this trip ? Try to clean these parts during all trips.

5. WATER-LEVEL RECORDER

Functioning?

Is the stage indicated by the recorder pen coincident with the stick gauge?

Is the time indication of the recorder correct?

Is the pen arm of the recorder obstructed especially at the border edge of the chart?

Pen Writing?

Are tracing lines on the chart clear and smooth?

Is the ink stock sufficient?

Is the ink flow regular?

Is pen cleaning necessary?

Floater Working?

Are the correct types of weight and counterweight used?

Is the float and weight assembly hanging freely at the extreme water levels?

Is the stilling well in a good condition? Free from siltation inside the well?

Are the intake pipes in a good condition? Free from siltation?

Range Checked?

Check whether the pen marks exactly between the upper and the lower border lines on the chart, i.e. the full range of the chart is reachable.

Is the chart zero set on the correct side?

In case of malfunctioning, try to make minor adjustments if you can. Replace the recorder if there is a major fault.

Clock checked?

Check the clock to see whether it is functioning properly.

6. BENCH-MARK

All station should have at least two bench-marks established some distance away from the monitoring station. This is to prevent any complete lost of datum used in water level measurement should there be a major catastrophe such as a flood which completely destroys the station and stick gauge.

If there is any bench-mark installed, write down the number and check the condition of the bench-mark.

Is the bench-mark located at a safe site on stable ground?

Can the bench-mark be found easily?

Any building, soil or vegetation is covering the bench-mark?

Level checked?

All bench-mark have to be checked once a year and to tie up with the stick gauges. Say "Y" if this is executed during this trip.

7. BATTERY

Functioning?:

Whether there is any indication of burn or failure?

Wiring Connections:

Check the connections for any loose ends.

Battery Fluid Level:

Check if the level of fluid in the battery is within the optimum range.

Battery Voltage:

Use the potentiometer to measure the voltage across the terminal and note it down.

Installation Date:

Note the date of the newly installed battery and this is also noted on the battery. It is important to label the 1st date of usage as the life span of the battery can be traced. Decision on when the next change of battery is required can be made better, especially when it is considered together with the voltage reading.

8. OTHER EQUIPMENT

This space is provided for writing down the status of some other equipment that may exist in the station.

9. DATA LOGGER

Functioning:

Using the manufacturer program to check and retrieve data files.

Refer to manual on the usage of the program if you are not sure.

Is the data logger storing data as it should?

Logger No.:

Note down the logger No. written on the logger. This is for identification purpose.

Diskette No.:

All diskette should be given a unique no. to avoid confusion.

Channel No.:

The channel of the logger where the data will be stored.

Time interval:

The time interval of the logger data that was set for the series of data in each channel.

Date and Time On:

The date and time on which the series of data started.

Date and Time Off:

The date and time on which the series of data stopped or terminated.

File Name Given:

The name of the file that is given to the respective data series. The convention is to use the first six digits as the "Date and Time Off", the next two digits derived from the channel number and the file extension based on the first three letters of the station name, e.g HAR for Haripura. Effectively it can be abbreviated as "DDMMYYCC.SSS" for easy remembrance. Be sure not to overwrite an already existing file !