



WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

Information Manual for Treatment Plant Operators

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Information Manual for Treatment Plant Operators

Prepared by:

Enforcement Workgroup
Water Quality Program
Washington State Department of Ecology

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INTRODUCTION

Why was this manual created?

What if this manual is different from what I have been guided to do?

What if I have questions?

Why do I need to read my permit?

1.0 Introduction

Why was this manual created?

This manual was prepared to help wastewater treatment plant operators complete and submit their Discharge Monitoring Reports (DMRs) (sample DMR forms in Appendix B) and other annual reports to the Department of Ecology (Ecology). Many permittees also fill out a U.S. Environmental Protection Agency (EPA) DMR. This manual is also useful for completing the EPA form, if applicable.

What if this manual is different from what I have been guided to do?

This manual is intended to complement, but not supercede, the National Pollutant Discharge Elimination System (NPDES) or state waste discharge permit or applicable regulations, which are the legal documents to which the permittee will be held responsible. If ever there is a conflict between this guidance and either the NPDES/State Waste Discharge Permit or the applicable regulations, the permit or regulations will supercede this guidance.

What if I have questions?

Questions regarding the permit, the DMR, or guidance contained in this manual should be directed to the appropriate Ecology Regional Office (see Appendix A for contact information). Some information is also available on the Ecology web site:

www.ecy.wa.gov/programs/wq/wqhome.html

Why do I need to read my permit?

Ecology cannot stress enough how important it is for every operator to read the permit issued to the plant at which they are currently working. Permits are written specifically for each type of system used to treat wastewater. There are three types of permits issued: NPDES, State Waste Discharge, and Water Reuse (sometimes referred to as Class A). Permits contain testing schedules, requirements, operational procedures, and reporting requirements.

Permits can change every time they are reissued; make sure you read all new permits carefully. If you have trouble understanding any portion of your permit, call your Ecology regional office for assistance.

Section 2: FILLING OUT A DISCHARGE MONITORING REPORT (DMR)

2.1 DMR Forms

What form do I use to submit the monitoring data I am required to collect?

What if my DMR form and permit are different?

What if I use the EPA DMR form?

Will Ecology accept a DMR that I created on my computer?

How do I get a DMR approved that I designed?

2.2 Completing DMR Heading Information

A. Monitoring Period

B. Plant Operator

C. Population

2.3 Completing Parameter Information

A. Monitoring and Parameter Location

Where does the DMR form show my monitoring location?

Where does the DMR form show which parameters I am to test?

B. Sample Measurement/Permit Requirement

Where do I enter my sample measurement on the DMR form?

Are my permit limits printed on my DMR form?

Where would I find how often I need to test for each parameter on my DMR form?

2.4 Reporting Your Results

Does it matter how the data are entered on the DMR form?

Does it matter what type of units I used to report my data?

How do I report an estimated value (flow only)?

What if I only test a parameter once, but I have to report the average and maximum daily?

What if I make a mistake on my DMR?

What if I have a no discharge of a single parameter?

What if I get a value below the detection limit?

What are the rules for reporting significant digits?

Do I round the data before I enter it onto my DMR form?

What is precision?

2.5 Signature Information

Why do the DMRs need to be signed?

A. Name/Title Principal Executive Officer or Authorized Agent

Who is authorized to sign the DMR?

B. Signature and Certification

Do all DMRs need to be signed?

If I am not the principal executive officer, may I sign the DMR?

What if I enter false information on the DMR?

2.6 Remarks Section of the DMR

What is the Remarks Section of the DMR for?

Is this where I can report the reasons for my non-compliance?

2.7 Review of Tips for Successful DMR Reporting

2.0 Filling out a Discharge Monitoring Report (DMR)

This section contains general guidance for filling out and submitting a Discharge Monitoring Report (DMR) form. Appendix B has a copy of a sample DMR.

2.1 DMR Forms

What form do I use to submit the monitoring data I am required to collect?

Use your DMR form. It contains the following information in addition to the data you provide:

- Permit Number
- Monitoring Period
- Facility Name
- County
- Receiving Water
- Name of Plant Operator in Charge
- Plant Type
- Population Served
- Permit Limits You Must Meet

What if my DMR form and permit are different?

If the parameter information on the DMR does not match your NPDES or State Waste Discharge permit, contact your Regional Office. Do not alter, line out, or highlight any preprinted items that appear on the DMR.

What if I use the EPA DMR form?

Some facilities submit an EPA DMR in addition to the Ecology DMR. The EPA DMR is a summary of results from the Ecology DMR. Just like the Ecology DMR, the Department of Ecology has pre-printed versions of this form. If a facility is required to submit an EPA form, the Department of Ecology will have or will be sending a copy of the form to the facility along with instructions on filling it out.

The General Guidance and Completion of DMR information in this document also applies to the EPA form.

A sample form and general instructions on filling out the EPA forms are included in Appendix B. For any questions pertaining to the EPA form, contact the regional office.

Will Ecology accept a DMR that I created on my computer?

Yes, Ecology will accept computer-generated DMRs as long as the permittee receives prior Ecology approval. This means that a facility can send its monitoring information on a form that it designed, provided it is approved by Ecology.

How do I get a DMR approved that I designed?

In order to get a DMR form approved, permittees must:

- Submit a formal letter to Ecology, requesting permission to use their own form.
- Send a completed copy of their Ecology DMR as well as a copy of their computer generated DMR. The permittee-generated DMR should closely resemble the Ecology DMR.

Ecology will review the form and provide input back to the facility on acceptability. Facilities cannot submit computer-generated DMRs until they have received Ecology approval. It is the facility's responsibility to account for any changes in their computer-generated DMR if the Ecology DMR form changes at all.

2.2 Completing DMR Heading Information

This section discusses the identifying information of the permitted facility. See Appendix B for a sample DMR with specific areas of the form noted to align with the following sub-headings:

A. Monitoring Period

What do I enter for the Monitoring Period?

Monitoring frequency and cycle are spelled out in the permit and monitoring periods will correspond to those frequencies and cycles. If the monitoring period is for one month, you would enter the name of the month and the year.

B. Plant Operator

Who do I enter for the Plant Operator?

This is used to identify the name of principal operator or superintendent in charge and his or her certification level. Additions or changes in operators should be listed in the REMARKS section.

C. Population

What do I enter for Population Served?

Enter the number of people your collection system serves. If you have industrial/commercial contributors, enter the total number of Equivalent Residential Units if it is known.

2.3 Completing Parameter Information

See Appendix B for sample DMRs with specific areas of the form noted to align with the following sub-headings.

For the purpose of clarification, the following definitions apply:

Permit Requirement:	A limit and/or monitoring requirement imposed by a NPDES/State Waste Discharge permit.
Sample Measurement:	The value reported on the DMR for a parameter
Observed/Analytical Value:	A single observed measurement or analyzed sample result

A. Monitoring and Parameter Location

Where does the DMR form show my monitoring location?

The monitoring location is specified in the line below Plant Type and Population. Typically, this area will say Influent, Effluent, Monitoring Well, etc. If you have interim, final, or seasonal limits, be sure to use the correct DMR. The monitoring locations will correspond with the permit requirements.

Where does the DMR form show which parameters I am to test?

The parameter description is located in the open boxes along the center-top of the form. The name of the parameter is printed on the first line and the type of units on the second line of the box. These parameters will correspond with the permit requirements.

B. Sample Measurement/Permit Requirement

Where do I enter my sample measurement on the DMR form?

The Sample Measurement box and the corresponding date the sample was collected is located on the horizontal rows across the DMR form just below the Parameter row. Data must be entered in the open boxes below the Parameter and across from the date.

Are my permit limits printed on my DMR form?

Yes, your permit limits are printed in the shaded horizontal boxes labeled Permit Limits. These are located at the bottom of the form.

Where would I find how often I need to test for each parameter on my DMR form?

Usually the line just above the parameters reflects the frequency with which samples are to be taken. A written explanation must be attached to the DMR if the actual frequency of analysis is different from that specified in the permit.

2.4 Reporting Your Results

Does it matter how the data is entered on the DMR form?

Yes it does. Data must be entered by using the following guidelines:

- Data must be typed, written in blue or black ink, or computer printed. **Entries in pencil will not be accepted.**
- Data must be reported in the **same units** as required by the NPDES/State Waste Discharge permit and as on the DMR.
- Do not enter the reporting units, commas, or comments, etc., in the Sample Measurement boxes.
- All violations of the permit limits should be circled. An explanation of the cause or possible causes of the violations and the corrective action you are taking should be included in the REMARKS section of the DMR, on the back of the DMR, or on a separate piece of paper.

Example: Permit limit is 25000 GPD, actual flow is 15000 GPD.
In the Sample Measurement box enter 15000 (no comma & no units).

Does it matter what type of units I used to report my data?

Yes, data must be reported in the units required by the permit. Useful conversion information can be found in Appendix E – Conversion Tables.

Example:

Flow – the permit-required unit on the DMR is MGD (Million Gallons per Day). The measured average daily flow is 155,000 GPD (Gallons per Day). The flow data must be converted to MGD (155000/1000000) and then reported as 0.155

How do I report an estimated value (flow only)?

Use the letter E to indicate estimated value.

Example: Flow is estimated to be 150,000 GPD, permit limit is 250000 GPD.
Enter E150000 in Sample Measurement box.

What if I only test a parameter once but I have to report the average and maximum daily?

If only one sample is analyzed during a monitoring period, record that number for all the following:

- Daily minimum
- Daily average
- Daily maximum

- Thirty (30)-day average
- Seven (7)-day average

Example: Sampling is required once per month for pH. The observed/analytical value is 7.3 units.
Enter 7.3 in the Minimum and Maximum Sample Measurement boxes.

Example: Sampling is required once per month for ammonia. The observed/analytical value is 25.3 mg/L.
Enter 25.3 in the Average and Maximum Sample Measurement boxes.

What if I make a mistake on my DMR?

Cross through any corrections to the data or information entered on the DMR and associated paperwork with a single line. Record the corrected value next to it. Initial and date as close to the correction as possible. **Do not use correction fluid (whiteout).**

What if I have a no discharge of a single parameter?

If there is no discharge of a certain parameter during the entire monitoring period, enter “No Discharge” anywhere on the line in the appropriate Sample Measurement reporting box(es) area. You must also provide an explanation of the “No Discharge” notation in the REMARKS section of the DMR or attach an explanation to the DMR.

What if I get a value below the detection limit?

Unless otherwise specified in the permit, actual measured values of all analytical results obtained above the Method Detection Limit (MDL) for all monitored parameters must be recorded and reported, as required by the permit. Measured values below the MDL should be reported as less than (<) the detection limit or as directed by Ecology’s Regional Office.

What are the rules for reporting significant digits?

Regardless of the measuring device, there is always some uncertainty in a measurement. Significant digits include all the digits in a measurement that are known with certainty as well as the last digit which is an approximation.

Example Table of Parameters and their Significant Digits		
Flow (MGD)	To the Ten Thousandth	75.1200 or 0.0012
pH (SU)	To the Tenth	7.1
Chlorine (mg/L)	To the Hundredth	2.51
Chlorine (lbs/day)	To the Tenth	4.5
TSS (mg/L)	To the Tenth	158.1 or 9.8
TSS (lbs/day)	To the Hundredth	231.08
BOD (mg/L)	To the Tenth	158.1 or 9.8
BOD (lbs/day)	To the Hundredth	231.08
Fecal Coliform (#/100 ml)	Whole Number	150

Rules for Significant Figures:

1. All non-zero digits (1-9) are to be counted as significant.
2. All zeros between non-zero digits are always significant. Both 3406 and 30.02 contain four significant digits.
3. For numbers that do not contain decimal points, the trailing zeros may or may not be significant. The number 360,000 may have two to six significant digits.
4. For numbers that do contain decimal points, the trailing zeros are significant. Both 0.450 and 6.00 have three significant digits.
5. If a number is less than 1, zeros that follow the decimal point **and** are before a non-zero digit are not significant. Both 0.00123 and 0.0710 contain three significant digits.

Do I round the data before I enter it onto my DMR form?

Rounding may be necessary in order to report in the same number of significant figures as the permit limit. All calculations (*i.e.*, averaging and multiplying) are performed prior to any rounding that is done.

Rules for Rounding:

1. If the digit being dropped is 1, 2, 3, or 4, leave the preceding number as it is. 19.2 rounded to the nearest whole number, gives you 19.
2. If the digit being dropped is 6, 7, 8, or 9, increase preceding digit by one unit. 16.7 and 16.9, rounded to the nearest whole number, gives you 17 in both cases.
3. If the digit being dropped is 5, round off preceding digit to the nearest even number. 2.25 becomes 2.2 and 2.35 becomes 2.4.

What is precision?

The correct unit of measurement, sample measurements must be reported with the same degree of precision that was achieved in the analysis/measurement of the value. This means that numbers resulting from calculations cannot be more precise than the raw data used in the calculations.

Rules for Precision:

1. For addition or subtraction, the answer can contain no more decimal places than the least precise measurement. $13.681 - 0.5 = 13.181$ should be rounded off to the tenths place, with a correct answer of 13.2
2. For multiplication or division, the least number of significant digits in any of the measurements determines the number of significant digits in the answer. $2.5 \times 3.42 = 8.55$ should be rounded off to two significant digits, with a correct answer of 8.6.
3. Numbers such as conversion factors or number of days are counted as numbers and are not considered when determining the number of significant digits or decimal places in the calculation.
4. If both addition/subtraction and multiplication/division are used in a calculation, follow the rules for multiplication/division.

Example 1: Report the annual total mass loading for phosphorous. Permit limit: 3125 lbs/year

Monthly mass loadings:

$$250.2+101+135+180+159+225.9+258+237+202.5+210+246.3+236.4=2441.3$$

lbs/year

Precision rule #1 applies.

The number 3 (in the tenths place) in the result is rounded down. Leave preceding number as is. Enter 2441 in the Sample Measurement box.

Example 2: Calculate the suspended solids mass loading. Permit limit: 75 lbs/day

$$Q = .67 \text{ MGD}, C = 10.5 \text{ mg/L}$$

$$8.34 \frac{\text{lbs}}{\text{MG}} = \text{Unit conversion for weight of one gallon of water in pounds. mg/L}$$

$$Q \times C \times \text{Unit Conversion} = \text{Mass Loading}$$

$$0.67 \times 10.5 \times 8.34 = 58.6719 \text{ lbs/day}$$

Precision rule #2 applies.

The number 5 and 8 in the result are the two significant digits.

The number 6 (in the tenths place) in the result is rounded up. Increase the preceding digit by one. Enter 59 in the Sample Measurement box

Example 3: Calculate the 7-day average for ammonia.

Permit limit: 4.5 mg/L, sample four times a week

$$C = 0.56, 0.93, 2.53, 6.92 \text{ mg/L}$$

$$\frac{0.56 + 0.93 + 2.53 + 6.92}{4} = 2.735 \text{ mg/L}$$

Precision rules #3 and #4 apply (Note: the 4 in the denominator is a counted number).

The numbers 2 and 7 in the result are the two significant digits.

The number 3 (in the hundredths place) in the result is rounded down. Leave preceding number as is. Enter 2.7 in the Sample Measurement box.

