



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DISCHARGE MONITORING REPORTS

Overview and Summary

Bureau of Point and Non-Point Source Management

For more information, visit www.dep.state.pa.us,

keyword: Wastewater Information

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Discharge Monitoring Reports – General Information

What are Discharge Monitoring Reports?

Discharge Monitoring Reports (DMRs) are reports that contain the results of self-monitoring for wastewater required by National Pollutant Discharge Elimination System (NPDES) permits and some Water Quality Management (WQM) permits. These reports are completed and submitted periodically to the Department of Environmental Protection (DEP) and other agencies (typically monthly, quarterly, semi-annually or annually). DMRs may be submitted on paper or electronically through DEP's website (see www.dep.state.pa.us/edmr). General information supplied in this document applies to both paper and electronic DMR reporting.

Who must submit DMRs?

Any facility that has been issued an NPDES permit that requires sampling and monitoring. Typically this includes sewage treatment plants and industrial facilities with a wastewater or storm water discharge to surface waters. DMRs may also be required for WQM permits with land application of effluent.

Where are DMRs submitted?

Paper DMRs must be submitted to the DEP Regional Office that issued the permit. In some cases, permits may also require submission to the U.S. Environmental Protection Agency (EPA), river basin commissions and county health departments. Electronic DMRs are submitted through a centralized web application for DEP review.

When are DMRs due?

In most cases, DMRs for NPDES permits must be received by DEP's Regional Office by the 28th day of the month following the monitoring period. For example, the September DMR must be received in DEP's Regional Office by October 28. Different due dates may apply for WQM permits.

What if a DMR is submitted late?

It is a violation of the permit if a DMR is not received by the required due date. If a DMR is submitted late, the operator should include an explanation for the late submittal either in the "Comments" section on the DMR or on a separate sheet of paper sent with the DMR. DEP may take escalating compliance actions to deal with chronic late submissions. The action could result in penalties or revocation of the permit.

Is it a violation if DMRs are not submitted?

Yes, failure to submit DMRs is a violation of the permit and state and federal law and is considered a "significant violation."

Do DMRs have to be signed, and by whom?

Yes. DMRs must be signed by a "Principal Executive Officer or an Authorized Agent as designated by the Principal Executive Officer as required by the permit." This is a person who can verify that the data being submitted are true and correct and were collected in accordance with the permit conditions. All DMRs submitted to DEP should contain original signatures in ink (except those submitting electronic DMRs, where a personal identification number is used). Signing a DMR that contains fraudulent data is a violation of both federal and state law and can result in severe penalties including fines, imprisonment and revocation of an operator's license.

May computer-generated DMRs be used?

DEP may allow submission of computer-generated DMRs. First send a blank copy of the computer-generated DMR to DEP and, if you receive EPA DMRs, to EPA for approval before a formal submission. Permits often require the submission of additional reports beyond the DMR. Computer-generated supplemental reports may be used if the content and formatting matches that of the paper forms that accompanied the permit.

What if there were no discharges from the facility for the monitoring period? Does the DMR need to be sent if a sample could not be collected?

Yes. Submission of DMRs must adhere to the reporting requirements and frequency listed in the permit. If there was no discharge for the reporting period, simply write “No Discharge” on the top of paper DMRs (also be sure to sign and date it), or check the “No Discharge” box if reporting electronically.

Must all samples taken of the plant’s effluent be submitted on the DMR?

All samples collected at compliance monitoring locations and analyzed using an EPA or DEP approved method by a laboratory accredited by or registered with DEP (25 Pa. Code Chapter 252) for parameters listed in the permit must be reported on the DMR, even if these exceed the number required by the permit. For example, if the permit requires two Fecal Coliform samples per month and the operator has three analyzed, all three must be reported.

What if there is a violation of my permitted effluent limitations?

Identify the violations and provide an explanation of what caused the violations and how the facility is correcting the situation that caused the violations on DEP’s Non-Compliance Reporting Form (3800-FM-BPNPSM0440). Submit the form as an attachment to the DMR. Report the sum of all violations for each parameter in the “NO EX” (Number of Excursions or Exceedances) column of the DMR.

What types of values are typically reported on DMRs?

