



Office of Drinking Water (ODW) Guidance: How to report levels of detected contaminants in your Consumer Confidence Report (CCR)

The purpose of this document is to explain how to list contaminant detection data in your CCR table(s). The reason for this document is to achieve CCR tables that reflect accurate numerical results based on EPA guidance on significant digits and rounding-off laboratory data. This will result in a CCR with data tables that are easier for the public to read.

One key element in the CCR is the water quality data table. The water quality data tables must contain both regulated contaminant data and unregulated contaminant data for which EPA and the state requires monitoring under federal and state regulations.

Reporting CCR Data from Drinking Water Watch

ODW reviews all CCRs based on data from Delaware’s Drinking Water Watch (DWW): <https://drinkingwater.dhss.delaware.gov/>. The data generated is in the form of a table similar to the example CCR table below:

| Inorganic Contaminants | Collection Date | Highest Level Detected | Range of Levels Detected | MCLG | MCL | Units | Violation | Likely source of contamination |
|------------------------|-----------------|------------------------|--------------------------|------|-----|-------|-----------|--------------------------------|
| Barium | 2019 | 0.222 | 0-0.222 | 2 | 2 | ppm | N | |
| Chromium | 2019 | 7 | 0-7 | 100 | 100 | ppb | N | |
| Fluoride | 2019 | 1.1 | 0-1.21 | 2.0 | 2.0 | ppm | N | |
| Mercury | 2019 | 0.8 | 0-0.8 | 2 | 2 | ppb | N | |

In reference to the table above, note two important columns: the range of levels detected column and the highest level detected column. These columns contain the information needed in the CCR, but the data listed in the table does not conform to the EPA’s guidance on significant digits and rounding.

Significant Digits

Note that the Maximum Contaminant Level (MCL¹) for mercury is 2 ppb, a whole number greater than zero (a number that does not have decimal places). In other words, the MCL for mercury is 2 ppb and not 2.0 ppb. When a mercury data point is listed in the CCR table, it must be listed as a whole number in the same units as the MCL (see rounding below).

Rounding

Note that the range of levels detected for mercury was 0-0.8 ppb. Since the MCL for mercury does not include digits beyond the decimal point, you must round the detected level of 0.8 ppb to 1, the nearest whole number.

How to Round Numbers² (also see illustration on next page)

Rounding numbers is accomplished by dropping digits that are not significant. In the mercury example, we need to round 0.8 to the nearest whole number by dropping the number after the decimal point. To round a number, the last significant digit should be increased by one unit if the digit dropped is 5, 6, 7, 8, or 9. If the digit dropped is 0, 1, 2, 3, or 4, do not change the last significant digit. In this mercury example, the last significant digit is a whole number greater than zero, so we round 0.8 to 1 ppb. The CCR table should list the mercury data as 1 ppb.

Using Drinking Water Watch Data in the CCR Table

Compare the two tables below to determine how to use rounding and significant digits when creating the CCR data table.

This table was generated from DWW:

| Inorganic Contaminants | Collection Date | Highest Level Detected | Range of Levels Detected | MCLG | MCL | Units | Violation | Likely source of contamination |
|------------------------|-----------------|------------------------|--------------------------|------|-----|-------|-----------|--------------------------------|
| Barium | 2019 | 0.222 | 0-0.222 | 2 | 2 | ppm | N | |
| Chromium | 2019 | 7 | 0-7 | 100 | 100 | ppb | N | |
| Fluoride | 2019 | 1.1 | 0-1.21 | 2.0 | 2.0 | ppm | N | |
| Mercury | 2019 | 0.8 | 0-0.8 | 2 | 2 | ppb | N | |

This table uses the data in the above table to create the CCR data table:

| Inorganic Contaminants | Collection Date | Highest Level Detected | Range of Levels Detected | MCLG | MCL | Units | Violation | Likely source of contamination |
|------------------------|-----------------|------------------------|--------------------------|------|-----|-------|-----------|--------------------------------|
| Chromium | 2019 | 7 | 0-7 | 100 | 100 | ppb | N | |
| Fluoride | 2019 | 1.2 | 0-1.2 | 2.0 | 2.0 | ppm | N | |
| Mercury | 2019 | 1 | 0-1 | 2 | 2 | ppb | N | |

Note that the CCR data table above does not include barium, a contaminant listed in the DWW table. The reason barium is not included in the CCR data table is because the MCL is a whole number greater than zero, and the data range was 0-0.222 ppm which rounds to zero.

Other Rounding Examples

1. Nitrate has an MCL of 10 ppm. If the DWW table lists nitrate at 7.94 ppm, the CCR table should list nitrate at 8 ppm.
2. Nitrate has an MCL of 10 ppm. If the DWW table lists nitrate at 7.49 ppm, the CCR table should list nitrate at 7 ppm. In this case, 7 is the last significant digit. The number before the last significant digit is 4. Rounding rules mean we drop the number 4 by rounding, in this case we round down. Note that we only round numbers before the last significant digit.
3. Copper has an Action Level of 1.3 ppm. If the DWW table lists copper at 0.479 ppm, the CCR table should list copper at 0.5 ppm.
4. Copper has an Action Level of 1.3 ppm. If the DWW table lists copper at 0.449 ppm, the CCR table should list copper at 0.4 ppm.

Rounding Illustration

Nitrate MCL is 10 ppm

this is the last significant digit

two significant digits

round this number down to zero

drop this number, do not round this number up

Nitrate detection was 7.49 ppm, so the CCR result is 7 ppm

this is the last significant digit

Summary

The concept of rounding and significant digits may seem complicated at first. However, it can be summed up in the following: most CCR MCLs are whole numbers, so the data result that you list in your CCR must also be a whole number. If the MCL or AL (action level) has a number past the decimal point, then your CCR result must also have a number with an equal number of places past the decimal point.

References

¹MCL – The MCL units as listed in the National Primary Drinking Water Regulations (NPDWR) are in mg/L. The MCL for chromium is 0.1 mg/L. However, EPA rules state that the MCL in the CCR must be reported “as a number greater than or equal to one and the level detected must be expressed in the same units.” See EPA guidance (page 10) on converting NPDWR MCLs to CCR MCLs:

<https://dhss.delaware.gov/dhss/dph/hsp/files/odwccrprep.pdf>

²EPA memorandum: *Procedures for Rounding-Off Analytical Data to Determine Compliance with Maximum Contaminant Levels Present in NIPDWR*, WSG-20, April 6, 1981.