Example 4: Report the 30-day average TSS. Permit limit: 22 lbs/day

Weekly averages:

$$\frac{11.71 + 6.69 + 4.52 + 3.33}{4} = 6.5625 \text{ lbs/day}$$

Precision rules #3 and #4 apply (Note: the 4 in the denominator is a counted number).

The numbers 6, 5, and 6 in the result are the three significant digits.

The number 2 (in the thousandths place) in the result is rounded down, leaving 6.56 as the result. The permit limit of 22 lbs/day requires that the result be reported to two significant digits. Round 5 up. Enter 6.6 in the Sample Measurement box.

2.5 Signature Information

Why do the DMRs need to be signed?

By signing the DMR, the principal executive officer or his/her authorized agent are acknowledging their agreement with the certification statement which states:

“I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

This certification statement is required by state and federal regulations.

A. Name/Title Principal Executive Officer or Authorized Agent

Who is authorized to sign the DMR?

Federal regulations require the DMR to be signed as follows:

- For a corporation, by a principal executive officer of at least the level of vice president;
- For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- **For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official (i.e., City Manager or Mayor).**

Send authorization in writing to the Department of Ecology. (See Appendix G for clarification of who may sign the DMR.)

B. Signature and Certification

Do all DMRs need to be signed?

Yes, all DMRs shall be signed (use *only* black or blue ink) by the person who is authorized to sign the DMR.

Each page of the DMR must have an original legible signature.

If I am not the principal executive officer, may I sign the DMR?

Yes, if the principal executive officer authorizes another person to sign the DMRs. An authorization document must be signed by the principal executive officer and submitted to Ecology's Regional Office (see Appendix A for address). Authorization documents must be submitted and approved *prior* to DMR submission. See Appendix G for authorization documents.

What if I enter false information on the DMR?

False information entered on the DMR by a permittee, or the permittee's designated representative, may be punishable as a Class C felony pursuant to RCW 9A.72.030. Falsification of a DMR by a certified wastewater treatment plant operator could result in revocation or suspension of the operator's certification pursuant to Chapter 173-230 WAC.

2.6 Remarks Section of the DMR

What is the Remarks Section of the DMR for?

This area may be used by the permittee to communicate to Ecology.

Is this where I can report the reasons for my non-compliance?

Yes, the permittee is required to report all instances of non-compliance with permit effluent limitations or monitoring requirements. These non-compliance reports shall contain each of the following:

- A description of the non-compliance and its cause;
- The period of the non-compliance, including exact dates and times;
- If the non-compliance has not been corrected, the anticipated time it is expected to continue; and
- Steps taken or planned to reduce, eliminate, and prevent the non-compliance and its recurrence.

The Report of Non-Compliance Event form (Appendix H) or an equivalent written explanation containing the information requested above may be used to report instances of non-compliance.

2.7 Review of Tips for Successful DMR Reporting

- A. Enter data legibly in blue or black ink (*do not use pencil*). Make decimals look like decimals. Do not use commas.
- B. Report *all* data as required by the NPDES/State Waste Discharge permit on the pre-printed DMR.
- C. For monthly pH reporting requirements, complete both the maximum and the minimum columns.

- D. Enter data in the blank boxes only.
- E. Do not alter, line out, or highlight printed items appearing on the Ecology DMRs.
- F. Do not use correction fluid (whiteout). Cross out any error, initial it, date it, and write the correct value next to the crossed-out value.
- G. Do not enter units or other information (such descriptive words or symbols as Trace, Not Applicable, None, etc.) in Sample Measurement value boxes.
- H. Make sure the reporting units are the same as those that appear in the permit. Special attention should be given when reporting flow data, temperature, and concentrations. Use consistent units in calculations.
- I. For *no* discharge during the entire monitoring period, write *No Discharge* on the DMR. Submit *all pages* marked “No Discharge” for all outfalls.
- J. For no discharge of a single parameter during the monitoring period, write *No Discharge* in the Sample Measurement column for that parameter.
- K. Date and sign, in ink, *all pages* of the DMR prior to submission.
- L. For each instance of non-compliance with a permit requirement, provide a written report.
- M. For modifications to permits, make requests in writing to Ecology. Do not make requests on the DMR form.
- N. Send proper copies and attachments to the appropriate Ecology Regional Office.

Section 3: SAMPLING AND MONITORING INFORMATION

3.1 Process Control and Compliance Monitoring

What is the difference between process control monitoring and permit compliance monitoring?

What are the conditions that must be met for permit compliance monitoring?

3.2 Sampling Frequencies

What are the different types of sampling frequencies that I may have to test?

3.3 Extra and Split Samples

What if I do extra sampling?

What if I need to or want to split samples?

3.4 Invalid Sample

What if I have an invalid sample because of invalid quality control or lab accident?

3.0 Sampling and Monitoring Information

3.1 Process Control and Compliance Monitoring

What is the difference between process control monitoring and permit compliance monitoring?

Process control monitoring should be performed to optimize treatment system operations and is not required to be reported on the DMR. Permit compliance monitoring is performed to verify compliance with permit limits and must be reported on the DMR.

What are the conditions that must be met for permit compliance monitoring?

Permit compliance monitoring must meet conditions specified by the NPDES/State Waste Discharge permit, which include, but are not limited to, the following:

- Must be routine and representative of wastewater discharged.¹
- Must be conducted to conform using the latest revision of the test procedures specified in the permit unless Ecology approves an alternative procedure in writing. All soil analysis and reporting will be in accordance with *Laboratory Procedures*, Soil Testing Laboratory, Washington State University, November 1981.
- Must be conducted by a laboratory accredited by the Department of Ecology Environmental Laboratory Accreditation Program.²
- Must perform Quality Assurance/Quality Control (QA/QC) analysis.

3.2 Sampling Frequencies

What are the different types of sampling frequencies that I may have to test?

Daily:

A daily time period is considered as a calendar day.

¹ To ensure sample is representative, mix well and pour amount needed for testing.

² Certain specific operation tests are exempted from the requirements of this program and therefore do not have to be performed in an approved laboratory. These tests include: all tests which are done for process control only; flow, temperature, and settleable solids. Conductivity, turbidity, and pH tests also do not require accreditation if the lab is operated by a discharger and is not required to be accredited for any other test.

MONTH						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Seven- (7) Day (Weekly):

A seven-day period is seven consecutive days beginning on Sunday and ending on Saturday.

MONTH						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Monthly:

Monthly is considered as a calendar month.

MONTH						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Quarterly, Semi-annually, Annually:

As specified in the permit. If permittees have questions, they will need to contact their regional office.

3.3 Extra and Split Samples

What if I do extra sampling?

Permit compliance monitoring should be scheduled to be routine and representative of the normal discharge, and set prior to collection. The permittee may decide to sample and analyze more frequently than required by the permit. This extra sample collection must be incorporated into the facility's monitoring schedule prior to collection. The extra sample observed/analytical values must be used in calculations for reporting on the DMR.

What if I need to or want to split samples?

The permittee may decide for various reasons to split a sample. This split sample must be incorporated into the facility's monitoring schedule prior to collection. Split sample observed/analytical values are to be averaged and must be used in calculations for reporting on the DMR. In addition, split samples must:

- A. Be split on the collection site (not in the lab).
- B. Be considered a representative sample and consistent with the facility's monitoring program.
- C. Be independent of any selection process for analysis.

3.4 Invalid Sample

What if I have an invalid sample because of invalid quality control or lab accident?

There are a number of conditions when a sample or sample results are considered invalid.

These include:

- If a sample is subject to a lab accident and a valid analysis cannot be performed,
- The quality control during sample analysis is not within analytical standards³,
- Sample preparation results in insufficient dilutions and the result is reported with a greater than symbol (>). (Typically occurs with BOD and coliform analysis.)

Regardless of the source of error, all invalid samples shall be treated as follows:

The permittee shall provide an explanation as to why the sample was invalid and from which, if any, calculations it was omitted in the REMARKS section of the DMR or attach an explanation to each copy of the DMR. **Documentation from the lab and/or a written explanation from the operator must be retained with lab records for inspection.**

³ It is very difficult to determine what an "out-of-control" situation is. Call your Ecology Regional Office for Technical Assistance.

Section 4: CALCULATING INFORMATION

4.1 Minimum

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4.0 Calculating Information

This section contains general guidance on how to report data value information and the calculations that may be required in order to report that information on the DMR. Check for specific requirements in your permit or call your Ecology regional office for clarification. Report all letters and symbols that are required to the left of the numeric value entered in the Sample Measurement box. Data reporting examples that include these principals can be found in Appendix D.

4.1 Minimum

How do I calculate for minimum/daily minimum?

For one observed/analytical value per day:

The minimum, or daily minimum Sample Measurement is the lowest observed/analytical value observed during the monitoring period for a specific parameter.

For more than one observed/analytical value per day:

Calculate the *daily discharge* for each day in the monitoring period. Report the Sample Measurement as the *lowest* of the daily discharges calculated.

For pH *do not average* – report the lowest value in the reporting period.

4.2 Averages

How do you calculate average concentration?

Seven- (7) Day Average Concentration (Quality):

Calculate the average of all daily discharges for each seven consecutive days in the monitoring period. The Sample Measurement is the highest of the seven-day averages calculated during the monitoring period.

Thirty- (30) Day Average Concentration (Quality):

Calculate the average of all daily discharges during the 30-day monitoring period. The Sample Measurement is the average of all samples measured during the one month (30-day) monitoring period. When the NPDES/State Waste Discharge permit requires only one observed/analytical value per monitoring period and only one sample was taken, the 30-day and 7-day Sample Measurements are the same.

What is average/arithmic mean?

The average or arithmetic mean is equal to the sum of the measurements divided by the number of measurements.

Example: Set of measurements: 2, 9, 8, 5, 6

$$\text{Arithmetic Mean} = \frac{2 + 9 + 8 + 5 + 6}{5} = \frac{30}{5} = 6$$

Daily Discharge:

For pollutants expressed in units of mass loading (lbs/day or kg/day):

Calculate the total mass loading of the pollutant discharged over the day by using the formula for mass loading found on page 30.

For pollutants with limitations expressed in other units of measurement:

Calculate the average observed/analytical value of the pollutant over the day (except for pH).

Daily Average or Monthly Average:

This is the average of daily discharges over a calendar month. Find by calculating the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

4.3 Weekly Average for a Week Split by Two Months

What if I have to do a weekly average and my week is split by two separate months?

If part of a weekly monitoring period falls partially in one month (monitoring period) then that portion shall be combined with the data for the next monitoring period. This seven-day period (part in one month and the remainder in the next month) is used to calculate the seven-day average. You report the weekly average with the month that has the majority of the days from the crossover week.

For the following example monitoring period, data from the last week of the first month is carried over, averaged with data from the first week of the next month, and reported as a weekly average with the next month's DMR.

MONTH 1						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

MONTH 2						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Example:

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
31	1	2 BOD = 23 TSS = 26 Fecal = 417	3	4 BOD = 17 TSS = 20 Fecal = 230	5 Fecal = 162	6 Fecal = 81
7	8	9 BOD = 14 TSS = 17 Fecal = 71	10	11 BOD = 26 TSS = 19 Fecal = 52	12	13
14	15	16 BOD = 17 TSS = 23 Fecal = 48	17	18 BOD = 14 TSS = 18 Fecal = 81	19	20
21	22	23 BOD = 28 TSS = 23 Fecal = 42	24	25 BOD = 21 TSS = 17 Fecal = 68	26	27
28	29	30 BOD = 30 TSS = 25 Fecal = 54				

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
			1	2 BOD = 12 TSS = 14 Fecal = 58	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Weekly Averages:

Week 1 (31st – 6th)

$$\text{BOD } \frac{23+17}{2} = 20$$

$$\text{TSS } \frac{26+20}{2} = 23$$

Fecal 417 LOG 2.6201

230 LOG 2.3617

162 LOG 2.2075

81 LOG 1.9085

$$9.0998 \div 4 = 2.2750 \text{ ANTI LOG} = 188$$

Week 2 (7th – 13th)

$$\text{BOD } \frac{14+26}{2} = 20$$

$$\text{TSS } \frac{17+19}{2} = 18$$

Fecal 71 LOG 1.8513

52 LOG 1.7160

$$3.5673 \div 2 = 1.7837 \text{ ANTI LOG} = 61$$

Week 3 (14th – 20th)

$$\text{BOD } \frac{17+14}{2} = 15.5$$

$$\text{TSS } \frac{23+18}{2} = 20.5$$

Fecal 48 LOG 1.6812

81 LOG 1.9085

$$3.5897 \div 2 = 1.7949 \text{ ANTI LOG} = 62$$

Week 4 (21st – 27th)

$$\text{BOD } \frac{28+21}{2} = 24.5$$

$$\text{TSS } \frac{23+17}{2} = 20$$

Fecal 42 LOG 1.6232

68 LOG 1.8325

$$3.4557 \div 2 = 1.7279 \text{ ANTI LOG} = 53$$

Week 1 (28th – 4th)

$$\text{BOD } \frac{30+12}{2} = 21$$

$$\text{TSS } \frac{25+14}{2} = 19.5$$

Fecal 54 LOG 1.7324

58 LOG 1.7634

$$3.4958 \div 2 = 1.7479 \text{ ANTI LOG} = 56$$

Highest Average Weekly:

BOD = 24.5

TSS = 23

4.4 Maximum

How do I calculate for maximum/daily maximum?

For one observed/analytical value per day:

The maximum or daily maximum Sample Measurement is the highest observed/analytical value during the monitoring period for a specified parameter.

For more than one observed/analytical value per day:

Calculate the daily discharge for each day in the reporting period. Report the Sample Measurement as the *highest* of the daily discharges calculated.

For pH, *do not average* – report the highest value in the reporting period.

4.5 Mass Loading

What is mass loading and how do I calculate it?

Mass loading is determined by multiplying the daily flow in million gallons per day (MGD), first by the concentration (mg/L), and then by the unit conversion $8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$

$$\text{Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$$

Q = Daily flow in MGD for each day observed/analytical values are taken

C = Parameter concentration in mg/L

$8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$ = unit conversion for weight of one gallon of water in pounds.

Seven- (7) Day Average Mass Loading (Quantity):

Calculate the average of all observed/analytical values for each seven days in the monitoring period. The Sample Measurement is the highest of the seven-day averages calculated during the monitoring period.

Thirty- (30) Day average Mass Loading (Quantity):

Calculate the average of all observed/analytical values during the 30-day monitoring period. The Sample Measurement is the average of all samples measured during the one month (30-day) monitoring period. When the NPDES/State Waste Discharge permit requires only one observed/analytical value per monitoring period and only one sample was taken, the 30-day and 7-day Sample Measurements are the same.

Example: Calculate mass loading (lbs/day) as follows:

$$\text{Mass Loading} = \frac{[(Q_1(\text{MGD}) \times C_1(\text{mg/L}) \times 8.34 \frac{(\text{lbs/MG})}{\text{mg/L}}) + (Q_2 \times C_2 \times 8.34 \frac{(\text{lbs/MG})}{\text{mg/L}}) + \dots + (Q_N \times C_N \times 8.34 \frac{(\text{lbs/MG})}{\text{mg/L}})]}{N}$$

Q_1, Q_2, \dots, Q_N = Daily flow in MGD for each day 1, 2, ... N, observed/analytical values are taken
 C_1, C_2, \dots, C_N = Parameter concentration(s) in appropriate units (mg/L) for days 1, 2, ...N.
 $8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$ = Unit conversion for weight of one gallon of water in pounds.
 N = Number of observed/analytical value days in the monitoring period.

