

# That Miserable 28 Day Cycle.

## DMR and MRO Reporting

November 2010  
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**Disclaimer:** This document is to be used as a guidance tool; it is not endorsed by IDEM.

Put me out, and end my pain.

Every time I look at the Discharge Monitoring Report and Monthly Report of Operation the confusion is my state of mind. Why can't reporting be cut and dry?

To say the least the DMR and MRO are not documents that should be left for the office staff to prepare. It is a critical part of the POTW operations. These documents contain the only information regulatory agencies receive to determine compliance. The preparer must understand the functions of the treatment facility, expected efficiencies, when the data tells us something has gone wrong or if the incorrect number of significant figures is used it may mean the difference between compliance and non-compliance. If the preparer does not have a detailed understanding of everything a treatment plant is required to accomplish, they should not prepare the MRO or DMR.

The goal today is to put laboratory and plant data in perspective so that the data reported reflects the monthly operation of the plant and it is in compliance with the NPDES permit.

There have been ongoing discussions on how-to report analytical data on the reports sent to IDEM. The NPDES Effluent Limits set the ground work on how data is reported. The NPDES Permit Limits set by EPA and IDEM regulate the amount of an analyte that can be discharged from a treatment plant not the level to which an analyte can be reported. The NPDES Permit may establish the Level of Detection (LOD) or the Level of Quantification (LOQ) that must be achieved or it is understood that all analysis must be reported to the Method Detection Limit (MDL). The data should be reported as determined in the analysis, not the NPDES limits listed for that analysis. In other words if the permit limit is 0.6mg/L and the MDL is 0.02mg/L, all results should be reported down 0.02mg/L not as <0.6mg/L on the MRO and DMR

Data should be reported to the Method Detection Limit whether it is dictated by the procedure, or determined by the laboratory. The MDL's for TSS and BOD<sub>5</sub> can be determined by their procedures stipulating restrictions that must be met before the results are valid. Restrictions for TSS are that the residue must be between 2.5 – 200 mg. The lower limit of 2.5 mg for a 1 liter sample would set the MDL at 2, (whereas 2.5 rounds to 2). CBOD<sub>5</sub> and BOD<sub>5</sub>'s MDL is determined by the minimum depletion of 2 mg/L. All other methods such as ammonia-nitrogen, chlorine, phosphorous, the MDL's determined by each individual laboratory reporting data.

# What are Discharge Monitoring Reports and Monthly Report of Operations?

DMR's (EXAMPLE 1) and MRO's (EXAMPLE 2) are reports that document the operations of a plant and reflect mandatory requirements of the NPDES (EXAMPLE 3) permit. The MRO is not limited to reporting NPDES influent and effluent parameters, but it details the daily operations of different processes in a facility into a monthly summary. The DMR is a summary report reflecting the quality and/or quantity of effluent parameters dictated by the NPDES permit. In Indiana both reports are sent to the Indiana Department of Environmental Management by the 28<sup>th</sup> day of the following month. **If the MRO or DMR are submitted late or not at all it is a violation of the NPDES permit** If a they are submitted late, an explanation should include for the late submittal either in the "Comments" section on the or on a separate sheet of paper.


These reports have to be signed by a IDEM recognized Operator of Record who verifies that all data submitted is the actual data, it is correct and was collected in accordance with the NPDES permit.