Permits generally include limitations (limits) on the concentration or amount of pollutants that can be discharged to waters of the commonwealth. Limits represent the minimum or maximum concentration or amount that may be discharged over a specific period of time. Statistics are used to derive limits and DMR values. “Statistical base code” is the term used to determine how statistical values are computed. Below are common statistical base codes and general definitions:

- Monthly average – also referred to as “average monthly,” this is the arithmetic mean of all results over a calendar month for a specific pollutant.
- Weekly average – also referred to as “average weekly,” this is the arithmetic mean of all results over a calendar week, from Sunday through Saturday, for a specific pollutant. Generally the maximum weekly average value is reported on DMRs.
- Maximum daily – also referred to as “daily maximum,” this is the highest daily or highest daily average result for a specific pollutant over the entire reporting period covered by a DMR.
- Instantaneous maximum – also referred to as “IMAX” or just “maximum,” this is the maximum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR – the value may differ from the maximum daily result if more than one sample is collected daily.
- Instantaneous minimum – also referred to as just “minimum,” this is the minimum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR.
- Geometric mean – this is the average of a set of n sample results given by the n^{th} root of their product, used most often for bacteria limits and results.

Who should be contacted if there are any questions or if there is a mistake on a submitted DMR?

If there are questions about filling out a DMR, correcting a previously submitted DMR or on how to make calculations for your DMR, contact the Clean Water Program, Operations Section, of the regional DEP office that issued the permit. If there are questions on DMRs received from EPA, contact DEP’s Central Office at 717-787-6744. Both paper and electronic DMRs can be revised after a submission is made. DEP regional contact numbers are as follows:

Southeast Region – (484) 250-5970
Northeast Region – (570) 826-2553
Southcentral Region – (717) 705-4707

Northcentral Region – (570) 327-0532
Southwest Region – (412) 442-4060
Northwest Region – (814) 332-6942

Discharge Monitoring Reports – Calculations

The following text answers some common questions about calculating values to report on Discharge Monitoring Reports (DMRs) for National Pollutant Discharge Elimination System (NPDES) permits and some Water Quality Management (WQM) permits. This information applies to both paper and electronic DMRs (www.dep.state.pa.us/edmr).

How is the geometric mean calculated for reporting Fecal Coliform results?

A geometric mean is obtained by calculating the n^{th} root of the product of a group of n values. Use the following equation:

$$\sqrt[n]{X_1 \cdot X_2 \cdot X_3 \cdot X_4 \cdot \dots \cdot X_n}$$

Where n = number of analysis results and X = value of each analytical result. Note: If any value of X is zero, substitute “1” for the calculation.

For example, five samples were analyzed; their results were 20, 300, 400, 500, and 0.

$$\sqrt[5]{20 \cdot 300 \cdot 400 \cdot 500 \cdot 1} = \sqrt[5]{1,200,000,000} = (1,200,000,000)^{1/5} = 65$$

Report all “non-detect” (e.g., < 2) and “too numerous to count” (TNTC) (e.g., > 2,000) results on DMR supplemental forms as reported by the laboratory. Do not report “TNTC” on supplemental forms, but instead report a value qualified with the “>” symbol. Where a data set includes one or more “non-detect” and/or TNTC results, calculate the geometric mean by ignoring qualifying symbols, but report the value with the symbol. If a data set includes both “>” and “<” qualifiers, the “>” qualifier takes precedence for reporting. For all “non-detect” values, specify in the comments section of the DMR the maximum volume filtered at the laboratory.

Example 1 – Four results are determined, < 2, 10, 20, and 30. The geometric mean should be reported as $(2 \cdot 10 \cdot 20 \cdot 30)^{0.25} = < 10$. Specify the maximum volume filtered for the < 2 result in the DMR comments.

Example 2 – Three results are determined, < 2, 1,000, and > 2,000. The geometric mean should be reported as $(2 \cdot 1,000 \cdot 2,000)^{0.333} = > 158$.

How is the weekly average calculated for reporting on DMRs?

A weekly average is calculated by the sum of all daily discharges (concentrations or loads) measured during a calendar week (Sunday – Saturday) divided by the number of daily discharges measured during that week. Unless otherwise specified in the permit, report the maximum weekly average value on DMRs.

Months do not always begin on a Sunday and end on a Saturday – how should weekly average values account for this?

Weekly average values are based on a calendar week of Sunday to Saturday. The first week of the month, for reporting purposes, always begins on a Sunday, and the last week of the month always ends on a Saturday. When a week is split between two months, the weekly average value for that week will be reported with the month containing the most days of that week.

Example – April 2009. April 1 is a Wednesday. The first week of April would include, for the purpose of calculating weekly averages, Sunday, March 29, Monday, March 30 and Tuesday, March 31. April 30 is a Thursday. The last week of April would include Friday, May 1 and Saturday, May 2. Therefore, five weeks would be considered for April 2009: March 29 – April 4 (Week 1), April 5 – 11 (Week 2), April 12 – 18 (Week 3), April 19 – 25 (Week 4) and April 26 – May 2 (Week 5).

