

GROUNDWATER DISCHARGE - REPORTING RESULTS BELOW QUANTIFICATION

GUIDANCE FOR PERMITTEES

INTRODUCTION

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) has developed this document to advise permittees how to use results that are less than quantification levels (QLs) to calculate and/or report daily concentrations, 7-day averages, and monthly averages.

For purposes of Groundwater Discharge Permit (GDP) compliance reporting, EGLE defines QL as follows:

Quantification Level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

EGLE acknowledges that different laboratories may use alternate terms to refer to the same or a functionally equivalent concept as defined above. Laboratories may, for example, use ND, for 'Non-Detect,' or they may use RL, for 'Reporting Level.' EGLE uses the term 'quantification level' in the GDP, and this is the term that will be referenced in this document.

If you have results that are less than the quantification levels and you need to calculate daily values or various averages, compliance with your GDP requires that you use the QLs themselves as the values in your calculations and then report less than that calculated result. For example, use "1" in your calculations when individual results are "<1 ct/100 ml" or "<1 ug/l." **You should use the QL actually reported by your laboratory for the parameter/sample result in question.**

Any calculation made with at least one sample result below quantification shall be reported as less than the calculated value X (i.e., "<X"). For 7-day or monthly averages, use the Daily values for your calculations, using the numerical values for any results less than QL but then report the final result as less than the calculated value.

As you review the examples on the following pages, keep in mind the three key scenarios you may encounter: 1) Your laboratory has reported results to you *below an acceptable QL*, 2) Your laboratory has reported results to you *at or above an acceptable QL*; and 3) Your laboratory has reported results to you *below an unacceptable QL*.

See the Effluent and Groundwater Characterization Water Reporting Limits and Analytical Methods at [Michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Groundwater-Discharge/groundwater-Reporting-Limits-and-Analytical-Methods.pdf](https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Groundwater-Discharge/groundwater-Reporting-Limits-and-Analytical-Methods.pdf) for a current list of EGLE's maximum acceptable QL for selected parameters. QLs are referred to as "Water Reporting Limits" in this document.

EXAMPLES



Daily Reporting When No Calculation is Necessary

Although Chloride is used in the following three examples, the same approach applies to any pollutant for which EGLE specifies a maximum acceptable QL and for which no calculation is necessary for DMR reporting.

In the following three examples, your GDP permit requires monitoring and reporting for Chloride. You should check the Effluent and Groundwater Characterization Water Reporting Limits and Analytical Methods at [Michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Groundwater-Discharge/groundwater-Reporting-Limits-and-Analytical-Methods.pdf](https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Groundwater-Discharge/groundwater-Reporting-Limits-and-Analytical-Methods.pdf) to see that EGLE specifies a “Water Reporting Limit” or maximum QL of 1.0 mg/l for GDP compliance reporting for Chloride.

1. Result Below Acceptable QL

Your laboratory reports to you the following sample result:

Analyte	Analytical Result	Reporting Level	Unit
Chloride	ND	1.0	mg/l

Report “<1.0” mg/l Chloride on the DMR Daily tab.

2. Result at or above Acceptable QL

Your laboratory reports to you the following sample result:

Analyte	Analytical Result	Reporting Level	Unit
Chloride	1.0	1.0	mg/l

Report “1.0” mg/l Chloride on the DMR Daily tab.

3. Result Below Unacceptable QL.

Your laboratory reports to you the following sample result:

Analyte	Analytical Result	Reporting Level	Unit
Chloride	<3.0	3.0	mg/l

Report “<3.0” mg/l Chloride on the DMR Daily tab.

NOTE: In this example your lab has used an unacceptable QL. It is unacceptable because it is higher than the maximum allowable QL of 1.0 mg/l specified by EGLE. A comment should be added in [MiEnviro](#) acknowledging the error.



Daily Reporting When a Calculation IS Necessary

Total Inorganic Nitrogen (TIN) daily concentration:

One grab sample is taken in a day and the analytical results are as follows: Nitrate 9.0 mg/l, Ammonia 1.5 mg/l, Nitrite <0.5 mg/l. Calculate the daily TIN concentration as follows:

$$9.0 \text{ mg/l} + 1.5 \text{ mg/l} + 0.5 \text{ mg/l} = 11 \text{ mg/l}$$

Report “**<11.0**” mg/l TIN on the DMR Daily tab.

Daily Loadings:

Multiply the daily concentration (in mg/l) by the total daily flow and the appropriate conversion factor. For a daily concentration below quantification, use the numerical portion of the daily concentration to calculate the loading and report less than the result. If the daily concentration of Total Phosphorus is <10 ug/l and total daily flow is 0.5 MGD, you would multiply the numeric portion of the concentration (in mg/l) x flow (MGD) x 8.34 (conversion factor) to obtain daily loading in pounds per day (lb/day) as follows:

$$0.01 \text{ mg/l} \times 8.34 \times 0.5 \text{ MGD} = 0.0417 \text{ lbs/day}$$

Report “**<0.042**” lbs/day on the DMR Daily tab (rounded result).



7-Day and Monthly Average Calculations

TIN monthly average:

Use TIN daily concentration results to calculate the Monthly Average. If weekly monitoring shows results of <50 ug/l, <10 ug/l, <10 ug/l, and <50 ug/l for daily concentrations of TIN, calculate as follows:

$$\frac{50 \text{ ug/l} + 10 \text{ ug/l} + 10 \text{ ug/l} + 50 \text{ ug/l}}{4} = 30 \text{ ug/l}$$

Report as “**<30**” ug/l on the DMR Summary tab.

Total Phosphorus monthly average:

Use the Total Phosphorus values to calculate the monthly average. If weekly monitoring shows results of <0.01 mg/l, 1.0 mg/l, 0.7 mg/l, and 0.8 mg/l, calculate as follows:

$$\frac{0.01 \text{ mg/l} + 1 \text{ mg/l} + 0.7 \text{ mg/l} + 0.8 \text{ mg/l}}{4} = 0.6 \text{ mg/l}$$

Report “**<0.6” mg/l** on the DMR Summary tab.

For 7-day averages with daily concentrations that are less than the QL, calculate using the QL as the value and report less than the calculated result.

Note that when monitoring is done only once each month, the monthly average concentration will be the same as the daily concentration since that one sample represents the entire month. For example, one sample of TIN is taken in a month. The daily value is calculated and reported as “<50” ug/l. The monthly average would also be reported as “<50” ug/l because 50 divided by 1 (sample collected) equals 50.

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