## Discharge Monitoring Report

PERMITTEE NAME/ADDRESS (Include full street address if different) NAME   WWTP 2010 ADDRESS   EXAMPLE 1 ROAD   EXAMPLEVILLE, IN FACILITY   WWTP 2010 LOCATION   EXAMPLEVILLE, IN		NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) DISCHARGE MONITORING REPORT (DMR) (2-18) (11-18) PERMIT NUMBER   EX 9432167   DISCHARGE NUMBER   001 MONITORING PERIOD FROM   11   11   11   TO   11   11   31   (20-21) (22-23) (24-25) (26-27) (28-30) (30-31)		Form Approved OMB No. 2040-0004 Approval expires 05-31-08						
		<input type="checkbox"/> Check here if No Discharge		NOTE: Read instructions before completing this form						
PARAMETER (32-37)	SAMPLE MEASUREMENT	(3 Card Only) QUANTITY OR LOADING (54-61)			(4 Card Only) QUALITY OR CONCENTRATION (54-61)			NO. EX (60-63)	FREQUENCY OF ANALYSIS (64-66)	SAMPLE TYPE (69-70)
		AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	MINIMUM (46-53)	AVERAGE (46-53)	MAXIMUM (54-61)			
Oxygen, dissolved (DO) 003000 1 0 0 Effluent Gross	*****	*****			5 DAMN		*****			
pH 004000 1 0 0 Effluent Gross	*****	*****			6 MIN	9 MAX				
Solids, total Suspended 00530 1 0 0 Effluent Gross			lb/d		24 MO AVG	35 WK AV				
Nitrogen, NH3 total, as(N) 00610 1 1 Effluent Gross			lb/d		1.7 MO AV	2.6 WK AV				
E. coli, colony forming (CFU) 51041 1 0 0 Effluent Gross	*****	*****			MO GEO	DAILY MX				
E. coli, max daily sample result 51041 Y 0 0 Effluent Gross (Supplement)	*****	*****				Rep Daily MX				
E. coli, total # of sample results 51041 Y 0 0 Effluent Gross (Supplement)	*****		Total Days Sample			Rep MO total			# of days above 235	
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		I CERTIFY UNDER PENALTY OF LAW THAT THE DATA AND ALL ATTACHMENTS WERE PREPARED AND SUBMITTED TO THE STATE OF INDIANA IN ACCORDANCE WITH THE NPDES PERMIT AND THAT I AM THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR OBTAINING THE INFORMATION. THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE, AND COMPLETE. I AM NOT PROVIDING ANY FALSE OR MISLEADING INFORMATION TO THE STATE OF INDIANA. (E.P.A. 33 CFR 140.23(a)(2)(i)-(iii). Penalties under these regulations include fines up to \$10,000 and or maximum imprisonment of 3 years, if needed and 3 years.)				TELEPHONE		DATE		
BIG BOSS, SUPT/OPTR						123	456-7891	12	27	11
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT				884				
COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)										

EXAMPLE 1

# Monthly Report of Operations

 <b>Monthly Report of Operation</b> <b>Activated Sludge Type</b> <b>Wastewater Treatment Plant</b> State Form 10829 (R3 / 11-08)	Name of Facility WWTP 2010			Permit Number IN0032476		
	Month	Year	Plant Design Flow	Telephone Number		
	February	2011	0.100 mgd	123-456-7891		
	Facility's e-mail address (if available):					
Certified Operator: Name BIG BOSS, SUPT/OPRTR			Class II	Certificate Number 1000		Expiration Date 6/30/2009

Page 3 of 4 State Form 10829 (R/12-2006)

FINAL EFFLUENT															
Day Of Month	Day of Week	Flow		BOD				Total Suspended Solids				Ammonia			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD5 - mg/l	CBOD5 - lbs	CBOD5 - lbs/day	CBOD5 - Weekly Average	Susp. Solids - mg/l	Susp. Solids - lbs	Susp. Solids - lbs/day	Susp. Solids - Weekly Average	Ammonia - mg/l	Ammonia - Weekly Average	Ammonia - lbs	Ammonia - Weekly Average
1	Sun	0.070		11		6.42		8		4.67				1.1	
2	Mon	0.090		8		6.00		5		3.75		1.2		0.9013	
3	Tue	0.070													
4	Wed	0.065													
5	Thu	0.060		15		7.51		6		3.00				1.0	
6	Fri	0.062		17		8.79		7		3.62				0.90	
7	Sat	0.060	0.068	20	14	10.0	7.751	8	6.8	4.00	3.810	1.1	1.060	0.5508	0.6122
8	Sun	0.056		23		10.7		9		4.20				1.3	
9	Mon	0.063		24		12.6		11		5.78				1.3	
10	Tue	0.060						15		7.51					
11	Wed	0.060													
12	Thu	0.063		23		12.1		18		9.46				1.1	
13	Fri	0.062		22		11.4		17		8.79					
14	Sat	0.059	0.060		23		11.71		14		7.147		1.2333		0.6231
15	Sun	0.056		23		10.7								2.0	
16	Mon	0.150		18		22.5		35		43.79				1.9	
17	Tue	0.160													
18	Wed	0.140		28		32.7		45		52.54				5.0	
19	Thu	0.110		24		22.0		35		32.11				4.8	
20	Fri	0.080		22		14.7		33		22.02				4.6	
21	Sat	0.065	0.109	29	24	15.7	19.74	36	36.8	19.52	33.99	5.0	3.8833	2.7121	3.224
22	Sun	0.065		30		16.3		36		19.52				4.1	
23	Mon	0.170		22		31.2		29		41.12				3.3	
24	Tue	0.171													
25	Wed	0.160													
26	Thu	0.146		28		34.1		37		45.05				4.2	
27	Fri	0.090		22		16.5		39		29.27				3.9	
28	Sat	0.077	0.126	19	24	12.2	22.07	33	34.8	21.19	31.23	3.7	3.84	2.3775	3.466
29	Sun	0.078													
Average		0.090		21.4		15.7		23.1	23.1	19.05				2.7	
Maximum		0.171	0.126	30.0	24	34.1	22.07	45	52.542	52.54	5.000	5.0	3.9	5.8415	3.4658
Minimum		0.056	0.060	8.0	14	6.00	5.000	5	3.0024	3.00	3.810	0.90	1.1	0.4657	0.6122
Data		29	4	20	4	20	4	20	24	24	4	23	5	19	4