Moving/Rolling Average:

A rolling average is calculated by using data results from the current date and the respective designated interval prior to the current date.

Example: 12-month rolling average

Calculate the current monthly average and the previous 11 monthly averages and divide the total by 12.

$$\frac{MA_C + MA_1 + MA_2 + \dots + MA_{11}}{12} = 12 \text{ MRA}$$

MA_C = Current monthly average
 MA_1 = First prior month's monthly average
 MA_2 = Second prior month's monthly average
 MA_{11} = Eleventh prior month's monthly average

What is average/arithmetic mean?

The average or arithmetic mean is equal to the sum of the measurements divided by the number of measurements.

Example: Set of measurements: 2, 9, 8, 5, 6

$$\text{Arithmetic Mean} = \frac{2 + 9 + 8 + 5 + 6}{5} = \frac{30}{5} = 6$$

Daily Discharge:

For pollutants expressed in units of mass loading (lbs/day or kg/day):

Calculate the total mass loading of the pollutant discharged over the day by using the formula for mass loading found on page 30.

For pollutants with limitations expressed in other units of measurement:

Calculate the average observed/analytical value of the pollutant over the day (except for pH).

Daily Average or Monthly Average:

This is the average of daily discharges over a calendar month. Find by calculating the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

What is annual total?

The annual total is the total cumulative mass loading for an entire monitoring year.

4.6 Percent Removal

How do I calculate the monthly average for percent removal?

Report the Sample Measurement as the **average** influent concentration **for the month** minus the **average** effluent concentration **for the month** all divided by the **average** influent concentration, all multiplied by 100.

Calculate the percent removal for a given monitoring period as follows:

$$\text{Percent Removal} = \left[\frac{C_{\text{Influent}} - C_{\text{Effluent}}}{C_{\text{Influent}}} \right] \times (100)$$

C_{Influent} = Average influent concentration for a given monitoring period

C_{Effluent} = Average effluent concentration for a given monitoring period

4.7 Fecal Coliform

How do I calculate the geometric mean?

(Applicable to Fecal Coliform and Total Coliform only.)

The geometric mean is calculated by multiplying each of the N values together and taking the Nth root of the product.

$$\text{Geometric Mean} = \sqrt[N]{C_1 \times C_2 \times \dots \times C_N}$$

N = Number of observed/analytical values during the monitoring period.

C_1, C_2, \dots, C_N = Concentration of observed/analytical value during the monitoring period.

Example: Wk 1 = 3.0/100 ml, Wk 2 = 36/100 ml, Wk 3 = 24/100 ml, Wk 4 = 14/100 ml
Permit limit: 20

$$\text{Geometric mean} = \sqrt[4]{3.0 \times 36 \times 24 \times 14} = 13.8/100 \text{ ml}$$

Precision rule #2 applies (Note: Exponentials follow the same precision rules as multiplication/division).

The numbers 1 and 3 in the result are the two significant figures.

The number 8 (in the tenths place) in the result is rounded up. Increase the preceding digit by one.

Enter 14 in the Sample Measurement box.

Or, calculate a geometric mean by taking the antilog of the log average.

$$\text{Geometric Mean} = \text{Log}^{-1} \left[\frac{\text{Log}C_1 + \text{Log}C_2 + \dots + \text{Log}C_N}{N} \right]$$

N = Number of observed/analytical values during the monitoring period.

C₁, C₂, ... C_N = Concentration of observed/analytical value during the monitoring period.

Or, add the logarithms of the *Daily Fecal Coliform Values* together then divide by the number of days testing was done. Compute the antilog of this number.

$$\text{Geometric Mean} = \text{Antilog of } \frac{\text{Sum of logarithms of Daily Fecal Coliform Values for the month}}{\text{Number of days tested}}$$

Seven- (7) Day Geometric Mean (GM7):

Calculate the geometric mean of all observed/analytical values for each of the seven days in the monitoring period. The Sample Measurement is the highest of the seven-day geometric means calculated during the monitoring period.

Thirty- (30) Day Geometric Mean (GEM):

Calculate the geometric mean of all observed/analytical values during the 30-day monitoring period. The Sample Measurement is the geometric mean of all samples measured during the one month (30-day) monitoring period. If only one *sample* is taken during the monitoring period, the Sample Measurement for the seven-day geometric mean will be the same for the 30-day geometric mean.

What if my coliform test is too numerous to count (TNTC)?

Upsets in the biological, physical, or chemical treatment processes of a plant can cause large shifts in the quality of effluent. Crowding and insufficient media to support full development of colonies can result if the bacterial concentration on the filter exceeds the upper limit of the ideal range (20-60 colonies/100 ml). Consequently, there could be large swings in the final level of fecal coliform bacteria. This is frequently reflected in the membrane filter (MF) test when the standard dilution/filtration series used results in plates that have colonies that are “too numerous to count” (TNTC). If you obtain TNTC

counts on all the plates for a day's test, use the following procedure to determine the reporting value:

Count the number of colonies on each plate to the best of your ability. If the number of fecal coliform colonies counted is greater than 200 on each of the plates, then assume the final count to be at least 200 organisms per plate. Calculate the approximate number of fecal coliform colonies using the count of 200 and the smallest filtration volume – note this as a TNTC value in the REMARKS section along with the reasons why you believe the TNTC count occurred and what measures are being taken to correct the problem. **You must use the estimated number in calculating your monthly and weekly limits for the reporting period. Use the “greater than” (>) symbol on the approximated number reported for the test in the Sample Measurement box (for example, >10000 organisms/100 ml).**

If TNTC measurements occur, the following steps are recommended:

- Resample and retest for fecal coliform bacteria;
- Work on finding the cause of the high fecal coliform counts; and
- Work with your laboratory on all issues pertaining to fecal coliform including, but not limited to, dilution amounts, additional sampling, timely notification of high results, incubator temperature accuracy, laboratory procedures....

How do I determine fecal coliform bacteria counts from plate results?

General Rules:

- There is no such value as a log of zero. If a zero value is needed while performing a geometric mean calculation, use an approximate value of one count instead of zero count. The value one has a log of zero.
- Results of the fecal coliform test are expressed in “Colony Forming Units” (CFU) or “organisms” per 100 ml.
- Basic calculation:

$$\frac{\text{Number of colonies counted} \times 100}{\text{Volume filtered (ml)}} = \text{CFU/100 ml}$$

- Whenever all plate counts are greater than 60 but under 200, or all the plates are less than 20, the results should be reported as an estimated value and an “E” should precede the reported value for that test (for example, E120). The estimated value must be used in calculating the maximum weekly and monthly geometric means.

Case 1: Ideal colony counts

Example 1: If only one sample plate has between 20-60 colonies, use that value for that one plate to calculate the test value:

$$\begin{array}{l} 4 \text{ colonies}/25 \text{ ml} \\ 10 \text{ colonies}/50 \text{ ml} \\ 25 \text{ colonies}/75 \text{ ml} \end{array} \qquad \frac{25 \times 100}{75} = 33 \text{ CFR}/100 \text{ ml}$$

OR

$$\begin{array}{l} 50 \text{ colonies}/25 \text{ ml} \\ 75 \text{ colonies}/50 \text{ ml} \\ 195 \text{ colonies}/100 \text{ ml} \end{array} \qquad \frac{50 \times 100}{25} = 200 \text{ CFU}/100 \text{ ml}$$

Example 2: If two or more plates have 20-60 colonies, figure each count separately and then average the results:

$$\begin{array}{l} 7 \text{ colonies}/6 \text{ ml (do not use)} \\ 30 \text{ colonies}/10 \text{ ml} \\ 58 \text{ colonies}/25 \text{ ml} \end{array} \qquad \begin{array}{l} \\ \frac{30 \times 100}{10} = 300 \text{ CFU}/100 \text{ ml} \\ \frac{58 \times 100}{25} = 232 \text{ CFU}/100 \text{ ml} \end{array}$$

$$\text{Average} = \frac{300 + 232}{2} = 266 \text{ CFU}/100 \text{ ml}$$

Case 2: Colony counts less than or greater than the ideal range but not TNTC

Example 3: If all plates are below 20, add them to get a higher volume and report the value as being estimated. You should use 0 count values in the calculation:

$$\begin{array}{l} 0 \text{ colonies}/2 \text{ ml} \\ 5 \text{ colonies}/10 \text{ ml} \\ 9 \text{ colonies}/25 \text{ ml} \end{array} \qquad \frac{(0 + 5 + 9) \times 100}{(2 + 10 + 25)} = \frac{(14) \times 100}{37} = \text{E}38 \text{ CFU}/100 \text{ ml}$$

Example 4: If no plates are within the 20-60 range and two or more plates have counts adding up to 20-60 colonies, add those plates together and do not use the other value:

$$\begin{array}{l} 6 \text{ colonies}/10 \text{ ml} \\ 18 \text{ colonies}/25 \text{ ml} \\ 80 \text{ colonies}/50 \text{ ml (do not use)} \end{array} \qquad \frac{(6 + 18) \times 100}{(10 + 25)} = 69 \text{ CFU}/100 \text{ ml}$$

Example 5: If all counts are over 60 but less than 200, take the plate with the smallest filtration volume and report the value as being estimated:

$$\begin{array}{l} 90 \text{ colonies}/10 \text{ ml} \\ 110 \text{ colonies}/25 \text{ ml} \\ 170 \text{ colonies}/35 \text{ ml} \end{array} \quad \frac{90 \times 100}{10} = \text{E900 CFU}/100 \text{ ml}$$

Case 3: Colony Counts with TNTC

Example 6: If all counts are over 200 (counts greater than 200 are considered “Too Numerous Too Count” or “TNTC”) use the value 200 and the smallest filtration volume to approximate the fecal coliform numbers and report the value as being *greater than*. (Use this value in the Sample Measurement box of the DMR. Report TNTC in the REMARKS section of the DMR or on a separate piece of paper along with your explanation of why you believe a TNTC value was obtained and what measures are being taken to correct the problem.):

$$\begin{array}{l} >200 \text{ colonies}/10 \text{ ml} \\ >200 \text{ colonies}/25 \text{ ml} \\ >200 \text{ colonies}/35 \text{ ml} \end{array} \quad \frac{200 \times 100}{10} = >2000 \text{ CFU}/100 \text{ ml}$$

Example 7: If no counts are in the 20-60 range, and there is at least one TNTC, add those plates together and do not use the TNTC:

$$\begin{array}{l} 18 \text{ colonies}/10 \text{ ml} \\ 110 \text{ colonies}/25 \text{ ml} \\ >200 \text{ colonies}/50 \text{ ml (do not use)} \end{array} \quad \frac{(18 + 110) \times 100}{(10 + 25)} = 366 \text{ CFU}/100 \text{ ml}$$

Example 8: If at least one TNTC and at least one count in the 20-60 range, use the value(s) in the 20-60 range and do not use any TNTC:

$$\begin{array}{l} 50 \text{ colonies}/25 \text{ ml} \\ >200 \text{ colonies}/50 \text{ ml (do not use)} \\ >200 \text{ colonies}/100 \text{ ml (do not use)} \end{array} \quad \frac{50 \times 100}{25} = 200 \text{ CFU}/100 \text{ ml}$$

4.8 Less Than

How do I calculate results that have a “less than” value?

Use the symbol < to indicate less than.

To calculate a Sample Measurement (concentration, mass loading, etc.) in which one or more of the reported observed/analytical values are preceded by the “less than” symbol, use the reported value in the calculation. At the end of the calculation, add the less than symbol (<) to the left of the calculated value. The Sample Measurement is then reported as less than the calculated value.

Example: Calculate daily average for ammonia (sample once/week).
Permit limit: 0.9 mg/L The raw data in mg/L: 0.9, 1.0, < 0.1, 0.5

$$\text{Average Concentration} = \frac{0.9 + 1.0 + 0.1 + 0.5}{4} = 0.625 \text{ mg/L}$$

Precision rules #3 and #4 apply (Note: The 4 in the denominator is a counted number).
The number 2 in the result is rounded down. Leave the preceding digit as it is.
Enter <0.6 in the Sample Measurement box.

Section 5: NON-COMPLIANCE INFORMATION

5.1 Discharge Monitoring Reports (DMRs)

When do my DMRs need to be submitted to Ecology?

What if my DMR is late?

What if I fail to submit my DMR?

What if I don't report all the data required?

5.2 Exceedance of Limits

What do I do if I have an exceedance of a permit limit?

How should I show my exceedance on my DMR?

Where can I report the reasons for my non-compliance?

5.3 Missed Sampling

What if I missed one or more sampling events?

5.4 Signature Authority

If I am not the principal executive officer, can I sign the DMR?

What will happen if I sign the DMR even though I don't have signature authority?

5.5 Lab Problems

What do I do if the lab has not returned my test results before my DMR is due?

What if there is a problem with the sample that I gave the lab and it is too late to re-test?

5.6 Extra Sampling

Can I take extra samples in order to keep my data within the permit limits?

Can I take extra samples to see if I will be in compliance with my permit and not report the bad results?

5.7 Falsification

What if someone enters false information on the DMR?

5.8 Spills, Spews, Etc.

What do I do if I have an SSO?

What do I do if I have a CSO?

What do I do if I have to bypass?

What do I do if I have a toxic pollutant or an upset?

What do I do if I have a disinfection failure?

Do I need to call anyone else besides Ecology?

5.0 Non-compliance Information

5.1 Discharge Monitoring Reports (DMRs)

When do my DMRs need to be submitted to Ecology?

Copies of the completed DMR **with an original signature** must be submitted to Ecology's regional office (see Appendix A for addresses) no later than the 15th of the month following the end of each reporting period unless otherwise specified in the NPDES/State Waste Discharge permit.

What if my DMR is late?

Submit the DMR as soon as possible. A late DMR is a violation of the permit and may result in formal enforcement action. It is suggested that you include an explanation in the REMARKS section of the DMR as to why the DMR is late.

What if I fail to submit my DMR?

Failure to submit a completed DMR is violation of the NPDES/State Waste Discharge permit. Failure to submit your DMR may result in formal enforcement including possible penalties. Willful failure to comply could result in criminal sanctions including fines and imprisonment. Certified wastewater treatment plant operators found responsible for failure to comply could be subject to revocation or suspension of their certificate to operate (see Chapter 173-230 WAC).

Failure to comply with the guidance, as outlined in this manual, for properly completing the DMR may necessitate the return of the submitted information (*i.e.*, DMR, correspondence) to the permittee for correction(s). *This could put the permittee in jeopardy of failure to submit the completed DMR within the appropriate time period, which could also result in enforcement.*

What if I don't report all the data required?

Failure to report data as required by the NPDES or State Waste Discharge permit is a violation of the permit. If you do *not* report certain data, leave the Sample Measurement box *blank* and attach a note of explanation.

5.2 Exceedance of Limits

What do I do if I have an exceedance of a permit limit?

If possible, re-sample at the first opportunity. Work to find the cause of the exceedance and report the non-compliance as described below in "*Where can I report the reasons for my non-compliance?*" An exceedance of a permit limit is a violation of the permit and may result in formal enforcement.

How should I show my exceedance on my DMR?

We suggest you circle the exceedance in red ink.

Where can I report the reasons for my non-compliance?

