

5.16 Tip Sheet: How can I round my results in QWDATA output?

- ❖ Rounding of values in table or flatfile output from QWDATA is controlled from the tabling options screen in any output format:

```
qwtable -- current selections for options
(1) Limit Results by DQI Code:      X_Historical, Accepted, or presumed OK
    __ User Specified
(2) Parameter Order:                X_Publication Order __As Supplied
(3) Rounding of Result Values:      X_Default __User __None
(4) Censoring of Zero Values:       X_None __User Specified
(5) Recensoring of Values:          X_None __User Specified
(6) Qualifiers in Output:           __Yes X_No
(7) Footnotes:                      __None X_Remarks __Qualifiers
(8) Create Parnames File:           __Yes X_No
(9) Time Datum:                     X_Watch Time __User Specified
```

- ❖ There are three options to round result values for output from QWDATA:

Default **User** **None**

Note: The Office of Water Quality recommends that default rounding is used for publication of water-quality results from QWDATA (See Memo <http://water.usgs.gov/admin/memo/QW/qw02.11.html>).

- ❖ **Default rounding** allows the software to employ the use of either the **lab standard deviation** stored with the result value or the **rounding array** from the parameter-method table.
 - The **laboratory standard deviation** can be stored with each result and will be used to round the result value if it exists. This value is used with the ASTM E29-93, a standard to determine the appropriate rounding for the result value. Details of this rounding application are available at: <http://phoenix.cr.usgs.gov/www/rounding.html>. To retrieve the laboratory standard deviation, select a by-result output format and use the ALPHA parameter code of LSDEV.
 - If the laboratory standard deviation is not stored with the result value, the 10-element **rounding array** stored in the parameter-method table will be used. This rounding array contains 10 elements: 9 precision codes that apply to values within specific decadal ranges and 1 element for the maximum decimals (MaxDec) used to display any value. The nine precision codes have meanings as follows:

Element	Applies to values with absolute magnitude:	Meaning of precision code
1	less than 0.01 *	Number of digits shown to the right of the decimal (e.g. a raw number of 0.12345 rounded using a precision code of 3 is displayed as 0.123).
2	less than 0.1 and greater than or equal to 0.01	
3	less than 1.0 and greater than or equal to 0.1	
4	less than 10 and greater than or equal to 1.0	Number of significant digits shown
5	less than 100 and greater than or equal to 10	
6	less than 1,000 and greater than or equal to 100	
7	less than 10,000 and greater than or equal to 1,000	
8	less than 100,000 and greater than or equal to 10,000	
9	greater than or equal to 100,000	

*Values equal to zero will be rounded using MaxDec, unless replaced by an "M" remark.

- ❖ **User rounding** allows the software to employ the use of a rounding code stored with a result. In some instances the default rounding behavior is not desired and user rounding will result in a rounded value that is controlled by the user-entered rounding code. The code stored is used in the same way as an element from the rounding array described above. If no code is stored with the result, the rounding array in the parameter-method table will be used.

Note: Historically, the stored user rounding codes have been entered inconsistently and the use of this option may result in undesired output.

- ❖ **No rounding** will result in the value being included in output in the same way it is stored in QWDATA.

Note: To avoid step patterns in the data, data output with no rounding may be useful for plots.

- ❖ Reminders about rounding in QWDATA output:

- If an 'M' appears in place of a result in the output, the program has identified that the result will round to zero. If a zero is not allowed for that parameter, an 'M' is included. More information about the behavior associated with results that round to zero is available at: <http://phoenix.cr.usgs.gov/www/roundzero.html>.
- Fixed-value parameters (e.g. collecting agency, analyzing agency, sampler type) will be rounded using the 10-element rounding array if default rounding is selected, or the stored rounding code if user rounding is selected.
- If the rounding of the results does not seem correct, please enter a GNATS report with the details of the output. Details on how to enter a GNATS report are included in [Tip Sheet 5.13](#).

❖ Example of rounding from QWDATA:

Unrounded Value	Precision Code	Rounded Result
-0.123	1	-0.1
1.5692	3	1.57
202.95	2	200

❖ Detailed discussions about rounding in QWDATA are available in the following sections of the QWDATA User's Documentation:

- [2.7.1 – Numeric Information – Rounding](#)
- [3.4.3.4.3 – Water Quality Table Options – Rounding of Result Values](#)
- [3.6.9 – Display the Parameter Method Precision Table](#)