MONTHLY REMOVAL SUMMARY					Total Monthly Flow:	
Percent Removal	BOD5	S.S.	Ammonia	Phosphorus	(million gallons)	
Primary Treatment	NA	NA				2.618
Secondary Treatment	NA	NA			Percent Capacity	
Tertiary Treatment	NA	NA			(actual flow/design)	90.0%
Overall Treatment						

EXAMPLE 2

NATIONAL  
POLLUTANT  
DISCHARGE  
ELIMINATION  
SYSTEM

EFFLUENT LIMITATIONS

TABLE 1

Parameter	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly Average	Weekly Average	Units	Monthly Average	Weekly Average	Units	Measurement Frequency	Sample Type
Flow [1]	Report	---	MGD	---	---	---	Daily	24-Hr. Total
CBOD <sub>5</sub>	3,547	5,320	lbs/day	20	30	mg/l	Daily	24-Hr. Composite
TSS	4,256	6,384	lbs/day	24	36	mg/l	Daily	24-Hr. Composite
Ammonia-nitrogen								
Summer [2]	301	461	lbs/day	1.7	2.6	mg/l	Daily	24-Hr. Composite
Winter [3]	532	798	lbs/day	3.0	4.5	mg/l	Daily	24-Hr. Composite

TABLE 2

Parameter	Quality or Concentration				Monitoring Requirements	
	Daily Minimum	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
pH [4]	6.0	---	9.0	s.u.	Daily	Grab
Dissolved Oxygen [5]						
Summer [2]	6.0	---	---	mg/l	Daily	10 Grabs/24-Hrs.
Winter [3]	5.0	---	---	mg/l	Daily	10 Grabs/24-Hrs.
Total Residual Chlorine [6]						
Final Effluent [7]	---	0.01	0.03	mg/l	Daily	Grab
<i>E. coli</i> [8]	---	125 [9]	235 [10]	colonies/100 ml	Daily	Grab

EXAMPLE 3

END THE PAIN by developing a PLAN and Sticking with It:

The permittee is responsible for the DMR and MRO; therefore operations and the laboratory should work in tandem with each other. Establish a PLAN and write it down. Document, Document....



Start with the NPDES

- ▶ Required Analysis: make sure the methods used are as required in the permit or approved by IDEM. All results should be reported to MDL of the method, determined by the laboratory.
- ▶ Monitoring Requirements: confirm that the frequency and types of samples collected are the same as outlined in the permit.
- ▶ Reporting Units and Limits: the units and limits are specified in *Part I* of the *NPDES Permit*.

**Significant Figures:**

Significant figures are used to report accurate data. The required number of significant figures or digits is established by the Reporting Limits in Part 1 of the NPDES permit. The number of significant

figures in analytical data represents the all of the numbers that are known to be accurate in addition to one more which is estimated.

The NPDES permit establishes limits that are representative of method sensitivity (accuracy). IDEM states that “when recording the values on the DMR from the MRO only record the value in the same number of digits that is contained in the permit. For example, the permit limit is 17.8 and the actual test result written on the MRO is 11.473. Enter a value with the same number of digits as the permit limit; in this case record 11.5 (apply all standards rules of “rounding”).”

[http://www.in.gov/idem/files/wastewater\\_certification\\_worksheet.doc](http://www.in.gov/idem/files/wastewater_certification_worksheet.doc)

Check with the laboratory to make sure that they are using the appropriate methodology and glassware. If the method does not measure to the limit necessary or using inappropriate glassware (non-Class “A”) can drastically influence the number of significant figures. Remember the least accurate measurement, piece of equipment (meters...glassware) used, helps to determine the number of significant figures used.

### Significant Figure Rules:

- ▶ Nonzero digits (1-9) are significant.
- ▶ Zeroes in the middle of a number are always significant.

