

**Watershed Management Branch
Groundwater Section
Spring Gaging Standard Operating Procedure
Draft – November 7, 2007 (Revised December 11, 2008)
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While spring gaging can be accomplished by one person, it is advised that you take someone along both for safety and recording measurements.

1) Sign out and secure necessary equipment and forms

- A) A Marsh-McBirney flow meter
- B) Measuring tape and metal stakes (in pack with flow meter)
- C) Clipboard and pen
- D) Wading rod
- E) Waders or water proof boots (depending on depth of spring runs)
- F) Field Meter (pH/Cond/Temp)
- G) Discharge Gaging Forms (one for each spring plus a few extras)
- H) Calculator (optional)

(NOTE: Tape Measure and Top-Setting Wading Rod scales are subdivided into *Tenths of Feet*, not inches)

2) Complete header information on Discharge Gaging Form (attached)

- A) **Location:** Spring Name and AKGWA Number
- B) **Date:** Of gaging
- C) **Personnel:** Those present
- D) **Time:** Start time
- E) **Discharge Estimate:** Estimate spring flow prior to beginning measurements
- F) **Conditions:** Comments on channel morphology (i.e. “good spot-uniform channel” or “poor location-uneven talus bottom”). You may also use this area for notes on hydrologic conditions (i.e. “drought” or “recent heavy rain”)
- G) At this time take **pH, Conductivity** and **Temperature** measurements and record in appropriate blanks.

3) Identify best channel cross-section and set up gear for gaging

- A) Look for a cross-section with a firm, relatively flat bottom where flow is fairly laminar and uniform from bank to bank. These conditions will not always be present, find the most suitable spot that you can and note in “Conditions”.
- B) Use metal stakes to secure each end of cloth tape to banks, perpendicular to flow direction. When measuring in foot increments, it is helpful to line up the first half foot of the tape with the water’s edge so that measurements are made at whole foot increments. Note the water’s edge reading as “Edge @ ___” in top row of *Distance from Initial Point* column.
- C) Attach gaging sonde to bottom of top-setting wading rod and secure wing-screw. Withdraw only enough sonde cable for comfortable operation.

- D) Turn **Range** knob to **Calibrate**. Allow needle to rise to the black stripe on the right end of the read-out marked “Calibrate”.
- E) Advance **Range** knob to appropriate velocity setting, typically **2.5**, corresponding to upper “2.5 ft/sec” velocity scale in readout.
- F) For most applications, leave **Time Con.** knob at **2**, for a more sensitive velocity reading every 2 seconds.

4) Begin Measurements

- A) Measurements should be taken at equal intervals across the entire width of the channel. Interval spacing is determined by channel width: Rule of thumb – Measure velocity at every foot if channel is greater than 10 ft, every ½ ft if less than 10 ft.
- B) Move wading rod to first measuring station and note on sheet the Tape reading for that station.
- C) Measure Depth with wading rod (Single graduation = Tenths of feet; Double graduation = ½ foot; Triple graduation = whole feet) and note as Decimal Feet (such as 0.5).
- D) Squeeze the release clamp on the handle scale at top of the wading rod to slide the adjustment rod to set the sonde to 0.6 of water depth. The adjustment rod has graduations for whole feet only. **NOTE:** If total depth is measured at 0.5 feet, set the 0 graduation on the adjustment rod to the 5 on the handle scale. Likewise, if total depth is measured at 1.8 feet, set the 1 graduation on the adjustment rod to the 8 on the handle scale. Remember that this sonde adjustment will have to be reset with each change in water depth. Water deeper than 2.5 feet should have two readings at each section, one at 0.2 and 0.8 of the depth.
- E) Insure that sonde is facing upstream, directly into the spring flow and read the velocity from the flow meter. Note the velocity as Decimal Feet per Second.
- F) Repeat these procedures across the entire width of the channel, noting width, depth and velocity.
- G) Finish by turning the **Range** knob to **Off** and cleaning and securing equipment.

5) Discharge Calculation

- A) Multiply through for each row to obtain the discharge for each station – cubic feet per second (ft³/s or cfs).
- B) Sum all the measurements in the Discharge column to calculate the total spring discharge. Compare this number to your discharge estimates.

References

- Buchanan, T. J. and W.P. Somers, 1969, **Discharge measurements at gaging stations**, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter A8.
- Carter, R. W. and Jacob Davidian, 1968, **General procedure for gaging streams**, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter A6.

Marsh-McBirney, Inc., 1990, **Model 2000 Portable Flowmeter Instruction ,
Installation and Operations Manual.**

Marsh-McBirney, Inc., No date, **Instruction Manual for Model 201/201D Portable
Water Flowmeter.**

