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Felicia Mizener
District Support Program
Division of Waste Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Update to the memorandum on rounding analytical data for site rehabilitation completion

Dear Ms. Mizener:

At your request, I have updated the rounding guidance memorandum (FDEP, 2011). The purpose of this update is to clarify the procedure for rounding analytical results for comparison to the cleanup target levels (CTLs) promulgated in Chapter 62-777, F.A.C.

Background

As noted in the 2011 rounding guidance memorandum, laboratories often report analytical results to more significant figures than those listed in Chapter 62-777, F.A.C. This may create uncertainty when the laboratory report exceeds the promulgated CTL due to the reporting of more significant figures. For example, the laboratory may report a concentration of 10.4 mg/kg for a chemical in soil. If the soil cleanup target level (SCTL) for this chemical is 10 mg/kg, the concentration in soil exceeds the SCTL only because extra significant digits were reported. The purpose of this guidance is to provide clarity on how to round analytical results for comparison to the CTLs.

The SCTLs listed in Table II of Chapter 62-777, F.A.C. are rounded to 2 significant figures if the SCTL is greater than or equal to 1 (≥ 1) and 1 significant figure if the SCTL is less than one (<1). This was decided during the rule adoption process and is listed as a footnote on the table. The groundwater cleanup target levels (GCTLs) and surface water cleanup target levels (SWCTLs) listed in Table I of Chapter 67-777, F.A.C. do not have this footnote; however, most of the values were rounded this way for simplicity and to be consistent with the SCTLs. The exceptions to this convention are standards. Primary and secondary groundwater standards and surface water standards are listed to the same number of significant figures as provided in the standard. For groundwater, the standards are promulgated in Chapter 62-550, F.A.C. and for surface water the standards are promulgated in Chapter 62-302, F.A.C.

Guidance

1. If the CTL has one significant figure, the analytical results for than contaminant may be rounded to one significant figure.

2. If the CTL has two significant figures, the analytical results for that contaminant may be rounded to two significant figures.

3. If the CTL is a groundwater or surface water standard, the analytical results for that contaminant may be rounded to the same number of significant figures as the standard.

Procedure with examples

The CTLs that are *not standards* are rounded to 2 significant figures if the CTL is ≥1 and 1 significant figure if the CTL is <1. Analytical results should be rounded to the same number of significant figures for comparison to the CTLs. There are simplified procedures that can be followed to arrive at the correct number of significant figures:

- Example 1: The CTL is 10 or greater. The analytical value should be rounded to 2 significant figures. A practical way to achieve the correct number of significant digits is to round the second digit from the left. The remaining digits to the right are zeros and nothing goes past the decimal point.

Analytical value (any units)	Rounded (any units)
1**5**,479	15,000
2,**4**56	2,500
3**4**.58	35
5**2**9.44	530

- Example 2: The CTL is greater than 1.0, but less than 10. The analytical value should still be rounded to two significant figures, but now there is one significant figure on each side of the decimal point. When the analytical value is 9.95 or greater, it will round to 10. For this special case, no decimal is placed after the 10 to maintain the same number of significant figures.

Analytical value (any units)	Rounded (any units)
7.535	7.5
5.59	5.6
1.50	1.5
9.97	10

- Example 3: The CTL is less than 1.0. The analytical value should be rounded to 1 significant figure. A practical way to achieve the correct number of significant digits is to round the first non-zero digit to the right of the decimal point. When the analytical value is 0.95 or greater, it will round to 1. For this special case, no decimal is placed after the 1 to maintain the same number of significant figures.

Analytical value (any units)	Rounded (any units)
0.**1**86	0.2
0.00000**4**	0.000004
0.0**4**875	0.05
0.00**5**0	0.005
0.00**1**5	0.002
0.**9**75	1

The CTLs that are *standards* are rounded to the same number of significant digits as the standards.

- Example 4: The CTL is a standard. The number of significant figures should always match the standard. Rounding rules for standards are important to follow since use of the above rounding rules may result in different conclusions. For example, suppose an analytical value of 5.46 needs to be compared to a standard of 5. Using the above rounding rules results in a value of 5.5, which exceeds the standard of 5. However, rounding to the same number of digits as the standard results in an analytical value of 5, which meets the standard.

Analytical value (any units)	Standard (any units)	Rounded (any units)
5.75	5	6
5.46	5	5
0.259	0.25	0.26
10.54	10.5	10.5

Please let me know if you have any questions regarding this updated guidance.

Sincerely,

Leah D. Stuchal, Ph.D.

References:

FDEP (2011) *Rounding Analytical Data for Site Rehabilitation Completion.* Florida Department of Environmental Protection Memorandum, November 17, 2011, Division of Waste Management, Tallahassee, Florida.