The permittee is required to report all instances of non-compliance with permit effluent limitations or monitoring requirements. These reports must be attached to the DMR until such non-compliance ceases. These non-compliance reports need to contain each of the following:

- A description of the non-compliance and its cause;
- The period of the non-compliance, including exact dates and times;
- If the non-compliance has not been corrected, the anticipated length of time it is expected to continue; and
- Steps taken or planned to reduce, eliminate, and prevent recurrence of, the non-compliance.

The Report of Non-Compliance Event form (Appendix H) or an equivalent written explanation containing the information requested above shall be used to report all instances of non-compliance.

5.3 Missed Sampling

What if I missed one or more sampling events?

If possible, take samples. Include a note in the REMARKS section of the DMR explaining the reasons for missed sampling. Not completing all monitoring requirements listed in the permit is a violation of the permit and may result in formal enforcement.

5.4 Signature Authority

If I am not the principal executive officer, may I sign the DMR?

Yes, if the principal executive officer authorizes another person to sign the DMRs. An authorization document must be signed by the principal executive officer and submitted to Ecology's Regional Office (see Appendix A for address). Authorization documents must be submitted and approved *prior* to DMR submission. See Appendix G for authorization documents.

What will happen if I sign the DMR even though I don't have signature authority?

The DMR will not be accepted by Ecology and a re-submittal with an authorized signature will be required. This may lead to the DMR being re-submitted late. If a re-submittal is not made, this would be a failure to submit a DMR. Both late DMRs and non-submittal of a DMR are violations of the permit and subject to enforcement.

5.5 Lab Problems

What do I do if the lab has not returned my test results before my DMR is due?

Submit the DMR with the data you have by the due date. Include a note in the REMARKS section of the DMR explaining the missing test results, and re-submit the DMR with all of the test results as soon as possible.

What if there is a problem with the sample that I given to the lab and it is too late to re-test?

Re-sample as soon as possible and include a note in the REMARKS section about the problem with the sample.

5.6 Extra Sampling

May I take extra samples in order to keep my data within the permit limits?

Extra sampling is allowed to *determine* compliance; however, extra sampling to *avoid* non-compliance is not allowed.

Each permit requires representative sampling. Samples and Analytical Procedure is a Special Condition of all permits. Samples and measurements must be representative of volume and nature of the usual quality of the discharge.

Sampling wastewater more frequently in order to meet monthly permit requirements is *not allowed*. If this becomes necessary to meet monthly average permit limits, review what steps need to be taken to correct the problem.

It is suggested that a regular sampling protocol be followed.

May I take extra samples to see if I will be in compliance with my permit and not report bad results?

No. All samples taken are required by the permit to be reported and included in calculations. Failure to do so is a violation of the permit and subject to formal enforcement. If the action is knowing and willful, it may result in criminal charges.

5.7 Falsification

What if someone enters false information on the DMR?

False information entered on the DMR by a permittee, or the permittee's designated representative, may be punishable as a Class C felony (see RCW 9A.72.030). Falsification of a DMR by a certified wastewater treatment plant operator could result in revocation or suspension of the operator's certification (see Chapter 173-230 WAC).

5.8 Spills, Spews, Etc.

What do I do if I have a Sanitary Sewer Overflow (SSO)?

Stop the overflow. Call your Ecology Regional Office and any others as required by the permit and submit a written report as per the permit.

What do I do if I have a Combined Sewer Overflow (CSO)?

Stop the overflow as soon as possible. Report the CSO as the permit requires. If the overflow is an unauthorized dry-weather overflow, report the overflow to Ecology's Regional Office and any others as required by the permit.

What do I do if I have to bypass?

If known ahead of time, follow directions in the permit to gain authorization from Ecology. If it is an emergency bypass, report the bypass immediately to Ecology and any others as required by the permit.

What do I do if I have a toxic pollutant or an upset?

Take operational steps to stop the upset. Call Ecology and any others as required by the permit and submit a written report as per the permit.

What do I do if I have a disinfection failure?

Get the disinfection back online as soon as possible. Call Ecology and any others, and submit a written report, as required by the permit.

Do I need to call anyone else besides Ecology?

The Department of Health – Shellfish program should be contacted immediately [(360) 236-3330] if the incident is to marine waters.

The local health department should also be notified of the incident.

Section 6: SUBMISSION INFORMATION

6.1 Discharge Monitoring Reports (DMRs)

Where do I mail in copies of my DMR?

6.2 Amended DMRs

What if I have to make changes to my DMR after I've already submitted it to Ecology?

6.3 Attachments to DMRs

Do I have to write my permit number on all attachments?

6.4 Electronic DMRs

Can I submit my DMR electronically?

6.5 Record Keeping and Data Retention

*How long do I need to keep my monitoring information?
What information do I need to keep?*

6.6 Submission of Other Reports

*Can I send or attach other reports with my DMR?
What information should be with the reports that I send in?*

6.0 Submittal Information

6.1 Discharge Monitoring Reports (DMRs)

Where do I mail in copies of my DMR?

Copies of the completed DMR *with an original signature* shall be submitted to Ecology's regional office (see Appendix A for addresses) no later than the 15th of the month following the end of each reporting period unless otherwise specified in the NPDES/State Waste Discharge permit.

6.2 Amended DMRs

What if I have to make changes to my DMR after I've already submitted it to Ecology?

To revise a previously submitted DMR, submit a revised copy of the affected pages marked "Amendment" in the upper right-hand corner and initial and date the amended areas. The initialing of the amended DMR form is subject to the same certification requirements as the original DMR. Attach explanations for the amendments to the DMR.

6.3 Attachments to DMRs

Do I have to write my permit number on all attachments?

All correspondence and DMR attachments **should** contain the appropriate NPDES/State Waste Discharge permit number.

6.4 Electronic DMRs

May I submit my DMR electronically?

Ecology is developing a web site that will allow the submission of DMRs via the Internet. The electronic DMRs are being developed and will be made available for implementation on a phased-in basis. As e-DMRs become available, all permittees will be notified of their availability through e-mail, the permit managers, the Ecology web site, etc.

6.5 Record Keeping and Data Retention

How long do I need to keep my monitoring information?

All monitoring information shall be kept for a minimum of three years. Such information must include:

- All calibration and maintenance records;
- All original recordings for continuous monitoring instrumentation;
- Copies of all reports required by your permit; and
- Records of all data used to complete the application for your permit.

The three years may be extended during the course of unresolved litigation regarding the discharge of pollutants by the permittee, or when requested by Ecology.

What information do I need to keep?

For each measurement or sample taken, the permittee must record the following information:

- the date, exact place, method, and time of sampling or measurement
- the individual who performed the sampling or measurement
- the dates the analyses were performed
- the individual who performed the analyses
- the analytical techniques or methods used
- the results of all analyses

When records are stored electronically, the records must be preserved in a manner that assures their integrity and is acceptable to Ecology. All records *must* be accessible to Ecology's regulatory staff when requested.

6.6 6.6 Submission of Other Reports

May I send or attach other reports in with my DMR?

Do not attach other reports to your DMR unless the report is specifically required to be submitted with the DMR. However, you should include explanations of any permit violations that are reported on the DMR. You may send other reports with your DMR, just do not attach them together. When sending in reports, make sure that the name of your facility, permit number, and the number of the permit condition you are complying with are listed on your report.

What information should be with the reports that I send in?

When sending in reports, make sure that the name of your facility, permit number, name of the report, and the number of the permit condition you are complying with are listed on your report.

Section 7: TIPS FOR COMPLETING OTHER ANNUAL REPORTS

7.1 Annual Wasteload Assessment for Domestic Wastewater Facilities

What are the typical requirements for the wasteload assessment report?

When do we have to plan for a new wastewater facility?

How do we determine if we need to plan for more treatment capacity?

7.2 Infiltration-Inflow (I/I) Analysis and Project Certification Report

Why do I need to do an I/I Report?

Where would I find guidance on conducting an I/I evaluation?

What should be in my I/I Report?

How do I know the amount of I/I my facility has?

7.0 Tips for Annual Reports

Make sure that the name of your facility, permit number, and the number of the permit condition you are complying with are listed on all reports.

7.1 Annual Wasteload Assessment for Domestic Wastewater Facilities

NPDES and State Waste Discharge permits for domestic wastewater facilities typically require an annual wasteload assessment. The purpose of the annual wasteload assessment is to compare your facility's current loadings with the design capacity.

What are the typical requirements for the wasteload assessment report?

The specific requirements are found in your permit but typically include:

- An indication of compliance or non-compliance with permit effluent limits;
- A comparison between the existing and the design monthly average dry weather and wet weather flows, peak flows, BOD, and TSS loadings;
- The percentage increase in these parameters since the last annual report;
- The present and design population or population equivalent, projected growth rate, and the estimated date upon which the design capacity is projected to be reached.

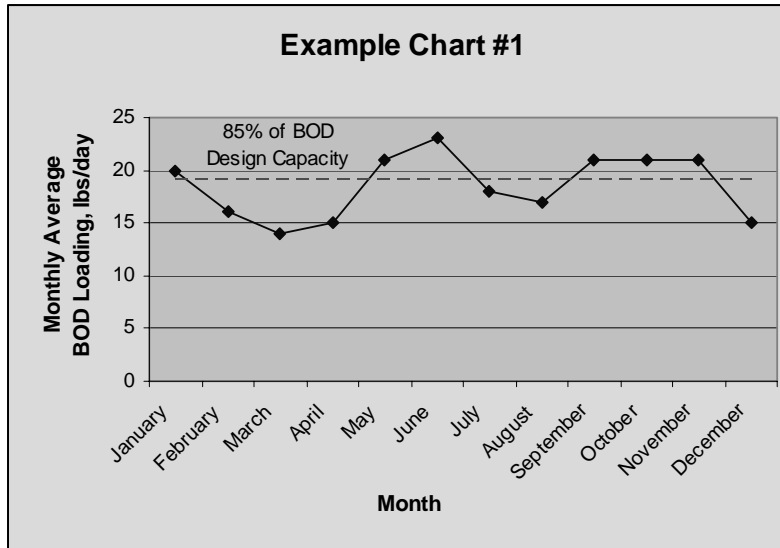
When do we have to plan for a new wastewater facility?

Permits for domestic wastewater facilities typically have language requiring a permittee to plan for new wastewater facilities when:

1. The actual flow or waste load for any of the design parameters identified in the facility's permit (typically BOD₅, TSS, and flow) reaches 85 percent of the facility's design capacity; or
2. When the projected increase for any of the design parameters identified in the permit would reach design capacity within five years.

How do we determine if we need to plan for more treatment capacity?

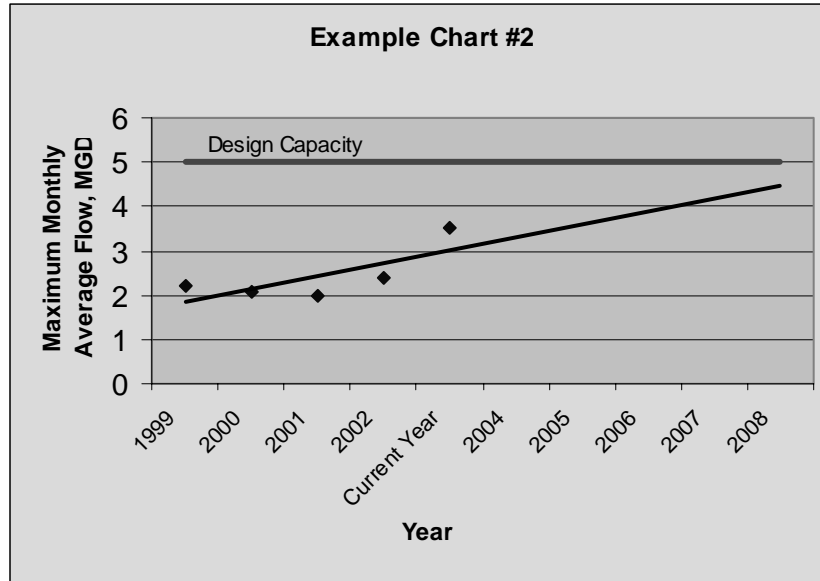
Determining if planning for additional treatment capacity is required under your permit is best done as part of your annual wasteload assessment. To determine whether planning is required under number 1 above, simply compare the maximum monthly flow and loading data to 85 percent of the design criteria for each parameter. Graphing monthly averages for flow and loading may help—an example graph is shown below. If the monthly average flow or loadings exceed 85 percent of the design capacity for any three consecutive months, then planning for new facilities is required.



Example 1: Comparison of monthly average to 85 percent design capacity. This should be done for each design parameter listed in the permit. In this case, there are three consecutive months exceeding 85 percent of the design capacity.

In order to determine if planning is required under 2, you must forecast future flow and loading five years into the future. There are many factors to consider when forecasting flows and loadings to a domestic wastewater facility and a complete description of these is beyond the scope of this document. However, one of the simplest ways of predicting future flows and loadings and a method that will suffice for many communities is “straight-line” forecasting. This method involves graphing the maximum monthly flow and loading data for the past five years and using a straight line forecast to project flow and loading out five years.

To use this method, plot the maximum monthly values for each of the last five years. Then use a “best-fit” approximation, either manually or with spreadsheet tools, to forecast values for that design parameter five years into the future. You may graph all parameters on one chart or graph each design parameter separately. Compare the five-year projections to the design capacity for each parameter. If the five-year future forecast exceeds the design criteria for any of the design parameters in your permit, your facility is required to begin planning for added capacity. An example chart is shown below.



Example 2: Straight line method of predicting if capacity will be reached within five years. This should be done for each design parameter listed in the permit. In this example, the design capacity will not be exceeded in five years.

7.2 Infiltration-Inflow (I/I) Analysis and Project Certification Report

Why do I need to do an I/I Report?

NPDES permits for domestic wastewater treatment facilities typically require an Annual I/I Report. Excessive I/I affects the collection and treatment system in several ways. It can cause hydraulic overloading of the treatment plant, resulting in a loss of solids from secondary clarifiers. Hydraulic overloading in the collection system from high I/I can result in overflows to surface water, streets, or basements. Excessive I/I can also dilute sewage, making compliance with secondary effluent standards difficult or impossible. Each collection system is different—the purpose of the I/I report is to help both facility owners and Ecology track and understand the specific I/I issues faced by a particular community.

Where would I find guidance on conducting an I/I evaluation?

Guidance on conducting an I/I evaluation is available in the USEPA publication *I/I Analysis and Project Certification*. This document is available from the Department of Ecology as Publication No. 97-03. Contact Ecology's Publications Office at (360) 407-7472 or P.O. Box 47600, Olympia, Washington 98504-7600, to obtain a copy. The document is also available on Ecology's web site at: www.ecy.wa.gov/programs/wq/wastewater/index.html#toc.