How is the monthly average calculated for reporting on DMRs?

A monthly average is calculated by the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during the month. All samples collected during the month must be included in the calculation.

How is the average mass load calculated in terms of pounds (lbs) per day?

Calculate the daily load in lbs/day by multiplying the average concentration of the parameter (in mg/l) on one day by the average flow (in million gallons per day) on the same day and a conversion factor of 8.34. Then sum the daily loads during the reporting period (e.g., month) and divide by the number of daily loads in that period (number of samples). For example, a facility is required to collect two samples per month for Total Suspended Solids (TSS) analysis and report the average monthly load. If the concentration of TSS is 10 mg/l in one sample and the average flow on the day of sampling is 1.0 MGD, the daily load is 83.4 lbs/day (10 mg/l x 1.0 MGD x 8.34). If the concentration of TSS is < 2.0 mg/l (non-detect) in the second sample and the average flow on the day of sampling is 1.0 MGD, the daily load is < 16.7 lbs/day (2.0 mg/l x 1.0 MGD x 8.34, and use the < symbol for the statistical result). The average monthly load is < 50.1 lbs/day ((83.4 lbs/day + 16.7 lbs/day) / 2, and use the < symbol for the statistical result). For calculating an average weekly load, sum the measured daily loads during the week (Sunday – Saturday) and divide by the number of daily loads for the week.

How is the total mass load calculated in terms of lbs?

Some permits require facilities to report the total load, which is different than the average load. To calculate the total load for a month, sum the daily loads (daily concentration x daily flow x 8.34) for the month, then divide by the number of measured loads, and then multiply by the number of days in the month. For example, if four weekly samples are collected during the month of May and the daily loads are determined to be 100 lbs/day, 125 lbs/day, 150 lbs/day and 175 lbs/day, the total load would be 4,262.5 lbs ((100 + 125 + 150 + 175) / 4 x 31 days).

How should results below detection limits be reported and how are statistical values with a data set that includes non-detect results calculated?

Laboratories will generally have, for most parameters, a Quantitation Limit (QL) and a Detection Limit (DL). *Detection Limit* is defined in 25 Pa. Code Chapter 252 (Environmental Laboratory Accreditation) as “The lowest concentration or amount of the target analyte that can be identified, measured and reported with confidence that the analyte concentration is not zero.” *Quantitation Limit* is defined in Chapter 252 as “The minimum concentration or activity of the component, compound, element or isotope that can be reported with a specified degree of confidence. Typically it is the concentration that produces a signal ten standard deviations above the reagent water blank signal.” The QL is typically a higher value than the DL. The QL is sometimes referred to as the “reporting limit.”

If you receive a report with a parameter value listed as “non-detect”, “ND”, or is qualified by a less than (<) symbol, it indicates that the laboratory has verified that the parameter value is less than the QL, and is reporting the value as a “non-detect” result. For DMR reporting purposes, DEP prefers the following approach to handling non-detect results:

1. Report the actual value reported by the laboratory on supplemental reporting forms.

Example – enter “<” into the Qualifier (Q) column of the Daily Effluent Monitoring Form (3800-FM-BPNPSM0435) for non-detect results. Do not enter “<” on this form for detected results.

2. Do not report zeroes or “non-detect” for statistical values on the DMR.

Example – use the less than (<) symbol on DMRs instead of “0” or “ND”.

3. Ignore the less than (<) symbol and calculate statistics (both concentration and load) based on detected results and the reporting limit(s) for non-detect results, except as noted in No. 4, below, where zero may be substituted for non-detect results. Where there is at least one non-detect result in a data set, include the less than (<) symbol with the statistical result.

Example – the average statistical value for a data set with three results, < 1.0, 2.0, and < 3.0 is < 2.0 for DMR reporting purposes.

4. If your permit contains a water quality based limit that is less than the most sensitive DL, as published in 25 Pa. Code Chapter 16 (Appendix A, Tables 2A and 2B), and you receive a result of non-detect in which the reporting limit is less than or equal to the most sensitive DL, zero may be substituted for the

reporting limit when calculating statistics in a mixed data set (i.e., some non-detect and some detected results).

Example – a permit contains a limit of 1 µg/l for a parameter. The minimum published DL for the parameter in Chapter 16 is 2 µg/l. Two results are received from the laboratory - < 2 µg/l and 2 µg/l. The average statistical value is 1 µg/l (i.e., < 2 µg/l is treated as zero for the calculation).

5. For reporting average values where you have all non-detect (<) results, report the result in this format on the DMR: “< QL” (where QL is the actual value reported by the laboratory). If the QL varies between samples, use the average QL for the period.

