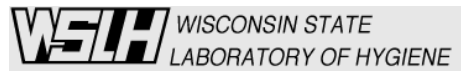


DMRs and Qualified Data



George Bowman
Inorganics Supervisor
State Laboratory of Hygiene



Rick Mealy
Regional Certification Coordinator
DNR-Laboratory Certification



What to report

Anything not marked by pre-printed "XXXXXXXX"

Parameter numbers followed by ** are related to plant operations/ process control monitoring.

Do not include dashes or words in data fields...
no: "NA", "ND", "—", etc.

The only non-numeric character should be the "<"
...and occasionally ">"
...but be sure any ">" doesn't look like a "7"

Reporting multiple results

If more than one sample was analyzed on a particular day (*e.g., pH, residual chlorine, DO*),

Write in the **HIGHEST** value

If the minimum value of a pollutant is of concern (*e.g., DO*)

Write in the **LOWEST** value

This does NOT apply to replicates!

For replicates, generally report the average of the two results.
Replicates really relate to a single sample.

Monitoring more frequently than required

Some facilities monitor more frequently than is required by their permit.

The code addresses this as follows:

NR 205.07 General conditions. (1) (r) Monitoring reports.

2. If the permittee monitors any parameter more frequently than required by the permit... the results of this monitoring shall be included in the calculation and reporting of the data submitted on the DMR or sludge reporting form submitted to the department.

Report ALL results. Include all results in any averages.

Filling Out DMRs

Wastewater Discharge Monitoring Long Report							For DNR Use Only	
Facility Name:	Results should be reported on the line for the day in which MOST of the sample was collected. If composite sample was taken at 7 am on May 17,						Date Received:	
Contact Address:	in which MOST of the sample was collected. If composite sample was taken at 7 am on May 17,						DOC:	
Facility Contact:	MOST was collected on May 16 (7 am to midnight). Therefore report as May 16 data.						FIN:	
Phone Number:							FID:	
Reporting Period:							Region:	
Form Due Date:							Permit Drafter:	
Permit Number:							Reviewer:	
						Office:		
	001	001	001	001	001	002		
Description	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	
Parameter	208	66	457	388	789	211		
Description	Flow Average	BOD5, Total	Solids, Suspended	Phosphorus, Tot	Nitrogen, Ammonia	pH		
Units	MGD	mg/L	mg/L	mg/L	mg/L	su		
Sample Type	Total Daily	24 hr. Flow Prop	24 hr. Flow Prop	24 hr. Flow Prop	24 hr. Flow Prop	Grab		
Frequency	Continuous	3/Week	3/Week	3/Week	3/Week	Daily		
Footnotes								
Sample Results								
			4.5					
		7.1	3.7					
		5.3	< 2					
		8.8	5.8					
			6.2					
		5.9	< 2					
		6.4	4.7					

Monthly & Weekly averages

Week 1 = days 1 - 7 Week 3 = days 15 - 21
 Week 2 = days 8 - 14 Week 4 = days 22 - 28
 Stub week = days 29, 30, 31

Report a weekly average for each of weeks 1-4.
 Do NOT report a weekly average for the "stub" week

DO include **all** data for the month when calculating monthly averages

Reporting Limit Exceedances

Be sure to report the number of times a specific limit was exceeded...

	Sample Point	001	001	001
	Description	EFFLUENT	EFFLUENT	EFFLUENT
	Parameter	208	66	45
	Description	Flow Average	BOD5, Total	Solids, Suspended
	Units	MGD	mg/L	mg/L
Limit(s) In Effect	Monthly Avg		30	30
	Monthly Avg - IT			
	Daily Max			
	Daily Min			
	Weekly Average		45	45

Arrows point to the '1' in the BOD5 Total column for the Monthly Avg row and the '0' in the Solids, Suspended column for the Monthly Avg row.

Dealing with Non-Detects

When the result is less than the LOD (Limit of Detection), write in “<” followed by the value of the LOD

DO NOT use “ND”

To do this correctly, you MUST be aware of what your LOD is for each sample

For calculations (*averages*) use a “0” in place of any “<” result.

A Primer on LODs for BOD

BOD detection limits are theoretically based.

- Assumption: the LEAST amount of depletion allowable is 2 mg/L.
- Based on the highest volume of sample used in a dilution series.
- This technique doesn't consider seed correction.

*BOD bottle
maximum
volume!*

$$\text{LOD mg/L} = 2 \text{ mg/L} \times \frac{300 \text{ mL}}{\text{mL least dilution}}$$

If the highest sample volume used is:	The LOD for that sample is:	The LOQ for that sample is:
300 mL	2	6.7
200	3	10
100	6	20
75	8	26.7
50	12	40

A Primer on LODs for TSS

Like BOD, the LOD for TSS is theoretically based.