Example	Significant Figures
94.072	5
1,023	4
40.56	4

- ▶ Zeroes at the beginning of a number, and serve only to locate the decimal point, (numbers that are less than 1 and immediately follow the decimal point) are not significant.

Example	Significant Figures
0.0034	2
0.0567	3
0.0834	3

- ▶ Zeroes at the end of a number, but before an implied decimal point may or may not be significant. In we can't tell whether the zeroes are part of the measurement or whether they serve only to locate the decimal point (which is implied but not written).

Example	Significant Figures
23,000	2,3,4,5
1,000	1,2,3,4
10	1,2

- ▶ Zeroes at the end of a number and also before a decimal point are significant. For small numbers the significance of the final zero is sometimes indicated by adding a decimal point.

Example	Significant Figures
10.	2
290.	3

- ▶ Zeroes at the end of a number but after the decimal point are significant. Assume that these zeroes wouldn't be indicated unless they were significant.

Example	Significant Figures
132.200	6
900.0	4
1.200	4

A significant figure calculator can be found at [http://ostermiller.org/calc/significant\\_figures.html](http://ostermiller.org/calc/significant_figures.html)

TABLE 1

Parameter	Quantity or Loading			Quality or Concentration		
	Monthly Average	Weekly Average	Units	Monthly Average	Weekly Average	Units
Flow [1]	Report	----	MGD	----	----	----
CBOD <sub>5</sub>	3,547	5,320	lbs/day	20	30	mg/l
TSS	4,256	6,384	lbs/day	24	36	mg/l
Ammonia-nitrogen						
Summer [2]	301	461	lbs/day	1.7	2.6	mg/l
Winter [3]	532	798	lbs/day	3.0	4.5	mg/l

TABLE 2

Parameter	Quality or Concentration				Monitoring Measureme: Frequency
	Daily Minimum	Monthly Average	Daily Maximum	Units	
pH [4]	6.0	----	9.0	s.u.	Daily
Dissolved Oxygen [5]					
Summer [2]	6.0	----	----	mg/l	Daily
Winter [3]	5.0	----	----	mg/l	Daily
Total Residual Chlorine [6]					
Final Effluent [7]	----	0.01	0.03	mg/l	Daily
<i>E. coli</i> [8]	----	125 [9]	235 [10]	colonies/100 ml	Daily

The number of significant figures for each parameter of the above permit is:

Parameter	-----Loading-----		-----Concentration-----	
	Significant figures	Limit lb/day Weekly /Monthly	Significant figures	Limit mg/l Weekly /Monthly
CBOD <sub>5</sub>	<b>4</b>	<b>3547/5320</b>	<b>1 or 2</b>	<b>20/30</b>
TSS	<b>4</b>	<b>4256/6384</b>	<b>2</b>	<b>24/36</b>
Ammonia Nitrogen (S)	<b>3</b>	<b>301/461</b>	<b>2</b>	<b>1.7/2.6</b>
Ammonia Nitrogen (W)	<b>3</b>	<b>532/798</b>	<b>2</b>	<b>3.0/4.5</b>
D.O.			<b>2</b>	<b>6.0</b>
TRC			<b>1</b>	<b>0.01/0.03</b>
pH <i>s.μ.</i>			<b>2</b>	<b>6.0/9.0</b>
<b><i>E. coli</i> Colonies/100ml</b>		<b>Nearest whole number</b>		

### Rounding:

Incorrectly rounding data may result in a permit violation, while correctly rounding data gives an accurate representation of the analysis.

#### Rounding Rules:

- ▶ Round only after all calculations are completed.

► Standard Methods states: “round off by dropping digits that are not significant. If the digit 6, 7, 8, or 9 is dropped, increase preceding digit by one unit and if the digit 0, 1, 2, 3, or 4 is dropped do not alter preceding digit. If the digit 5 is dropped, round of preceding digit to the nearest even number.”

**Examples:**

1.239 rounded to 3 significant figures is 1.24  
 0.0175 rounded to 2 significant figures is 0.018  
 2.25 rounded to 2 significant figures is 2.2

**Because ...**

... the next digit (9) is 5 or more  
 ... the next digit (5) round of preceding digit to the nearest even number  
 ...the next digit (5) round of preceding digit to the nearest even number

**Precision:**

Calculating data or loading rates the final “value” cannot be more accurate than the least precise analysis/measurement value. In other words the final value cannot have more digits or numbers after the decimal point than the least number used.

Precision Rules:

► Addition/Subtraction: the final value reported uses the least number of decimal places or no more *decimal places* than the least precise measurement.