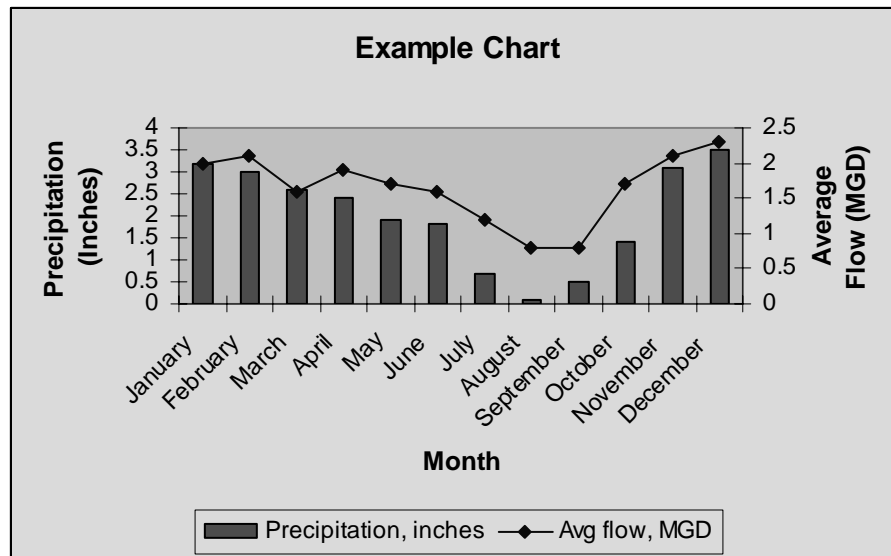
What should be in my I/I Report?

An Annual I/I Report should include each of the following elements:

1. The average monthly flow and total precipitation for each month for the past year together with a graph (see example below) plotting a comparison of precipitation versus influent flow.
2. The maximum monthly and peak hourly hydraulic design capacity for the plant.
3. The design population equivalent for the treatment plant and the population served by the facility, per month, for the past year.
4. The amount of I/I for each year since the base year and the percent of maximum monthly design capacity each year's I/I represents.
5. The percent increase or reduction in I/I for each year subsequent to the base year I/I.
6. The additional lengths of sewer lines added to the collection system, per month, for the past year. Also include a brief summary of any major sewer rehabilitation or I/I reduction projects.

How do I know the amount of I/I my facility has?

The difference between the highest and lowest monthly average flow is considered the amount of I/I the treatment facility is experiencing. If the amount of I/I increases by 15 percent from that found in the "base" year (adjusted for equivalent rainfall), then the report must give an explanation for the increased I/I and what corrective measures are planned to address the increase.



Typically a year with a near-normal rainfall is selected as the base year. From time to time it may be necessary to select a new base year if there have been significant changes

to the collection system such as significant inflow disconnection projects, sewer rehabilitation projects, or major additions to the collection system.

Sample Annual I/I Report forms are included in Appendix I. Contact your Ecology Facility Manager if you have questions on how to complete the annual I/I report for your facility.

Section 8: BIOSOLIDS

8.1 Introduction

8.2 Resources Available

8.3 General Guidance

What are biosolids?

How do the federal and state programs relate to each other and how does that affect me?

Why are data needed?

8.4 Biosolids Collection

When do biosolids data need to be collected?

What biosolids data need to be collected?

8.5 Biosolids Submittals

When do biosolids data need to be submitted?

How is biosolids quality evaluated?

8.6 Vector Attraction Reduction

What are two approaches to VAR?

8.7 Pollutant Limits

What are the pollutants that are regulated?

8.8 Calculations

How do I calculate an agronomic rate of application for my biosolids?

8.0 Biosolids

8.1 Introduction

This chapter is meant to address a few of the areas and issues likely to be of interest to operators in particular, and to provide help locating additional and more detailed information.

Note: The state and federal programs for biosolids management are substantially similar. It is expected that compliance with the technical standards of the state program will yield compliance with federal technical standards. The federal administrative procedures are somewhat different, although EPA has been cooperative in working these out. Some discussion regarding these differences will be found in appropriate sections that follow, although this chapter is not intended to qualify as guidance for the purposes of federal program compliance.

8.2 Resources Available

There is a wealth of resources available on biosolids management. Many guidance, technical support, and background information documents have been published and are available free on the Internet or on request. Both Ecology and EPA have published guidance documents; Ecology has a web site for biosolids management, and there are at least three stakeholder organizations that also have web sites which provide information and access to resources. Following is a list of frequently used resources and how to obtain or locate them. All of these references are themselves links to additional resources.

What is it?	Who should have it?	Published by?	How can you get it?
Biosolids Management Guidelines, WDOE 93-80 (revised July 2000)	Any treatment plant that applies its biosolids to the land or uses a contractor for that purpose. Contractors and consultants.	Ecology	Contact the regional or headquarters biosolids coordinator, or get it from the Internet at http://www.ecy.wa.gov/programs/swfa/biosolids/guidelines.html
Managing Nitrogen from Biosolids WDOE 99-508 (April 1999)	Mostly those who are directly involved in land application and determining agronomic rates of application.	Ecology	Contact the regional or headquarters biosolids coordinator, or get it from the Internet at http://www.ecy.wa.gov/programs/swfa/biosolids/guidelines.html
A Plain English Guide to the EPA Part 503 Biosolids Rule EPA/832/R-93/003; September, 1994	Anyone responsible for managing biosolids or who needs an understanding of federal regulations.	EPA	Contact U.S. EPA directly or download the document at: http://www.epa.gov/owm/mtb/biosolids/503pe/index.htm
Control of Pathogens and Vector Attraction Reduction in Sewage Sludge. EPA/625/R-92/013 (Rev. 10/99)	Anyone who is responsible for determining either Pathogen or Vector Attraction Reduction in	U.S. EPA, National Risk Management Research Laboratory	Contact the National Risk Management Research Laboratory in Cincinnati directly, or download the document at: http://www.epa.gov/ORD/NRMR

What is it?	Who should have it?	Published by?	How can you get it?
	biosolids.		L:/Pubs/1999/625R99013.pdf
Chapter 173-308 – Biosolids Management	Anyone responsible for managing biosolids or making permit-related decisions.	Ecology	Contact the regional or headquarters biosolids coordinator, or get it from the Internet at http://www.ecy.wa.gov/programs/swfa/biosolids/lawsandrules.html
Department of Ecology Internet Website	Anyone needing more information about biosolids management.	Ecology	http://www.ecy.wa.gov/programs/swfa/biosolids/index.html
Northwest Biosolids Management Association Website	NBMA members, other interested stakeholders.	Northwest Biosolids Management Association	Contact the NBMA at 206-684-1145 or go to http://www.nwbiosolids.org
National Biosolids Partnership Website	Regulators, the regulated community, consultants. Anyone needing more information about biosolids management.	National Biosolids Partnership	http://biosolids.policy.net
Water Environment Federation Website	The regulated community and anyone needing more information about biosolids management.	Water Environment Federation	http://www.wef.org

8.3 General Guidance

What are biosolids?

When the sludge produced in the treatment of sewage meets standards for application to the land, it is called biosolids. Biosolids are not a solid waste. State laws direct us to maximize the beneficial use of biosolids, a valuable commodity. When residual solids do not meet standards for application to the land, they are considered to be sewage sludge, which is a solid waste. Sewage sludge must either be treated to meet standards for biosolids or be disposed in a municipal solid waste landfill or incinerated. Incineration and landfilling are not considered beneficial uses

Septage is a form of biosolids. The management criteria for septage are a little different and will not be discussed here. The solids produced in the treatment of other influents (*i.e.*, industrial wastewater) are not sewage sludge and cannot be properly referred to as biosolids, regardless of the quality or degree of treatment.

How do the federal and state programs relate to each other and how does that affect me?

The federal biosolids program is administered by the U.S. EPA under the Clean Water Act. EPA has established national standards for biosolids management. All of the standards in the state rules were taken directly from the federal rules. There are some

administrative differences in the two programs. Permit applications are periodically due to EPA, even though they may not act on them. Annual reports must be submitted to Ecology (March 1st) and EPA (February 19).

EPA requires permit applications from all treatment works treating domestic sewage (TWTDS). This includes all POTWs, biosolids compost facilities, private treatment works treating *only* sewage, and some other facilities. Facilities holding NPDES permits must submit a complete permit application to EPA. Other facilities are required to submit only Part 1 of the federal application form. EPA will also accept the state application form as long as it contains the information required for the federal program. If EPA is engaged in permitting a facility they may require submittal of the federal application (form 2S). Washington state requires a complete application from all facilities.

EPA requires annual reports from all facilities that serve a population of 10,000 or more, have an average wet month daily design flow of one mgd or more, or implement pretreatment programs. Washington requires annual reports from all facilities, but small facilities submit less documentation (documentation remains subject to request or review on inspection). Annual reports are due to EPA by February 19th of each year, and to the state by March 1st. Ecology encourages facilities to meet the earlier deadline in order to comply with federal program requirements.

Why are data needed?

State laws direct us to maximize the beneficial use of biosolids, a valuable commodity. EPA has established standards for biosolids quality. Data are needed to document and show that biosolids are safe for application to the land. Additionally, data are required in order to determine the agronomic rate of application when biosolids are applied to agricultural lands and forest lands. These data are all important because they document compliance with regulatory standards and are used in response to inquiries and complaints. Monitoring requirements for incineration and landfilling are different and will not be discussed here; those practices are not considered beneficial uses.

8.4 Biosolids Collection

When do biosolids data need to be collected?

Data are needed whenever something is done with biosolids, whether it is beneficial use, transfer to another treatment facility, incineration, or landfilling. When biosolids are wasted throughout the year, data will generally need to be collected throughout the year. When biosolids are held in temporary storage, such as drying beds or lagoons, some data collection may be deferred until the time of use or disposal. Facilities holding biosolids in lagoons should sample for pollutants (but not nitrogen, pathogens, or vector attraction reduction) at least once every permit cycle, even when they don't anticipate removing the biosolids. This is critical in order to avoid unpleasant surprises when it is time to remove the biosolids. Certain data, especially for pathogen and vector attraction reduction and nutrient information, need to be collected in close proximity to the time of use or disposal. Timing of sampling events will vary between facilities, and operators should consult with the regional biosolids coordinator at the Department of Ecology if a schedule has not been established by permit.

The minimum frequency of sampling for biosolids is dependent upon the amount of material received for processing or applied to the land in a calendar year. The table below is from WAC 173-308-150.

Metric tons (U.S. tons) per 365-day period	Frequency
Greater than zero but less than 290 (320)	once per year
Equal to or greater than 290 (320) but less than 1,500 (1,653)	once per quarter (four times per year)
Equal to or greater than 1,500 (1,653) but less than 15,000 (16,535)	once per 60 days (six times per year)
Equal to or greater than 15,000 (16,535)	once per month (12 times per year)

Keep in mind that the table above specifies a *minimum* frequency of sampling, not a necessary or optimum frequency. Facility-designed manuals of operation and permits may require more frequent sampling. Also, sampling frequency should not be confused with the number or timing of samples during a sampling event. Samples of biosolids must also be *representative*. This means that not only is the number of sampling events important, but also the timing of sampling, the number of samples per event, and how the samples are taken. Frequency of sampling may depend on factors such as the nature and duration of land application projects and whether biosolids are sold or given away to the public. Sampling can be reduced over time if processes and results of monitoring are consistent. It is possible that the sampling frequency for metals, pollutants, nutrients, pathogens, and vector attraction reduction could be different.

You should have a sampling plan designed for your facility and your approach to biosolids management. If you do not have an approved sampling plan you should develop one.

What biosolids data need to be collected?

The data requirements vary with the operation. When biosolids are transferred to another treatment works, often the only information required is for pollutant concentrations. For facilities operating lagoons, pollutant information should be collected periodically, but other information will not be needed until removal of the solids. The scope of basic information that must be collected is described below.

Pollutant Concentrations: Arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. All land application programs require this information.

Note: Analysis for pollutants should be for the total concentration. Analysis of extractable pollutants may be required for other purposes, but is not required for the biosolids program.

Other Pollutants: Case-by-case.

Nutrient Concentrations: Total Kjeldahl Nitrogen, nitrate, ammonia and ammonium, and sometimes phosphorous, potassium and other nutrients. All land application programs require information on nitrogenous compounds at a minimum.

Pathogen Reduction: Fecal coliform, salmonella, enteric viruses, and viable helminth ova. Sampling for pathogens depends on the alternative selected for pathogen reduction. Fecal coliform data may be all that is needed in some cases. Data on operating parameters (time and temperature) may be required in other cases, especially when Class A pathogen reduction is the goal.

Vector Attraction Reduction: pH, percent solids, percent volatile solids, specific oxygen uptake rate.

Other: Percent solids, percent volatile solids.

Sampling methods that must be used are described in WAC 173-308-140. Ecology recommends *Managing Nitrogen from Biosolids* (see the resource list above) for approaches to nitrogen analysis. Note that the version of *Standard Methods for the Examination of Water and Wastewater* is the 18th edition (1992). This edition should be used as later editions are not presently authorized by rule.

8.5 Biosolids Submittals

When do biosolids data need to be submitted?

Biosolids data must be available for review at the treatment works at all times. In some circumstances data may need to be submitted on request. There are two times when biosolids data are required and must be submitted: When a permit application is prepared and when an annual report is prepared. The data required are much the same in both cases. Annual reports are due by March 1 of each year for the previous calendar year. Permit application deadlines are scattered across the five-year cycle of the statewide general permit.

How is biosolids quality evaluated?

There are three aspects of biosolids quality that are important under federal and state rules. The standards of both programs are the same. The qualitative standards of concern are for *Pathogen Reduction*, *Vector Attraction Reduction*, and *Pollutant Concentrations*.

“Exceptional Quality” or “EQ” is terminology that evolved during the development of the national program. It was not actually used by EPA in the federal rules. The state chose to adopt this terminology in its rules because usage had become commonplace. *Exceptional Quality* means biosolids that meet standards for Class A pathogen reduction, have met Vector Attraction Reduction by treatment, and do not exceed the pollutant concentration limits in Table 3 of the rule. *A biosolids product must meet all three of these most stringent criteria to be considered Exceptional Quality.*

Pathogen Reduction:

When biosolids are applied to the land, they may come in contact with a crop destined to be used as forage or feed for livestock, with a food crop such as corn or wheat, or with ornamental plants such as turf or nursery stock. Biosolids may also be applied to the land so that direct contact by either livestock or people could occur. To protect people and livestock against the possible presence of pathogenic organisms, two classes of pathogen reduction have been established: *Class A* and *Class B*.

Class A biosolids have been treated so that they are considered safe for use in circumstances where there are no further controls in place regarding site management or access. These biosolids may be used on lawns, gardens, or areas accessible by the general public.

Class B biosolids have been treated so that they are safe to use with additional site management and access restrictions. Site management restrictions prohibit crop harvest for a period of time after application ranging from thirty days to thirty-eight months. Access restrictions apply to livestock and to the public, and range from thirty days to one year.

There are six alternatives for producing Class A biosolids. One alternative is actually a group of options called *Processes to Further Reduce Pathogens*. Most of the Class A processes involve documentation of operating criteria and some amount of sampling and analysis afterward. Organisms to be sampled for may include enteric viruses, viable helminth ova, and fecal coliform or Salmonella bacteria.

There are three alternatives for producing Class B biosolids. One alternative, the *Processes to Significantly Reduce Pathogens*, actually contains several options. Generally, for Class B biosolids, either a process is being documented within certain established operating parameters or sampling is done for fecal coliform bacteria.

Both Class A and Class B options offer an *Equivalency* alternative. Equivalency is determined by the U.S. EPA Pathogen Equivalency Committee and involves a comprehensive application and review process which may take up to two years. Pathogen equivalency determinations are rare and in most cases will not be the best option for treatment works.