- Assumption: Minimum capture weight of 1 mg (of residue).
- Based on: Volume of sample filtered.

Thus, if 1 liter of sample is filtered, then you can "detect" 1 mg per liter.

$$\text{LOD mg/L} = 1000 \times \frac{1 \text{ mg}}{\text{mL sample filtered}}$$

<u>Volume filtered</u>	<u>LOD</u>	<u>LOQ</u>
25 mL	40 mg/L	133 mg/L
50	20	67
100	10	33
250	4	13
500	2	6.7
1000	1	3.3

LODs for other parameters

For anything other than BOD and TSS, you will need to follow the infamous EPA procedure to calculate your LOD.

Be aware that this calculated LOD is a dynamic property. Therefore you should verify it by going through the process annually.

QA/QC Information Boxes

Miscellaneous QA/QC information specific to each parameter reported.

QA/QC Information	LOD				
	LOQ				
	QC Exceedance				
	Lab Certification				

LOD & LOQ Reporting

The LOD and LOQ do not need to be reported for parameters on the list entitled, *“Parameters for Which LOD/LOQ Need Not Be Reported”*.

QA/QC Information	LOD	Enter the LOD for each parameter that requires it				
	LOQ	The LOQ is calculated as $10/3$ times the LOD				
	QC Exceedance					
	Lab Certification No.					

Reporting LOD & LOQ

<u>Parameter</u>	<u>LOD?</u>	<u>LOQ?</u>
66 BOD ₅ , Total	N	N
649 cBOD ₅	N	N
112 Chlorine, Total Residual	Y	Y
Default LOD is 100 ug/L...anything < 100 ug/L is compliant		
789 Nitrogen, Ammonia (NH ₃ -N) Total	Y	Y
388 Phosphorus, Total	N	N
457 Suspended Solids, Total	N	N

Reporting LOD & LOQ

VOCs:

Yes for wastewater; not required for sludge

Semivolatiles:

Yes for wastewater; not required for sludge

PCB/Pesticides/Herbicides...Yes

Inorganics: varies;

Yes for CN-, AOX/TOX, O&G, 00H, SO4

Metals: Generally Yes

NOT required for: Na, K, Ca, Mg, Mn, Fe, Hardness
Dissolved Boron

QC Exceedance Box

Place an “X” in the “QC Exceedance” box if ANY QC Exceedance was observed for that parameter during the month reported.

QA/QC Information	LOD					
	LOQ					
	QC Exceedance	Mark with an “X” to indicate QC exceedances				
	Lab Certification					

Who did the testing?

Provide the 9-digit laboratory certification number associated with the laboratory that did the testing for each reportable parameter

QA/QC Information	LOD					
	LOQ					
	QC Precedence					
	Lab Certification No.	Be sure to identify the lab doing the testing				

- Ex. You do your own BOD & TSS but subcontract testing for ammonia and phosphorus.
- List YOUR LabCert number under BOD and TSS columns.
 - Report the contractor's ID under the ammonia and phosphorus columns.

General Remarks Box

This box is reserved for comments OTHER than those related to laboratory QA/QC problems. Examples include:

- Sloughing of solids causing high values
- Inability to obtain a sample
- Autosampler temperature problems
- Flooding related problems (*if you're under water, you surely are not testing!*)

General Remarks

Report any unusual incidents or observations here

Laboratory QC Comments Box

This box is reserved for comments
SPECIFICALLY related to
laboratory QA/QC problems

Laboratory Quality Control Comments

Report any Quality Control exceedances here
Very important in assessing data quality

Laboratory QA/QC Comments Box

This is a weakness we are seeing during audits

Historically, reporting anything here has been
perceived as a “black mark” against the facility

Time to change history!

- (1) You are required to report this information
- (2) If engineers do NOT see information here,
we cannot assist you in resolving
laboratory problems

The Truth About Qualified Data

Qualified data are NOT necessarily “bad” data.



ALL this means is that the data user (i.e., the DNR) needs to take into consideration the nature of the situation surrounding the qualification when interpreting the results.

Checking with Mr. Webster

qual·i·fy (kwŏl'ē-fī')

v. qual·i·fied, qual·i·fy·ing, qual·i·fies.

v. tr.

1. To describe by enumerating the characteristics or qualities of; characterize.
2. To make competent or eligible for an office, a position, or a task.
3.
 - a. To declare competent or capable; certify.
 2. To make legally capable; license.
4. To modify, limit, or restrict, as by giving exceptions.
5. To make less harsh or severe; moderate.