$\begin{array}{r} 13.681 \\ + 0.5 \\ \hline 14.181 \\ \mathbf{14.2} \end{array}$ <p style="text-align: right; margin-right: 20px;"><i>Least precise measurement</i></p>	$\begin{array}{r} 1.0239 \\ - .75436 \\ \hline .26954 \\ \mathbf{.2695} \end{array}$ <p style="text-align: right; margin-right: 20px;"><i>Least precise measurement</i></p>
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► Multiplication/Divisions: the final value reported uses the least number of *significant figures*.

$\begin{array}{r} 1.9654 \\ \times 1.5 \\ \hline 2.9481 \\ \mathbf{2.9} \end{array}$ <p style="text-align: right; margin-right: 20px;"><i>significant figures</i></p>	$\begin{array}{r} 3.9654 \\ \div 2.5 \\ \hline 1.58256 \\ \mathbf{1.6} \end{array}$ <p style="text-align: right; margin-right: 20px;"><i>significant figures</i></p>
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► If both addition/subtraction and multiplication/division are used in a calculation; follow the rules for multiplication/division.

► Numbers such as conversion factors or number of days are counted numbers and are not considered when determining the number of significant figures or decimal places in the calculation.

**Definitions and Reporting Protocol:**

➤ Calculation of Averages: “For all parameters except *E. coli* and Fecal Coliform, calculations that require averaging of sample analyses or measurements of daily discharges shall use an arithmetic mean unless otherwise specified in the permit. *E. coli* and Fecal Coliform are calculated as a geometric mean” (IDEM)

$$\text{Average/AVG} = \frac{\text{sum of data for the monitoring period}}{\text{\#of data points (or \# of sampling days)}}$$

➤ Daily Discharge: “means the total mass of a pollutant discharged during the calendar day or, in the case of a pollutant limited in terms other than mass pursuant to 327 IAC 5-2-11(e), the average concentration\* or other measurement of the pollutant specified over the calendar day or any twenty-four

hour period that represents the calendar day for purposes of sampling. \*pH is the only exception to using an average calculation to determine a Daily Discharge Value. pH values should never be averaged.” (IDEM)

- **Weekly Average:** “the total mass or flow weighted concentration of all daily discharges during any calendar week for which daily discharges are sampled or measured, divided by the number of daily discharges sampled and /or measured during such calendar week.” (IDEM) The weekly average is listed on Saturday, on the MRO, since a calendar week goes from Sunday thru Saturday. When a week overlaps two months, the month with four or more days is where the average is posted. Do not forget to include the data for the days not showing. The MRO on IDEM’s web site will do all calculations correctly, but do not forget if the last week of the month overlaps, the first week of data for the following month must be entered for the weekly average to be correct.
- **Monthly Average:** “the total mass or flow weighted concentration of all daily discharges during a calendar month on which daily discharges are sampled or measured, divided by the number of daily discharges sampled and /or measured during such calendar month.” (IDEM)
- **Daily Maximum:** “The daily maximum discharge limitation is the maximum allowable daily discharge for any calendar day. The ‘daily discharge’ means the total mass of a pollutant discharged during the calendar day or, in the case of a pollutant limited in terms other than mass pursuant to 327 IAC 5-2-11(e), **the average concentration**\* or other measurement of the pollutant specified over the calendar day or any twenty-four hour period that represents the calendar day for purposes of sampling. \*pH is the only **exception** to using an average calculation to determine a Daily Discharge Value. pH values should never be averaged.” (IDEM)
- **MIN/Minimum:** The daily minimum discharge limitation is the minimum allowable daily discharge for any calendar day.
- **Maximum Weekly Average:** is the largest weekly average during the monitoring period.
- **MDL/Method Detection Level:** Permits state, in reference to chlorine, cyanide, mercury and other Metals, that “the MDL shall be derived by the procedure specified for the MDL’s contained in 40 CFR Part 136, Appendix B,.” MDL and LOD (limit of detection) are the equivalent.
- **LOQ/Limit of Quantitation:** “is a measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calibrated at a specified concentration about the method detection level. It is considered the lowest concentration at which a particular contaminate can be quantitatively measured using a specified monitoring contaminate.” The LOQ for chlorine in most permits is 0.06 mg/l which is 3.18 times the MDL.
- **Quantity/Loading or Pounds Formula:** calculate as follows:  
concentration (in mg/L) x flow (in million gallons per day) x 8.34 pounds per gallon.
- **Percent (%) Removal:** calculate as follows:  
$$\text{Percent Removal ( \% )} = \frac{\text{Influent} - \text{Effluent}}{\text{Influent}} \times 100\%$$
  
influent = the calendar month average of the influent concentration;  
effluent = the calendar month average of the effluent concentration.