An excellent explanation of both Class A and Class B pathogen reduction can be found in Chapter 5 of A Plain English Guide to the EPA Part 503 Biosolids Rule.

Following is brief discussion of issues we encounter most frequently:

- Be sure to compare the timing for Class A treatment processes with those of the Vector Attraction Reduction options. In some cases VAR must be accomplished at the same time, or after, the pathogen reduction step.
- Ecology prefers the use of fecal coliform as an indicator of pathogen reduction over the analysis for Salmonella bacteria, which are actual pathogens. We believe the detection of fecal coliform bacteria is more reliable at this time.
- Class A Alternative 4 allows pathogen reduction verification via analysis without any associated treatment. Ecology presently discourages the use of this option based on input from U.S. EPA. Facilities that wish to pursue this option will need to have comprehensive sampling programs in place. The current cost of analysis for enteric virus and viable helminth ova may make this prohibitive.
- Under Class A Alternative 5, the days at temperature for composting options are consecutive days. This is also true for the Vector Attraction Reduction approach in WAC 173-308-180(4), which is often used with this Class A alternative.

- For Class B options, biosolids that achieve pathogen reduction by one of the PSRPs are considered Class B from that point forward. When the geometric mean of seven samples approach is used, the biosolids are only Class B at that time, and must generally be used within 30 days of analysis. Because of the difference in the applicability of the two types of Class B determinations, products that achieve Class B by PSRP and those that achieve Class B by the seven samples methodology should not be mixed in storage. Timing of pathogen reduction relative to Vector Attraction Reduction is not as critical for Class B options as it is for Class A.

Example: Class B Alternative 1 using the geometric mean of seven samples is one of the most common approaches to determining compliance with pathogen reduction requirements. The result of the seven samples is compared against a regulatory standard of 2,000,000 fecal coliform per gram of dry solid material. The value you are working with is a *geometric* mean. To calculate a geometric mean, take the logarithm of each result, and then do a simple arithmetic average of the seven logarithms. Next, convert the average logarithmic value you obtained from the seven samples back into its corresponding value (the antilog). The advantage of using the geometric mean is that it tends to smooth out fairly wide variations in the analytical results, so an excursion or two beyond the regulatory standard will probably not result in a failure under the Class B standard.

Example:

Date	Sample #	Fecal Coliform Density	Log
4/2	1	2,400,000	6.380211
4/3	2	3,000,070	6.477131
4/5	3	1,000,500	6.000022
4/6	4	750,500	5.875061
4/8	5	1,300,400	6.114977
4/10	6	3,900,000	6.591065
4/13	7	1,900,100	6.278776

Average of logs = 6.245320

Antilog of 6.245320 = 1,759,219 = compliance with standard of 2,000,000 fecal coliform per gram of dry solid material.

The seven samples collected for this method of demonstrating pathogen reduction should be collected over a period of time from systems that regularly waste biosolids. One sample every other day is a good approach. When a pile of biosolids or a lagoon is sampled, the seven sample approach may still be appropriate. Generally more consideration needs to be given to sample location in these cases, although all samples may be taken on the same day. When evaluating data, be sure that fecal coliform concentrations have been converted to a dry weight basis.

8.6 Vector Attraction Reduction

Vector Attraction Reduction (VAR) is roughly related to odor control, but it is not precisely the same thing. A vector is a living thing that can carry disease-causing organisms away from a site. Insects, rodents, and birds are examples of potential disease

vectors. The purpose of Vector Attraction Reduction then is to reduce the attractiveness of biosolids to potential disease vectors. Since it is primarily the odorous characteristic of the biosolids which attracts disease vectors, there is a close approximation between vector attraction reduction and odor control.

What are two approaches to VAR?

There are two basic approaches to VAR. Biosolids can be treated or conditioned at the sewage treatment facility or elsewhere, *prior* to being applied to the land. Lime stabilization and volatile solids reduction are two common means of Vector Attraction Reduction.

The second approach to VAR is to manage it in the field. In this case the biosolids are either injected into the soil when they are applied, or tilled into the soil shortly after they are applied. This approach uses the soil as a physical barrier to vectors.

Unlike pathogen reduction, there is no equivalency procedure for VAR. Our friends at the State of Pennsylvania Department of Environmental Protection have provided an on-line resource at http://www.dep.state.pa.us/dep/biosolids/software/operator_tools.htm. This resource is especially helpful with Alternative 1 for volatile solids reduction and Alternative 2 for Specific Oxygen Uptake Rate.

8.7 Pollutant Limits

What are the pollutants that are regulated?

Nine pollutants are regulated by rule: Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc. EPA and Ecology have the option to regulate other pollutants, and for example will inquire about PCB content in certain older biosolids products that have not been previously or recently tested. The federal and state biosolids rules contain four tables listing pollutant limits. Tables 1 and 3 are all that will be discussed here (disregard Table 4 in any event as its purpose is consistently misunderstood and it is not generally used). Biosolids which meet the Table 3 values for all pollutants benefit from reduced regulatory obligations when they are applied to the land. *Most facilities in Washington state produce biosolids which easily meet, and often fall far below the Table 3 thresholds.* If you are not meeting Table 3 values you should discuss this with your regional biosolids coordinator.

The Table 1 values are referred to as *pollutant ceiling limits*. This is the maximum value of each pollutant which is allowable in biosolids that are applied to the land. Note that this is the concentration in the product that will actually be applied to the land after all processing, treatment, blending and mixing have taken place. These values are *instantaneous* with respect to compliance. Biosolids which exceed a Table 1 value may not be applied to the land. Anytime this happens you need to be in contact with the regional biosolids coordinator.

The Table 3 values are referred to as the *pollutant concentration limits*. These are *monthly average* concentrations. So if three samples are taken in one month, two of them could be above the allowable Table 3 value, but if the average of the three is at or below the Table 3 value those biosolids would be in compliance with Table 3. If your biosolids exceed any of the Table 3 values you should discuss the situation with your regional biosolids coordinator.

Biosolids management generally deals with dry-weight analyses, except for some agronomic rate determinations. Results for pollutants reported as milligrams per liter are almost always unconverted wet weight numbers. Occasionally the results have been converted, but the units were not changed. The conversion to dry weight can make a huge difference (a factor of fifty for a two-percent solids sample).

Example: Convert wet weight to dry weight by dividing the wet weight number by the percent solids:

Sample is 4% solids
Pollutant value is reported as 14 mg/l
 $14 \text{ mg/l} \div .045 \approx 311 \text{ mg/kg of pollutant}$

Analytical results showing non-detects for virtually any metal are suspect, although non-detects can be correct in some cases. Copper and zinc are good indicators here since their concentrations are typically relatively high as compared with some other pollutants. Non-detects for these elements are almost certainly an indication of a sampling or analysis error. The usual culprit is inadequate solids in the sample. The solution here is usually a larger sample volume for analysis.

8.8 Calculations

How do I calculate an agronomic rate of application for my biosolids?

There are different approaches and assumptions in agronomic rate calculations. The preferred approach is provided in Chapter 5 of Ecology's *Biosolids Management Guidelines* (see resource list above). A more in-depth and detailed explanation of nitrogen dynamics can be found in *Ecology's Managing Nitrogen from Biosolids*. Oregon State University has an excellent on-line resource for calculations which can be found at: <http://eesc.orst.edu/agcomwebfile/edmat/html/pnw/pnw511w/default.html>. Keep in mind that your method of agronomic rate calculation and your assumptions used in those calculations are subject to agency approval.

APPENDICES

Appendix A	Department of Ecology Regional Offices
Appendix B	Sample DMRs
Appendix C	Frequency of Analysis
Appendix D	Sample Types
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Appendix F	Data Reporting Examples
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Appendix A

Department of Ecology Regional Offices and Contacts

Region	Counties	Contacts
<p>Central Regional Office 15 West Yakima Avenue, Suite 200 Yakima, WA 98902-3401 (509) 575-2490 Fax (509) 575-2809</p>	<p>Yakima, Benton, Klickitat, Chelan, Douglas, Kittitas, and Okanogan</p>	<p>Operator Outreach: Otis Hampton (509) 884-6807 Compliance Officer: Donna Smith (509) 575-2612 Permit Coordinator: Cindy Huwe (509) 457-7105</p>
<p>Eastern Regional Office 4601 North Monroe Street Spokane, WA 99205-1295 (509) 329-3400 Fax (509) 329-3529</p>	<p>Spokane, Grant, Adams, Whitman, Ferry, Franklin, Stevens, Pend Oreille, Garfield, Columbia, Asotin, Lincoln, and Walla Walla</p>	<p>Operator Outreach: Otis Hampton (509) 884-6807 Compliance Officer: Mike Hepp (509) 329-3536 Permit Coordinator: Cynthia Wall (509) 329-3537</p>
<p>Northwest Regional Office 3190 – 160th Avenue SE Bellevue, WA 98008-5452 (425) 649-7000 Fax (425) 649-7098</p>	<p>King Whatcom, Skagit, Snohomish, San Juan, Kitsap, and Island</p>	<p>Operator Outreach: Carl Jones (360) 407-6431 Compliance Officer: Amy Jankowiak (425) 649-7195 Permit Administrator: Tricia Miller (425) 649-7201</p>
<p>Southwest Regional Office P.O. Box 47775 Olympia, WA 98504-7775 (360) 407-6300 Fax (360) 407-6305</p>	<p>Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Stevenson, Thurston, Wahkiakum</p>	<p>Operator Outreach: Carl Jones (360) 407-6431 Compliance Officer: Pat Bailey (360) 407-6281 Permit Administrator: Carey Cholski (360) 407-6279</p>

Appendix B

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0012345	Month	Year
Facility Name Anytown WWTP	County	Any County
Receiving Water Any River	Plant Operator	
Plant Type Tricking Filter	Population	

Frequency	INFLUENT										EFFLUENT																		
	CONT	1/WEEK	1/WEEK	1/WEEK	1/WEEK	DAILY	1/WEEK	1/WEEK	1/WEEK	1/WEEK	1/WEEK	1/WEEK	DAILY	1/WEEK															
Date	FLOW	MGD	BOD 5-DAY	MG/L	BOD 5-DAY	LBS/DAY	TSS	MG/L	TSS	LBS/DAY	pH	STANDARD UNITS	BOD 5-DAY	MG/L	BOD 5-DAY	% REMOVAL	BOD 5-DAY	LBS/DAY	TSS	MG/L	TSS	% REMOVAL	TSS	LBS/DAY	CHLORINE	UG/L	FECAL COLIFORM	#/100 ML	
1																													
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Total																													
Permit	0.69						6	30	65	173	30	65	173	54	200														
Limits				800			9	45		260	45			260	114	400													

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775
 AVG=Average AVW =Highest Weekly Average GEM=Geometric Mean MAX=Maximum MIN=Minimum
 GM7=highest 7-day Geometric Mean

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

 Name and Title

 Signature

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME
ADDRESS

COUNTY
FACILITY
LOCATION

PERMIT NUMBER			DISCHARGE NUMBER			
MONITORING PERIOD						
YEAR	MO	DAY	TO	YEAR	MO	DAY
(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) (54-61)			(4 Card Only) QUALITY OR CONCENTRATION (38-45) (46-53) (54-61)			NO. EX. (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM				UNITS
PARAMETER	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT					LIMIT	LIMIT				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		I CERTIFY UNDER PENALTY OF LAW, THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS 1001 AND 33 USC § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000.00 AND OR MAXIMUM IMPRISONMENT OF BETWEEN SIX MONTHS AND FIVE YEARS.)					TELEPHONE		DATE		
TYPED OR PRINTED							SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA CODE	NUMBER	YEAR
COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)											

EPA DMR GENERAL INSTRUCTIONS

1. Enter dates beginning and ending “*Monitoring Period*” covered by form where indicated.
2. Enter “*Sample Measurement*” data for each parameter under “*Quantity*” and “*Quality*” in units specified in permit. “*Average*” is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during “*Monitoring Period*,” “*Maximum*,” and “*Minimum*” are normally extreme high and low measurements obtained during “*Monitoring Period*.” (**Note to municipals with secondary treatment requirement:** Enter 30-day average of sample measurements under “*Average*,” and enter maximum 7-day average of sample measurements obtained during monitoring period under “*Maximum*.”)
3. Under “*No Ex*,” enter number of sample measurements during monitoring period that exceed maximum (and/or minimum or 7-day average as appropriate) permit requirement for each parameter. If none, enter “0.”
4. Enter “*Frequency of Analysis*” both as “*Sample Measurement*” (actual frequency of sampling and analysis used during monitoring period) and as “*Permit Requirement*.”
5. Enter “*Sample Type*” both as “*Sample Measurement*” (actual sample type used during monitoring period) and as “*Permit Requirement*.”
6. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date.
7. If no discharge occurs during monitoring period, enter “*No Discharge*” across form in place of data entry.
8. Enter “*Name/Title of Principal Executive Officer*” with “*Signature of Principal Executive Officer of Authorized Agent*,” “*Telephone Number*,” and “*Date*” at bottom of form.
9. Mail signed Report to Office(s) by date(s) specified on permit. Retain copy for your records.

Appendix C

Frequency of Analysis

If the permittee does sampling at a frequency which is not on the list, then he/she should use the following guidelines to determine how to report it: The denominator of the code denotes the sampling period in the permit. For instance, 07 stands for a week, 30 for a month, and YR for a year. Choose the appropriate denominator and then insert the number of samples taken in that time as the numerator. The numerator and denominator may not exceed two places.

Frequency of Analysis Codes:	
Code	Frequency of Analysis
CONT	Continuous during monitoring period
01/HR	Hourly
01/01	Daily
02/01	Twice Daily
01/07	One day per week
02/07	Two days per week
03/07	Three days per week
04/07	Four days per week
05/07	Five days per week
06/07	Six days per week
01/14	Once Every two weeks
01/30	One day per month
02/30	Two days per month
01/60	Once every two months
01/90	One day per quarter
02/90	Two days per quarter
1/180	One day every six months
1/365	One day each year
002	Once every two years
103	Once every three days
104	Once every four days
105	Once every five months
110	Once every ten days
1AS	As needed
1BA	Once per batch
1PD	Once per discharge
1PM	Once per permit cycle
201	Twice during permit cycle
2BA	One batch per year
3BA	Two batches per year
2IS	Twice during irrigation season
BIS	Before and after irrigation season
MIS	Monthly during irrigation season
WIS	Weekly during irrigation season

Appendix D

Sample Type

The table contains the sample types most often used in permits. If the exact description of the sample type used is not in the table, the permittee should simply follow the conventions for the Frequency of Analysis codes that are in the previous table.