Example – the average statistical value for a data set with three results, < 1.0, < 2.0, and < 3.0 is < 2.0 for DMR reporting purposes.

6. For reporting maximum daily values on DMRs, report the maximum detected value for the period. If there are no detected values, report the highest QL for the period, in this format: “< QL”.

Example – the maximum daily statistical value for a data set with three results, < 1.0, 2.0, and < 3.0 is < 3.0 for DMR reporting purposes.

This approach is a statement of preference rather than a regulatory requirement. If the permit requires otherwise, adhere to permit requirements. See “Management of Non-Detect Results for Discharge Monitoring Reports” (3800-FS-DEP4262) for additional information.

How are concentrations and loads calculated for Total Nitrogen?

The concentration of Total Nitrogen (TN) in a sample is determined by the sum of concentration results for Nitrite-Nitrogen (NO₂-N), Nitrate-Nitrogen (NO₃-N) and Total Kjeldahl Nitrogen (TKN) (measured in the same sample). Where one of the components of TN has a result of non-detect, ignore the less than (<) symbol for the calculation, but include it in statistical results. It is noted that for the purpose of certifying and verifying TN credits under PA’s Nutrient Trading Program (see 25 Pa. Code § 96.8), credits will be calculated using the difference between actual performance (i.e., DMR data) and permit limitations, where the less than (<) symbol for Total Monthly loads is ignored.

Example – A permit requires that two samples be collected per month for TN. The permit requires that the Total Monthly load be reported on the DMR. Sample 1 is collected on a day in June in which the average flow is 0.5 MGD. Sample 1 is analyzed and the following results are obtained: NO₂-N + NO₃-N = < 1.0 mg/l, TKN = 10 mg/l. Sample 2 is collected on a different day in June in which the average flow is 0.6 MGD. Sample 2 is analyzed and the following results are obtained: NO₂-N + NO₃-N = 2.0 mg/l, TKN = < 5.0 mg/l.

The relevant statistical values for TN are as follows:

Sample 1 Concentration: < 11.0 mg/l (< 1.0 mg/l + 10 mg/l)

Sample 1 Load: < 45.9 lbs/day (< 11.0 mg/l x 0.5 MGD x 8.34)

Sample 2 Concentration: < 7.0 mg/l (2.0 mg/l + < 5.0 mg/l)

Sample 2 Load: < 35 lbs/day (< 7.0 mg/l x 0.6 MGD x 8.34)

Average Monthly Concentration: < 9.0 mg/l ((11.0 mg/l + 7.0 mg/l) / 2, use the < symbol)

Total Monthly Load: < 1,214 lbs (((< 45.9 lbs/day + < 35 lbs/day) / 2) x 30 days in June)

Discharge Monitoring Reports – How to Complete DMRs

The following text answers some common questions about completing NPDES permits and some WQM permits. This information applies to both paper and electronic DMRs (www.dep.state.pa.us/edmr).

Which forms should be used?

DEP will attach paper DMRs to the permit. Use these DMRs as the “Master,” and make copies for ongoing completion and submission. If the facility is considered a “Major” discharger, within a short period of time the Master DMRs will be received in the mail from EPA, unless the facility participates in DEP’s electronic DMR (eDMR) system. When Master DMRs are received from EPA, begin using them immediately, and cease use of DEP-issued DMRs. If you elect to participate in eDMR, there is no need to send paper DMRs or supplemental reporting forms to either DEP or EPA. Facilities are encouraged to check all forms for accuracy and contact DEP if mistakes are found.

Where is information and data entered on paper DMR forms?

Complete all header information, including permittee name and address, facility name and location, permit number, discharge (outfall) number, monitoring period begin and end dates and other information that may be requested. This information is often pre-populated by DEP or EPA. Below is an example of a DMR:

Parameter		Quantity or Loading			Quality or Concentration			
		Average	Maximum	Units	Avg Monthly	Max Daily	Instantaneous Max	Units
Flow	Sample Measurement	0.5	****	MGD	****	****	****	****
	Permit Requirement	Report Avg Monthly	****		****	****	****	
Benzene	Sample Measurement	****	****	****	< 0.001	****	0.002	mg/L
	Permit Requirement	****	****		0.001	****	0.0025	

Data are expected in any blank space that is not filled in with asterisks (or XXX). Do not leave spaces blank unless there was no discharge from the outfall for the entire reporting period. Note that column headers will often vary. For example, EPA Master DMRs use the word “VALUE” instead of statistical descriptions. Also be sure to complete the No. Ex, Frequency of Analysis and Sample Type columns, as shown on the right. At the bottom of the form, the person authorized to submit the DMR should type or print his or her name, sign the form, type or print his or her telephone number, date the form and include any comments.