- Percent Capacity: calculate as follows:

$$\frac{\text{Effluent Average Flow mgd/}}{\text{Design Flow mgd}} \times 100$$

- Geometric mean is defined as the  $n^{\text{th}}$  root, usually the positive  $n^{\text{th}}$  root, of a product of  $n$  factors. In order to calculate the Geometric Mean, any value that is zero (0) must be changed to a 1, in case of E.coli. The IDEM Excel MRO will accurately calculate the geometric mean for E. coli when reported as “0”.

- Recording Concentrations that are at or below the Method Detection Limit:

1. The MDL or LOQ would be reported as is, not as  $\frac{1}{2}$  of that value when averaging data.
2. As per IDEM: “reporting analytical results on the DMR that are below detection levels should be reported using a less than “<” symbol plus the laboratory’s numeric limit of detection for that parameter (e.g. “<5 mg/L”). Do not enter 0, or  $\frac{1}{2}$  of the MDL. When using the IDEMs Excel MRO sheets, never enter a “<” sign, but instead enter the absolute value of the MDL, or the < sign can be hand written on the MRO after calculations are completed.
3. NPDES permits state, concentrations less than the limit of quantitation shall be reported as the actual measured value and concentrations less than the limit reported as less than the value of the limit of detection. For example, cyanide has a MDL of 5.0ug/L and a LOQ of 16.0ug/L. Samples were measured at 12.0, 5.1, 1.0, and 16. 0. All but 1.0ug/L would be reported as they are and 1.0ug/L would be reported as <5.0ug/L. Remember numerical results are reported between the MDL and LOQ, but understand that a result in this range is less certain than one above the LOQ.
4. In the Comments section of the MRO report the days that samples were at or below the MDL for each parameter, every month, with a note on the method used. Example: A laboratories MDL for Ammonia is 0.02 mg/L, for applicable samples they would report on the MRO 0.02 mg/L or <0.02 mg/L and note in the comments section the days that were below 0.02mg/L.
5. *E.coli*: The MDL of *E.coli* is 1, which should be noted in the comments section. IDEM request that instead of reporting TNTC, or too numerous to count, report 63,200 because it is more statistically provable.
6. Chlorine: Reporting chlorine results that are below the LOQ of 0.06 mg/L, report then as analyzed until results are below the established MDL and then are reported as < (less than) the MDL achieved by the laboratory. If the MDL is 0.01 mg/L results would be reported as follows: 0.06, 0.05, 0.04, 0.03, 0.02, and <0.01.

- Report GLI Chlorine Measurements accurately (for GLI Permittee’s only) AS PER IDEM

Permittees whose facilities are located in the northern part of the state may have GLI (Great Lakes Initiative) reporting requirements for Total Residual Chlorine (TRC) that are different from the rest of the state. The permit footnote that corresponds to chlorine reporting will mention “GLI” if it is applicable and will also list any adjustments to the Daily Maximum values, if they apply to the facility.

In general, the GLI chlorine (TRC) footnote states that a value of “0” can replace the actual daily concentration value for chlorine - for the purpose of calculating the Monthly Average - if the actual daily TRC measurement is < 0.06 mg/l. If all or most of the chlorine measurements for a facility are usually below 0.06 mg/l each day (thus an adjusted value of “0” value can be used for each of those days in order to calculate the monthly average), the final monthly average concentration for chlorine should be very low.

It is important to remember that even though an adjusted daily value of “0” can be used to calculate the Monthly Average, the actual/real chlorine measurements must be used to determine and report the Daily Maximum concentration and loading values, and they should not be “0”. At this time, there is no chlorine equipment that measures with an accuracy/reliability of less than 0.01 mg/l or 0.02 mg/l. Thus, no daily TRC measurement should ever be reported as “0”, “0.0”, or “0.00 mg/l” on the Monthly Report of Operation (MRO) or Discharge Monitoring Report (DMR). But, if

no TRC is detected during analysis, the daily value shall be reported as “<0.01 mg/l” or “<0.02 mg/l” (and can be reported as “0.01” or “0.02” to make the calculations simpler), depending on the accuracy level of the sampling equipment. (Refer to the instrument’s instruction manual for accuracy level.)

The following pages present two examples of how to report TRC in the GLI area.

The first example shows how to adjust the daily TRC values when calculating monthly average for a facility that has some TRC values less than 0.06 mg/l and some that are not less than 0.06 mg/l. Because some of the TRC values for this month are not less than 0.06 mg/l, we can anticipate that none of the summary TRC data reported for Monthly Average or Daily Maximum (Concentration or Loading) on the DMR form will have a value of “0”.