Qualifying Data - Considerations

- Make sure your comments are meaningful and understandable to the end user.
- Provide enough information so that the DNR can assess the data quality.
- Remember to include qualifiers from subcontract labs!
- Attach comments on a separate sheet if necessary. Write “see attachment” in the QC Comments box.

Qualifying Data - Reference Sample Failures

NR 149.13 (4) PROCEDURE FOR CORRECTING UNACCEPTABLE REFERENCE SAMPLE RESULTS.

(a) All test categories, except category 18– safe drinking water tests. After 2 consecutive reference sample failures the laboratory shall...

2. Qualify all test results of the analytes in the test or test categories which the laboratory has failed to meet acceptance limits on 2 consecutive reference samples

Example - Reference Samples

Situation: You have failed your BOD reference sample for the 2nd consecutive round of testing.

Resolution:

1. Order a 3rd reference sample ASAP
2. Identify and correct the problems
3. Pass the remedial reference sample!
4. Qualify any BOD results on the DMR until you pass a reference sample

Qualifying Data - QC Failures

NR 149.14 (3)(h) If the results of

- known standards,
- spiked samples,
- method blanks, or
- replicates

exceed the quality control limits,

corrective action shall be taken by the laboratory.

The laboratory shall

- reanalyze the affected samples or
- qualify the results *back to the last acceptable quality control check of the same type*

unless the laboratory determines that sample results are unaffected.

Qualifying Data - the “HOWs”

Code definition...

NR 149.04 (21m) “Qualify” means to place a written statement accompanying the test results which identifies anomalies encountered in generating the data.

Reference Sample failures (2 consecutive)...

NR 149.13 (4)(a) 2. Laboratories shall qualify test results by placing a statement in their analytical report [*i.e. the DMR*] stating that the laboratory has failed 2 consecutive reference samples for this analyte or analyte group.


QC Exceedances...

NR 149.14 (3)(h) The results are qualified by reporting that the laboratory analysis was not within the acceptance limits for this test.

QC Examples - Blanks

Situation: Your BOD blank depletions have been unacceptable for the past week. You traced the problem to a new bottle of “Cowboy Bob’s” distilled water.

 ~~BOD blank failed.~~

 5/10/01 to 5/17/01 - BOD blank depleted more than is allowed (0.2 mg/L).
Blank depletions ranged 0.6 to 1.1 mg/L.
Traced to new bottle of water.

QC Examples - Known Standard

Situation: Your BOD glucose-glutamic acid (GGA) exceeded acceptance criteria. You used a new lot of GGA standard the next day and results were fine.

~~☒ GGA exceeded acceptance criteria.~~

☒ 5/7/01 - GGA analyzed this day (235 mg/L) exceeded criteria (198 ± 30.5). Repeated GGA with new lot on 5/12/01. Result was 202 mg/L.

QC Examples - Replicates


Situation: Your influent TSS replicate on 5/17/01 exceeded upper control limit.


~~☒ Replicate failed for TSS.~~

☒ 5/17/01 - Replicate result (5.5 mg/L) for TSS on influent exceeded upper control limit (1.9 mg/L). Replicates are done weekly, so data since 5/10/01 are affected. Heavy rains caused TSS levels to be 3 times typical levels. Did another replicate next day and it passed.

QC Examples - Spikes

Situation: Your phosphorus effluent spike on 5/17/01 exceeded control limits.

 ~~Phosphorus spike exceeded control limit~~

 5/17/01 - Spike for phosphorus on final effluent (35%) exceeded criteria (79-128%).
Final is spiked every two weeks, so data back to 5/3/01 is affected. High phosphorus this day (1.2 mg/L) and the spike amount was too low (0.1 mg/L). I raised the spike amount to 0.5 mg/L, made up a spike the next day and it passed.

Qualifying Data - Final Words

- There is a significant level of QC required in testing, and thus - statistically speaking- you are going to exceed something each month.
- Even a lab doing only BOD and TSS 3x/week can generate up to 24-30 QC samples/ month.
- Add in ammonia & phosphorus, and the number increases to 76-95/month
- Consequently, it's almost an expectation that something will be qualified each month.
- With qualifiers, "less" is not more.

George Bowman
(608) 224-6278

Dr. Bill Sonzogni, Director
State Laboratory of Hygiene
2601 Agriculture Drive
Madison, WI 53718

Rick Mealy
(608) 264-6006

Wisconsin DNR
PO Box 7921
Madison, WI 53707

State Lab web address:

<http://www.slh.wisc.edu/outreach/>

DNR's LabCert homepage:

<http://www.dnr.state.wi.us/org/es/science/lc/>

For more information