No. Ex	Frequency of Analysis	Sample Type
0	2/month	Measure
	2/month	Measure
0	2/month	Grab
	2/month	Grab

What information should be included in the Comments Section at the bottom of DMRs?

The area provided for comments on the form is small, and there is little room to explain violations or other relevant information. Write a brief summary of violations in this section; however, DEP requests that all violations during the monitoring period be reported in more detail on DEP’s Non-Compliance Reporting Form (3800-FM-BPNPSM0440) and be submitted as an attachment to the DMR. Listing and/or explaining violations in the Comments Section of the DMR is optional, but whether or not this is done, DEP requests completion of the Non-Compliance Reporting Form. Other uses of the Comments Section include explanations of attachments to the DMR, explanations for the unavailability of data and brief summaries of issues that have affected operations or effluent quality during the monitoring period. Always consider attaching a letter or separate document to explain your situation in more detail.

How should statistical values be rounded for reporting purposes?

Statistical values reported on the DMR should be rounded to the same number of decimal places as the limit for the parameter as set forth in the permit. If the permit does not contain a limit but requests monitoring only, statistical values for concentration results should be rounded to the maximum number of decimal places in the data set as reported by the laboratory or the instrument used for analysis. If mass loads must be reported and there is no limit, round statistical values to the nearest whole number, unless the calculated

number is less than one, in which case the value should be rounded to one significant figure (e.g., 0.1, 0.05, etc.). If the number being rounded is followed by 5, 6, 7, 8, or 9, round the number up, otherwise round down.

Example 1 – A permit includes an average monthly limit of 3.0 mg/l for Ammonia-Nitrogen with weekly monitoring. The results for a monitoring period are 2.10 mg/l, 3.52 mg/l, 2.71 mg/l, and 3.56 mg/l. The average value is 2.9725 mg/l. The result should be “rounded up” and reported as 3.0 mg/l on the DMR to match the number of decimal places in the permit limit. If there was no permit limit, the result should be reported as 2.97 mg/l, since two decimal places were reported by the laboratory.

Example 2 – A permit includes an average monthly mass loading limit of 100 lbs/day for TSS with 2/month monitoring. The TSS concentration results for a monitoring period are 15 mg/l and 5 mg/l, with average flows on the days of sampling of 1.0 MGD and 1.5 MGD, respectively. The mass load for the first sample is 125.1 lbs/day, and the load for the second sample is 62.55 lbs/day. The average of the two mass loads is 93.825 lbs/day. Report the value 94 lbs/day on the DMR since the limit is written as a whole number.

How do is the number of excursions (NO EX) determined?

“NO EX” (or “No. Ex”) means “number of excursions” from or “number of exceedances” of effluent limitations. In the NO EX column you should report, for each parameter, the total number of reported values that exceed permit limitations. If there are not limits in the permit for a parameter, indicate zero (0) in the NO EX column for that parameter.

Example 1 – pH is monitored daily during a 30-day monitoring period. On one day a value less than the minimum pH limit of 6.0 SU was measured. On two days values greater than maximum pH limit of 9.0 were measured. Since both the minimum and maximum limits were exceeded, indicate “2” in the NO EX column.

Example 2 – A permit includes average monthly, maximum daily and instantaneous maximum (IMAX) limits of 15 mg/l, 20 mg/l and 30 mg/l, respectively, for Oil and Grease, with weekly monitoring. The following results are obtained for the month: 10 mg/l, 15 mg/l, 25 mg/l and 40 mg/l. The average monthly value is 22.5 mg/l. Report “3” in the NO EX column, since all limits were exceeded.

What should be done if there was no discharge from an outfall or no discharge of a specific pollutant?

If there was no discharge at all from an outfall during the monitoring period, check the “NO Discharge” box (if available) or write “No Discharge” on the top of paper DMRs. Complete the information above and below the table and mail the DMR to the appropriate agency(ies). Be sure to sign and date the DMR.

If there was no discharge of a specific parameter, or if data are not available for a specific parameter for the entire monitoring period, do not leave the DMR blank. Instead, report one of the following No Discharge / No Data Indicator (NODI) codes that apply to your situation, and attach an explanation to the DMR:

- A** The facility is exempted from monitoring the parameter because of a General Permit condition.
- E** All samples or results are not available due to equipment failure or because sample collection was overlooked or samples could not be collected for the parameter.
- GG** If the permit requires sample collection and analysis only under certain conditions and those conditions were not met during the monitoring period.
- FF** Other: use if there is any reason for the absence of data that is not covered by those above.