The second example shows how to adjust the daily TRC values when calculating Monthly Average for a facility that has all TRC values less than 0.06 mg/l. Because all daily TRC values for this month are less than 0.06 mg/l, we can expect to see the Monthly Average values (for both Concentration and Loading) have a “0” value on the DMR. But again, the Daily Maximum TRC values (for both Concentration and Loading) will not have “0” values.

In both cases, all final values were compliant with the applicable permit limits.

Note: Actual (not adjusted) daily TRC measurements should be entered on the State MRO form. The extra columns in the following examples (to show which data can be adjusted and how) are currently not available on the State MRO forms. These columns can be put into blank or unused columns on your MRO or on separate bench sheets in order to complete adjustments for the Monthly Average calculations.

**Example #1**

Here is an example of a GLI facility required to sample for Chlorine 5 x’s per week. In this case 20 of the 22 values were less than 0.06 mg/l and thus could be adjusted to be a “0” value for monthly averaging purposes.

Day	Flow (MGD)	Res. Chlorine Concentration Daily (mg/l)	< 0.06?	Adjusted GLI Res. Chlorine Conc. Value used to calc. Mnthly Ave.	Chlorine Loading Mnthly Ave.	Chlorine Loading Daily lbs/day
Monday	1.000	0.05 mg/l	Yes	0	0	0.42
Tuesday	1.100	0.03 mg/l	Yes	0	0	0.28
Wednesday	1.120	0.04 mg/l	Yes	0	0	0.37
Thursday	1.000	0.06 mg/l	No	0.06	0.50	0.50
Friday	0.980	0.02 mg/l	Yes	0	0	0.16
Monday	1.120	0.05 mg/l	Yes	0	0	0.47
Tuesday	1.300	0.03 mg/l	Yes	0	0	0.32
Wednesday	1.220	0.04 mg/l	Yes	0	0	0.41
Thursday	1.330	0.03 mg/l	Yes	0	0	0.33
Friday	1.290	0.02 mg/l	Yes	0	0	0.22
Monday	0.850	0.05 mg/l	Yes	0	0	0.35
Tuesday	1.000	0.03 mg/l	Yes	0	0	0.25
Wednesday	0.990	0.04 mg/l	Yes	0	0	0.33
Thursday	0.970	0.05 mg/l	Yes	0	0	0.40
Friday	1.100	0.05 mg/l	Yes	0	0	0.46
Monday	1.000	0.06 mg/l	No	0.06	0.50	0.50
Tuesday	1.400	0.03 mg/l	Yes	0	0	0.35
Wednesday	1.380	0.04 mg/l	Yes	0	0	0.46
Thursday	1.200	0.03 mg/l	Yes	0	0	0.30
Friday	1.300	0.02 mg/l	Yes	0	0	0.22
Monday	0.900	0.05 mg/l	Yes	0	0	0.38
Tuesday	0.980	0.03 mg/l	Yes	0	0	0.25
Monthly Total	24.53			0.12	1.0	
Daily Max		0.06				0.50
Monthly Ave.				0.005	0.045	

0.12/22 Days = 0.005 mg/l Conc. Monthly Average

1.0/22 Days = 0.045 lbs/day Loading Monthly Ave.

**These numbers can be transferred to the DMR, such that they appear as:**

	Loading (lbs/day)		Concentration (mg/l)	
	Monthly Ave	Daily Maximum	Minimum	Daily Maximum
Total Residual Chlorine	0.045	0.50	0.005	0.06
Limits	0.133	0.80	0.01	0.06

**Example #2**

Here is an example of a GLI facility required to sample for Chlorine (TRC) 5 x's per week. In this case all 22 TRC values were less than 0.06 mg/l and thus could be adjusted to be a "0" for monthly averaging purposes.