Sample Type Codes	
Code	Sample Type
Grab	Individual grab sample
24HC	Twenty-four hour composite
N/A	Continuous monitoring
02	Batch
08	Eight hour composite
1D	One per discharge
3G	Three grab samples per hour
4H	Four hour average
BA	One per batch
BW	One per backwash cycle
CA	Calculated
CP	Composite
CS	Core sample
DA	Daily average
DS	Discrete sample
DT	Daily total
ES	Estimated
G2	Grab twice
G3	Grab three times
G4	Grab four times
G6	Grab six times
GH	Five grab samples in 24 hours
IM	Immersion
IN	Instantaneous
MS	Measured
MT	Metered
OC	Occurs
RC	Recorded
RP	Repressed
VI	Visual
WT	Weekly total

Appendix E

Conversion Tables

1 Million Gallons Per Day (MGD) = 1,000,000 GPD: To convert MGD to GPD, multiply by 1,000,000

1 Gallon Per Day (GPD) = 0.000001 MGD: To convert GPD to MGD, divide by 1,000,000

1 gallon of water = 8.34 pounds

1 part per million (ppm) = 1 milligram per liter (mg/L)

1 part per billion (ppb) = 1 microgram per liter (ug/L)

1 ppm = 1 mg/L = 1,000 ppb = 1,000 ug/L

1ppb = 0.001 ppm = 0.001 mg/L

1 ppm = 1 gallon per 1,000,000 gallons (1gal/MG)

Temperature (°F) = [1.8 x TEMP(°C)] + 32

Temperature (°C) = [TEMP(°F) – 32] x (5/9)

Converting Sludge Gallons to Metric Tons

Dry Metric Tons = $\frac{\text{gallons hauled} \times 0.00417 \text{ tons/gal} \times \% \text{ total solids in decimal form}}{1.1 \text{ tons/metric ton}}$

$0.00417 \text{ tons/gal} = \frac{8.34 \text{ lbs/gallon}}{2000 \text{ lbs/ton}}$ Total Solids (in decimal form) = $\frac{\% \text{ Total Solids}}{100}$

Example: Sludge hauled = 100,000 gals Total Solids = 5.0% or 0.05

Dry Metric Tons = $\frac{100,000 \text{ gals} \times 0.0147 \text{ tons/gal} \times 0.05}{1.1 \text{ tons/metric ton}} = 18.9 \text{ metric tons}$

Precision rule #2 applies.

After applying round rules, the number 9 is rounded up. Increase the preceding digit by one.

Dry Metric Tons = 19

Appendix F

Data Reporting Examples

Precision:

Rules for Precision:

1. For addition or subtraction, the answer may contain no more decimal places than the least precise measurement:
 $3.681 - 0.5 = 13.181$ should be rounded off to the tenths place, with a correct answer of 13.2.
2. For multiplication or division, the least number of significant digits in any of the measurements determines the number of significant digits in the answer:
 $2.5 \times 3.42 = 8.55$ should be rounded off to two significant digits, with a correct answer of 8.6.
3. Numbers such as conversion factors or number of days are counted as numbers and are not considered when determining the number of significant digits or decimal places in the calculation.
4. If both addition/subtraction and multiplication/division are used in a calculation, follow the rules for multiplication/division.

Addition:

3.5682	Rule #1
2.164	
<u>+7.02</u>	
12.7522	Rounding \wedge 12.75

Subtraction:

3.0486	Rule #1
<u>-0.76358</u>	
2.28502	Rounding \wedge 2.2850

Multiplication:

1.6843	Rule #2
<u>x 2.6</u>	
4.37918	Rounding \wedge 4.4

Division:

38.2	Rule #2
<u>\div 4.1458</u>	
9.2141444	Rounding \wedge 9.21

Daily Discharge Computation:

Example One: How to calculate a daily discharge involving units of mass loading.

The five-day BOD concentration is 18 mg/L. The flow on the day the sample was taken was 0.15 MGD.

Step 1: Determine the daily discharge by finding the total mass loading discharged over the day, using the following formula:

$$\text{Total Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$$

Q = Daily flow in MGD for day observed/analytical values are taken.

C = Parameter concentration in mg/L.

$8.34 \frac{\text{lbs/MG}}{\text{mg/L}}$ = unit conversion for weight of one gallon of water in pounds.

$$= 18 \times 0.15 \times 8.34 = 22.518 \text{ lbs/day}$$

Step 2: Precision Rule #2 applies. The daily discharge is 23 lbs/day.

Example Two: How to calculate a daily discharge involving units other than mass loading.

The chlorine residual concentrations from grab samples collected throughout the day are:

Sample One:	1.8 mg/L	Sample Four:	2.0 mg/L
Sample Two:	1.9 mg/L	Sample Five:	1.1 mg/L
Sample Three:	1.6 mg/L	Sample Six:	1.5 mg/L

Step 1: Determine the daily discharge by taking the average of six samples.

$$\frac{1.8+1.9+1.6+2.0+1.1+1.5}{6} = \frac{9.9}{6} = 1.65 \text{ mg/L}$$

Step 2: Precision Rules #3 and #4 apply. The daily discharge is 1.7 mg/L.

Daily Average Computation:

Example 3: How to calculate a daily average at a facility that operates four days a week and discharges four days a week.

The measured five-day BOD daily discharges are:

Week One:	12.4 mg/L, 16.5 mg/L, 11.1 mg/L, 14.8 mg/L
Week Two:	15.2 mg/L, 10.8 mg/L, 10.1 mg/L, 12.7 mg/L
Week Three:	11.6 mg/L, 10.7 mg/L, 13.3 mg/L, 14.0 mg/L
Week Four:	14.5 mg/L, 16.8 mg/L, 17.2 mg/L, 20.1 mg/L

Step 1: Determine the daily average. This is accomplished by adding all of the daily discharges and dividing by the number of daily discharges.

$$\frac{12.4+16.5+11.1+14.8+15.2+10.8+10.1+12.7+11.6+10.7+13.3+14.0+14.5+16.8+17.2+20.1}{16} = \frac{221.8}{16} = 13.8625 \text{ mg/L}$$

Step 2: Precision Rules #3 and #4 apply (Note: The 16 in the denominator is a counted number). Enter 13.8 in the Sample Measurement box.

Concentration Computations:

Example Four: How to calculate and report a 30-day and 7-day average five-day BOD concentration when the sampling frequency requires only one sample per monitoring period.

The measured five-day BOD concentration of a 24-hour effluent composite sample is 31 mg/L.

Step 1: Enter 31 in the Sample Measurement box. (Since only one sample was collected, the “Average” and “Highest Average Weekly” sample measurements are identical.)

Example Five: How to calculate and report a 30-day and 7-day average five-day BOD concentration when the sampling frequency requires only one sample per week.

The measured five-day BOD concentrations are:

Week One: 31 mg/L
Week Two: 37 mg/L
Week Three: 12 mg/L
Week Four: 27 mg/L

Step 1: Determine the highest weekly average five-day BOD concentration to be reported. This occurs in Week Two, where 37 mg/L is the highest concentration. Enter 37 in the Sample Measurement box under the “AVW.”

Step 2: Determine the 30-day average five-day BOD concentration. This is calculated, by averaging the four concentrations:

$$\frac{31 + 37 + 12 + 27}{4} = \frac{107}{4} = 26.75 \text{ mg/L}$$

Step 3: Precision Rules #3 and #4 apply. Enter 27 in the Sample Measurement box under the “AVG” column.

Example Six: How to calculate and report a 30-day and 7-day average five-day BOD concentration when more than one sample per week is collected.

The measured five-day BOD concentrations are:

Week One: 28 mg/L, 30 mg/L
Week Two: 27 mg/L, 25 mg/L
Week Three: 30 mg/L, 29 mg/L
Week Four: 28 mg/L, 32 mg/L

Step 1: Compute concentrations for each week:

$$\text{Week One: Average Concentration} = \frac{28 + 30}{2} = \frac{229}{2} = 29 \text{ mg/L}$$

$$\text{Week Two: Average Concentration} = \frac{27 + 25}{2} = \frac{52}{2} = 26 \text{ mg/L}$$

$$\text{Week Three: Average Concentration} = \frac{30 + 29}{2} = \frac{59}{2} = 29.5 \text{ mg/L}$$

$$\text{Week Four: Average Concentration} = \frac{28 + 32}{2} = \frac{60}{2} = 30 \text{ mg/L}$$

Step 2: Determine the highest average weekly seven-day average five-day BOD concentration to be reported. This occurs in Week Four, where 30 mg/L is the highest concentration. Enter 30 in the Sample Measurement box under “AVW” column.

Step 3: Determine the 30-day average five-day BOD concentration. This is calculated by averaging the eight, five-day BOD concentrations:

$$\frac{28 + 30 + 27 + 25 + 30 + 29 + 28 + 32}{8} = \frac{229}{8} = 28.625 \text{ mg/L}$$

Step 4: Precision Rules #3 and #4 apply. Enter 29 in the Sample Measurement box under the “AVG” column.

Mass Loading Computations:

Example Seven: How to calculate and report a 30-day and 7-day average five-day BOD mass loading when the sample frequency requires only one sample per monitoring period.

The measured five-day BOD concentration of a 24-hour effluent composite is 28 mg/L. The daily flow on the day the sample was collected was 120,000 gallons.

Step 1: Convert flow to million gallons per day (MGD): 120,000 GPD = 0.12 MGD

Step 2: Compute mass loading in lbs/day:

$$\text{Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$$

Q = Daily flow in MGD for each day observed/analytical values are taken.

C = Parameter concentration in mg/L.

$$8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}} = \text{unit conversion for weight of one gallon of water in pounds.}$$

$$= 0.12 \times 28 \times 8.34 = 28.0224 \text{ lbs/day}$$

Step 3: Precision Rule #2 applies. Enter 28 in both of the Sample Measurement boxes. (Since only one sample was collected, the “AVG” and “AVW” Sample Measurement are identical.)

Example Eight: How to calculate and report 30-day average and 7-day average five-day BOD mass loadings when the sampling frequency requires only one sample per week:

The weekly five-day BOD concentrations and daily flows on the days samples were collected were:

Week One:	BOD: 25 mg/L	Flow: 0.13 MGD
Week Two:	BOD: 30 mg/L	Flow: 0.14 MGD
Week Three:	BOD: 35 mg/L	Flow: 0.12 MGD
Week Four:	BOD: 27 mg/L	Flow: 0.15 MGD

Step 1: Compute Mass Loadings for each week:

$$\text{Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$$

Q = Daily flow in MGD for each day observed/analytical values are taken.

C = Parameter concentration in mg/L

$8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$ = Unit conversion for weight of one gallon of water in pounds.

Week One (L ₁):	25 x 0.13 x 8.34 = 27.105 lbs/day
Week Two (L ₂):	30 x 0.14 x 8.34 = 35.028 lbs/day
Week Three (L ₃):	35 x 0.12 x 8.34 = 35.028 lbs/day
Week Four (L ₄):	27 x 0.15 x 8.34 = 33.777 lbs/day

Step 2: The highest of the seven-day averages should be reported. This occurs in both Weeks Two and Three, where 35.028 lbs/day is the highest mass loading. After applying Precision Rule #3, and the rounding rules, enter 35 in the Sample Measurement box under “AVW” column.

Step 3: Compute 30-day average (monthly average) mass loading =

$$\text{MA} = [(L_1 + L_2 + \dots + L_N)/N]$$

MA = Current Monthly Average

L₁, L₂, ...L_N = Daily mass loading in lbs/day for each day 1, 2, ...N, observed/analytical values are taken

N + Number of observed/analytical value days in the monitoring period.

$$\frac{27.105 + 35.028 + 35.028 + 33.777}{4} = \frac{130.938}{4} = 32.7345 \text{ lbs/day}$$

Step 4: Precision Rules #3 and #4 apply. Enter 33 in the Sample Measurement box under “AVG” column.

Example Nine: How to calculate and report the 30-day average and 7-day average five-day BOD mass loadings when more than one sample per week is collected:

The daily five-day BOD concentrations and daily flows on the days that samples were collected were:

Week One:	BOD: 25 mg/L	Flow: 0.13 MGD
	BOD: 23 mg/L	Flow: 0.12 MGD
Week Two:	BOD: 30 mg/L	Flow: 0.14 MGD
	BOD: 29 mg/L	Flow: 0.15 MGD
Week Three:	BOD: 35 mg/L	Flow: 0.12 MGD
	BOD: 33 mg/L	Flow: 0.13 MGD
Week Four:	BOD: 27 mg/L	Flow: 0.15 MGD
	BOD: 29 mg/L	Flow: 0.14 MGD

Step 1: Compute mass loadings for each day:

$$\text{Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$$

Q = Daily flow in MGD for each day observed/analytical values are taken.

C = Parameter concentration in mg/L.

$8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$ = Unit conversion for weight of one gallon of water in pounds.

Week One: Day One (L₁): Mass Loading = 25 x 0.13 x 8.34 = 27.105 lbs/day
Day Two (L₂): Mass Loading = 23 x 0.12 x 8.34 = 23.0184 lbs/day
Week Two: Day One (L₃): Mass Loading = 30 x 0.14 x 8.34 = 35.028 lbs/day
Day Two (L₄): Mass Loading = 29 x 0.15 x 8.34 = 36.279 lbs/day
Week Three: Day One (L₅): Mass Loading = 35 x 0.12 x 8.34 = 35.028 lbs/day
Day Two (L₆): Mass Loading = 33x 0.13 x 8.34 = 35.7786 lbs/day
Week Four: Day One (L₇): Mass Loading = 27 x 0.15 x 8.34 = 33.777 lbs/day
Day Two (L₈): Mass Loading = 29 x 0.14 x 8.34 = 33.8604 lbs/day

Step 2: Compute average mass loadings for each week:

Week One: Average mass loading = $\frac{27.105 + 23.0184}{2} = \frac{50.1234}{2} = 25.0617$ lbs/day

Week Two: Average mass loading = $\frac{35.028 + 36.279}{2} = \frac{71.307}{2} = 35.6535$ lbs/day

Week Three: Average mass loading = $\frac{35.028 + 35.7786}{2} = \frac{70.8066}{2} = 35.4033$ lbs/day

Week Four: Average mass loading = $\frac{33.777 + 33.8604}{2} = \frac{67.6374}{2} = 33.8187$ lbs/day

Step 3: The highest of the seven-day averages should be reported. This applies in Week Two, where 35.6535 lbs/day is the highest mass loading. After applying precision and rounding rules, enter 36 in the Sample Measurement box under “AVW” column.

Step 4: Compute 30-day average (monthly average) mass loading =

$$\text{MA} = [(L_1 + L_2 + \dots + L_N)/N]$$

$$\frac{37.105 + 23.0184 + 35.028 + 36.279 + 35.028 + 35.7786 + 33.777 + 33.8604}{8} = \frac{259.8744}{8} = 32.4843 \text{ lbs/day}$$

Step 5: Precision Rules #3 and #4 apply. Enter 32 in the Sample Measurement box under the “AVG” column.

Example Ten: How to calculate and report the 30-day average nitrogen mass loadings when one sample per day is collected:

The different component parameters of nitrogen have the following concentrations:

Nitrate = 0.5 mg/L Nitrite = 0.06 mg/L Ammonia = 20.25 mg/L TKN = 22.55 mg/L

Organic Nitrogen = TKN – Ammonia = 22.55 mg/L – 20.25 mg/L = 2.30 mg/L

Step 1: Sum the concentrations of the different component parameters of nitrogen.

$$\text{Nitrate} + \text{Nitrite} + \text{Ammonia} + \text{Organic Nitrogen} \\ 0.5 \text{ mg/L} + 0.06 \text{ mg/L} + 20.25 \text{ mg/L} + 2.30 \text{ mg/L} = 23.11 \text{ mg/L}$$

Apply Precision Rule #1. Nitrogen Concentration = 23.1 mg/L

Step 2: Compute the daily mass loading of nitrogen with a daily flow of 100 MGD.

$$\text{Mass Loading (lbs/day)} = Q \text{ (MGD)} \times C \text{ (mg/L)} \times 8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}}$$

Q = Daily flow in MGD for each day observed/analytical values are taken

C = Parameter concentration of mg/L

$$8.34 \frac{\text{lbs} / \text{MG}}{\text{mg} / \text{L}} = \text{Unit conversion for weight of one gallon of water in pounds.}$$

$$\text{Day One (L}_1\text{): Mass Loading} = 100 \times 23.1 \times 8.34 = 19265.4 \text{ lbs/day}$$

Step 3: Compute mass loadings for each day of the month using the methods in Step 2.

Step 4: Compute the 30-day (or monthly) average nitrogen mass loading, using the formula below:

$$\text{MA} = [(L_1 + L_2 + \dots + L_N)]/N$$

MA = Current Monthly Average

L₁, L₂, ... L_N = Daily mass loading in lbs/day for each day 1, 2, ... N, observed/analytical values are taken.

N = Number of observed/analytical value days in the monitoring period.

Step 5: Apply Precision Rules #3 and #4. Round number and enter in Sample Measurement box.

Rolling Average Computation:

Example Eleven: How to calculate 12-month rolling average phosphorus mass loadings from collected sample data.

Step 1: Follow the steps 1-4 for calculating the 30-day average mass loadings as seen in the 30-day average five-day BOD mass loadings above (examples Seven – Nine).

Step 2: Calculate the 12-month rolling average by using the following equation:

$$\frac{\text{MAC} + \text{MA}_1 + \text{MA}_2 + \dots + \text{MA}_{11}}{12} = 12 \text{ MRA}$$

MA_C = Current monthly average

MA₁ = First prior month's monthly average

MA₂ = Second prior month's monthly average
 MA₁₁ = Eleventh prior month's monthly average

MA ₁ = 2.7 mg/L	MA ₇ = 3.0 mg/L
MA ₂ = 3.2 mg/L	MA ₈ = 3.6 mg/L
MA ₃ = 6.0 mg/L	MA ₉ = 2.7 mg/L
MA ₄ = 6.0 mg/L	MA ₁₀ = 2.5 mg/L
MA ₅ = 3.2 mg/L	MA ₁₁ = 1.9 mg/L
MA ₆ = 2.9 mg/L	MA ₁₂ = 2.2 mg/L

$$\frac{2.7 + 3.2 + 6.0 + 6.0 + 3.2 + 2.9 + 3.0 + 3.6 + 2.7 + 2.5 + 1.9 + 2.2}{12} = \frac{41.1}{12} = 3.325 \text{ mg/L}$$

Step 3: Precision Rules #3 and #4 apply. Enter 3.3 in the Sample Measurement box.

Step 4: For the following month, use the current monthly average as well as the previous eleven months.

Current month = MA₁₃ = 3.9 mg/L

$$\frac{3.2 + 6.0 + 6.0 + 3.2 + 2.9 + 3.0 + 3.6 + 2.7 + 2.5 + 1.9 + 2.2 + 3.9}{12} = \frac{41.1}{12} = 3.425 \text{ mg/L}$$

Step 5: Precision Rules #3 and #4 apply. Enter 3.4 in the Sample Measurement box.

Geometric Mean Example:

Example Twelve: How to calculate 7-day and 30-day geometric mean when the sampling frequency requires only one sample per week.

The measured fecal coliform concentrations for each week are:

Week One:	4MPN/100 ml
Week Two:	6 MPN/100 ml
Week Three:	1,100 MPN/100 ml
Week Four:	80 MPN/100 ml

Step 1: Determine the seven-day geometric mean. This occurs in Week Three, where 1,100 MPN/100 ml is the highest concentration. Enter 1100 in the Sample Measurement box under the "GM7" column.

Step 2: Determine the 30-day geometric mean.

Either using:

$$\text{Geometric Mean} = \sqrt[N]{C_1 \times C_2 \times \dots \times C_N}$$

N = Number of observed/analytical values during the monitoring period.

C₁, C₂, ... C_N = Concentration of observed/analytical value during the monitoring period.

$$\text{Geometric Mean} = \sqrt[4]{4 \times 6 \times 1100 \times 80} = \sqrt[4]{2112000} = 38 \text{ MPN/100 ml}$$

Or:

$$\text{Geometric Mean} = \text{Log-1} \frac{[\text{Log}C_1 + \text{Log}C_2 + \dots + \text{Log}C_N]}{N}$$

N = Number of observed/analytical values during the monitoring period.

C₁, C₂, ... C_N = Concentration of observed/analytical value during the monitoring period.

$$\text{Geometric Mean} = 10 \frac{[\text{Log}4 + \text{Log}6 + \text{Log}1100 + \text{Log}80]}{4} = 38 \text{ MPN/100 ml}$$

Enter 38 in the Sample Measurement box under the “GEM” column.

Appendix G

INSTRUCTIONS

Discharge Monitoring Report (DMR) Signature Authorization

Your NPDES/State Waste Discharge permit may require you to periodically submit a DMR. The reports must be signed as follows:

1. For a corporation: by a responsible corporate officer. For the purposes of this section, a responsible corporate officer means:
 - (i) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making function for the corporation, or
 - (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures, or
2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
3. For a municipality, state, federal, or other public agency: by either a principal or executive officer or ranking elected official. A principal executive officer of a federal agency includes:
 - (i) the chief executive officer of the agency, or
 - (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency; or
4. A duly authorized representative of the person described in items 1, 2, or 3. A person or position is duly authorized representative only if:
 - (i) the authorization is made in writing by a person described in paragraph 1, 2, or 3;
 - (ii) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager (NPDES only), superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position - NPDES); and
 - (iii) the written authorization is submitted to Ecology.

Initial authorization or changes to authorization: If an authorized person or a position is no longer accurate, a new authorization satisfying the requirements of paragraph 4 must be submitted to Ecology prior to, or together with, any reports to be signed by an authorized representative. We strongly recommend at least two people be identified to sign DMRs to cover such absences as vacations, illness, retirements, etc.



Discharge Monitoring Report (DMR) Signature Authorization Form

Permittee name: _____ NPDES/State permit no: _____

Facility name: _____ Date: _____

Name of person described in paragraph 1, 2, or 3:	Title:
Signature of person described in paragraph 1, 2, or 3:	Date:

The permittee must notify Ecology of any change in this information during the life of the permit.

Name and/or title of person responsible for signing DMRs:	Phone: ()		
Mailing name:			
Mailing address:	City:	State:	Zip Code:

Name and/or title of person responsible for signing DMRs:	Phone: ()		
Mailing name:			
Mailing address:	City:	State:	Zip Code:

Name and/or title of person responsible for signing DMRs:	Phone: ()		
Mailing name:			
Mailing address:	City:	State:	Zip Code:

Name and/or title of person responsible for signing DMRs:	Phone: ()		
Mailing name:			
Mailing address:	City:	State:	Zip Code:

Return to Permit Administrator at the regional office:

Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3401

Eastern Regional Office
4601 North Monroe Street
Spokane, WA 99205-1295

Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, WA 98008-5452

Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

ECY 070-84 If you need this information in an alternate format, please contact us at 360-407-7529. If you are a person with a speech or hearing impairment, call 711 or 800-833-6388 for TTY.

Date

Permit Coordinator
Department of Ecology
_____ Regional Office

Dear Permit Coordinator:

RE: National Pollutant Discharge Elimination System (NPDES) Permit No. _____

Or

State Waste Discharge Permit No. _____

This letter is to grant authorization to _____, Group ____ Lead Operator, to sign the monthly wastewater treatment plant discharge monitoring reports (DMRs), and all other reports as may be required by the Department of Ecology as per our NPDES/State Waste Discharge permit.

Sincerely,

(NOTE: Federal regulations require this application to be signed as follows: A) For corporation, by a principal executive officer or at least the level of vice president; B) For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or C) For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.)

Appendix H



Initial Non-Compliance Notification*

Washington State Department of Ecology
Water Quality Program

Ecology contact: _____ Region: _____

Incident type: Permit violation Order violation Anticipated non-compliance Bypass/overflow Order Other _____

NPDES/State Waste Discharge #: _____ Facility: _____

Date of non-compliance: _____ Location (outfall, treatment unit, or pump station): _____

Description of non-compliance(s) and cause(s): _____

Has event ceased? Yes No If so, when? _____ Was event due to plant upset? Yes No

NPDES/State Waste Discharge Permit limits violated? Yes No

Start date, time of event: _____ End date, time of event: _____

Date, time oral notification made to Ecology? _____ Ecology official contacted: _____

Date, time notification made to Dept. of Health? _____ Dept. of Health official contacted: _____

Immediate corrective actions: _____

Preventive (long term) corrective actions: _____

Volume (Amount): _____ Was prior Ecology authorization received for this event? Yes No

If so, Ecology official contacted: _____ Date of Ecology approval: _____

Detail the start and end dates and times. (Use additional sheets to provide full detail of the event.)

Facility representative: _____ Title: _____ Date: _____

Phone #: (____) _____ Fax #: (____) _____

Name of Principal Executive Officer or Authorized Agent

Signature of Principal Executive Officer or Authorized Agent

*Ecology may request a more detailed report.

ECY 070-81 *If you need this information in an alternate format, please contact us at 360-407-7529. If you are a person with a speech or hearing impairment, call 711 or 800-833-6388 for TTY.*

INSTRUCTIONS

The Department of Ecology developed this standardized form to simplify the reporting of non-compliance events. The NPDES/State Waste Discharge General Permit conditions require certain discharges of untreated or partially treated sewage must be reported orally within either two hours or 24 hours, and also in writing within five days or as required by the appropriate regulation. This form should be used for these events, as well as to report non-compliance relating to consent orders, scheduled events, and bypass events.

All necessary information can readily be reported to Ecology on this form. Additional information required to describe the event can be attached. Please make additional copies of this form and use as needed. Instructions are provided below. For questions on form use, please contact the appropriate office listed below for the county where the permitted facility is located. Thank you for your cooperation.

Instructions to complete and submit Initial Non-Compliance Notification:

1. Provide facility information and all applicable event details. Dates should be completed in the month/day/year format.
2. Provide your name, title, business phone number, and date report was completed. Use additional sheets, as needed, to provide full detail of the event.
3. For written reports, mail or fax the completed form to the appropriate Ecology regional office listed below. Attach all other non-compliance reports to the DMR submittal (be sure to attach to each set of DMR copies), or mail separately if related to consent order/scheduled event non-compliance. After hours and weekend reporting of unusual discharge events of other non-compliance must be reported through the Ecology Incident Tracker for each region.

Ecology regional offices:

<p>Central Regional Office 15 West Yakima Avenue, Suite 200 Yakima, WA 98902-3401 (509) 575-2490 Fax (509) 575-2809 Counties: Yakima, Benton, Klickitat, Chelan, Douglas, Kittitas, and Okanogan</p>	<p>Eastern Regional Office 4601 North Monroe Street Spokane, WA 99205-1295 509) 329-3400 Fax (509) 329-3529 Counties: Spokane, Grant, Adams, Whitman, Ferry, Franklin, Stevens, Pend Oreille, Garfield, Columbia, Asotin, Lincoln, and Walla Walla</p>
<p>Northwest Regional Office 3190 - 160th Avenue SE Bellevue, WA 98008-5452 (425) 649-7000 Fax (425) 649-7098 Counties: King Whatcom, Skagit, Snohomish, San Juan, Kitsap, and Island</p>	<p>Southwest Regional Office P.O. Box 47775 Olympia, WA 98504-7775 (360) 407-6300 Fax (360) 407-6305 Counties: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Stevenson, Thurston, Wahkiakum</p>



Appendix I

Annual Treatment Facility Review

The following tables and guidelines have been developed to assist in preparing an Annual Treatment Facility Review Report:

_____ Sewage Treatment Plant

Annual Treatment Facility Review Report, _____, 20____, to _____, 20____ (dates).

Peak hour design flow: _____ Design population equivalent: _____
 Peak day design flow: _____ Present population served: _____
 Maximum monthly design flow: _____ Maximum day average design flow: _____

Table 1. Influent Monthly Average Loading

Month	Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)

lbs/day = flow (MGD) X BOD or TSS (mg/L) X 8.34 lbs/gallon

Table 2. Maximum Influent Monthly Average Loading (highest month)

Month	Monthly Average	Design Capacity	% of Design Capacity ¹
Flow (MGD)			
BOD (lbs/day)			
TSS (lbs/day)			

Table 3. Monthly Maximum Data for the Last Three Years (for plotting)

Year	Maximum Monthly Flow	Maximum Monthly BOD	Maximum Monthly TSS

¹Please note, if actual flow or waste load reaches 85 percent of design capacity, the permittee must submit a plan and schedule in accordance with Supplemental Condition _____ of the permit.

Permit Violations Review

This review must provide, on a monthly basis:

1. Effluent limits: date, parameter (including flow), permit limit violated, report value, and 24-hour flow.
2. Raw sewage bypasses: date(s), location, receiving water, duration (hours), and volume.
3. In-plant secondary treatment bypasses: date(s), duration (hours), total plant flow, volume bypassed, and treatment provided (*i.e.*, primary treatment and disinfection).



Sewage Treatment Plant
Annual Infiltration/Inflow Report _____, 20____ to _____, 20____ (dates)

Month	Average Monthly Flow (MGD)			Total Monthly Rainfall (inches)			Population Served			Additional Sewer Lines Added (ft.)		
	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	
January												
February												
March												
April												
May												
June												
July												
August												
September												
October												
November												
December												
Total												
Low Month									Total (feet)			
High Month									Total (miles)			
Yearly Average												

Plant Design Capacity
 Peak Design Flow:
 Average Design Flow:
 Population Equivalents:

Infiltration/Inflow Summary

Year	I/I	% Over Base I/I	% of Aver. Des. Flow

Comments: _____

ECY 070-83 If you need this information in an alternate format, please contact us at 360-407-7529. If you are a person with a speech or hearing impairment, call 711 or 800-833-6388 for TTY.

Appendix J

Reference Web Pages

Biosolids Application

<http://www.ecy.wa.gov/programs/swfa/biosolids/pdf/0299gpapp.pdf>

Ecology Home Page

<http://www.ecy.wa.gov>

Ecology Lab Users Manual

<http://aww.ecology/programs/eap/Documents/labmanual.pdf>

Ecology Water Quality Home Page

<http://www.ecy.wa.gov/programs/wq/wqhome.html>

EPA - National Pollutant Discharge Elimination System (NPDES)

<http://cfpub.epa.gov/npdes>

EPA SSO Rule

http://cfpub.epa.gov/npdes/sso/ssorule.cfm?program_id=4

Lab Accreditation

http://www.ecy.wa.gov/programs/eap/labs/labs_main.html

Reporting Environmental Incidents (spills)

http://www.ecy.wa.gov/programs/spills/forms/nerts_online/environmental_complaints.htm

Wastewater Operator Certification Program

http://www.ecy.wa.gov/programs/wq/wastewater/op_cert/index.html

Water/Wastewater Calculations

<http://www.dep.state.pa.us/dep/deputate/waterops/redesign/PAGES/calculator.htm>

Appendix K

Glossary

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of treatment."

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling, and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring --Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, *e.g.*, a dilution factor of 10 means the effluent comprises 10 percent by volume and the receiving water 90 percent.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater—Water- or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Responsible Corporate Officer-- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or that have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total Suspended Solids is a measure of the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary non-compliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include non-compliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

Appendix L

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