Day	Flow (MGD)	Res. Chlorine Concentration Daily (mg/l)	< 0.06?	Adjusted GLI Res. Chlorine Conc. Value used to calc. Mnthly Ave.	Chlorine Loading Mnthly Ave.	Chlorine Loading Daily lbs/day
Monday	1.000	0.05 mg/l	Yes	0	0	0.42
Tuesday	1.100	0.03 mg/l	Yes	0	0	0.28
Wednesday	1.120	0.04 mg/l	Yes	0	0	0.37
Thursday	1.000	0.05 mg/l	Yes	0	0	0.50
Friday	0.980	0.02 mg/l	Yes	0	0	0.16
Monday	1.120	0.05 mg/l	Yes	0	0	0.47
Tuesday	1.300	0.03 mg/l	Yes	0	0	0.32
Wednesday	1.220	0.04 mg/l	Yes	0	0	0.41
Thursday	1.330	0.03 mg/l	Yes	0	0	0.33
Friday	1.290	0.02 mg/l	Yes	0	0	0.22
Monday	0.850	0.05 mg/l	Yes	0	0	0.35
Tuesday	1.000	0.03 mg/l	Yes	0	0	0.25
Wednesday	0.990	0.04 mg/l	Yes	0	0	0.33
Thursday	0.970	0.05 mg/l	Yes	0	0	0.40
Friday	1.100	0.05 mg/l	Yes	0	0	0.46
Monday	1.000	0.05 mg/l	Yes	0	0	0.50
Tuesday	1.400	0.03 mg/l	Yes	0	0	0.35
Wednesday	1.380	0.04 mg/l	Yes	0	0	0.46
Thursday	1.200	0.03 mg/l	Yes	0	0	0.30
Friday	1.300	0.02 mg/l	Yes	0	0	0.22
Monday	0.900	0.05 mg/l	Yes	0	0	0.38
Tuesday	0.980	0.03 mg/l	Yes	0	0	0.25
Monthly Total	24.53			0	0	
Daily Max		0.05				0.50
Monthly Ave.				0	0	

0/22 Days = 0 mg/l Conc. Monthly Average      0/22 Days = 0 lbs/day Loading Monthly Average

**These numbers will appear on the DMR as:**

	Loading (lbs/day)		Concentration (mg/l)	
	Monthly Ave	Daily Maximum	Minimum	Daily Maximum
Residual Chlorine	0	0.50	0	0.05
Limits	0.133	0.80	0.01	0.06

## Putting the Plan in Action:

Verify the name, address, permit number, and monitoring period on each sheet of the MRO and DMR.

To complete the MRO collect all pertinent daily data (i.e., flows, precipitation, and analytical results).

Making sure that the NPDES Permit criteria are met:

1. Correct sample site
2. Analysis required
  - a. Method specified
  - b. Detection Limit and reporting units
  - c. Type of sample (grab, composite, etc...)
  - d. Frequency (daily, weekly, biweekly, monthly.etc...)
3. For each parameter or analysis, from the NPDES LIMITS, determine the number of significant figures required for Quantity or loading and Quality or Concentration Limits.

The MRO is divided up by sampling points that are subdivided into the required analysis. Record the data on the on the Monthly Report of Operations on the date collected using the correct number of significant figures. DO NOT use “ND” or “BDL” for non-detect values, use the actual method detection limit determined by the laboratory (i.e., a less than sign followed by the detection limit) and report 63,200 not TNTC for *E. coli*.

Perform all required calculations (loading calculations, averages, percent removal, and record maximum and minimum values). Be sure to report *E. coli* as a geometric mean. **Review** and determine that the information recorded on the MRO is accurate and reflects the operation of the plant. Verify data that is unusual or seems to be out of place with the surrounding data, by reviewing all records, (laboratory, or operational reports).

When all forms are complete, the Certified Operator must sign and date each sheet. A *signature stamp is not acceptable*.

The DMR report reflects the NPDES permit and has specific monitoring requirements for each monitoring period. It consist of NPDES monitoring parameters, results, type, and frequency of samples and the number of times the permit limits were exceeded (exceedances). Each Parameter has two lines: the Sample Measurement line has white or lightly shaded boxes in which the data is recorded using the correct concentration units. If a box contains asterisks, no value is required. Below it is the Permit Requirements line that has shaded (blue) boxes with the permit limit, frequency of analysis and type of sample listed.

To confirm that the requirements of the NPDES permit are met, the data in the Sample Measurement line for loading and concentration should not exceed the limits listed in the Permit Requirement row. For sample type, and frequency the data entered in the Sample Measurement line should meet or exceed that listed in the Permit Requirements line. If not you are in violation of the permit. Enter an explanation in the comments box or attach it to the report as to why this occurred.

With the above information, a copy of the NPDES Permit, Operational information, Laboratory data, and patience a Monthly Report of Operations can be completed.

## Completing **M**onthly **R**eport of **O**perations

### 1. Header information is correct and complete for each page:

**Name of Facility**

**Permit Number**

**Month**

**Year**

**Signature of Certified Operator**

**Signature of principal executive officer or authorized agent**

**Date (month, day, year) of the day signed**

An example follows:

Monthly Report of Operation  
 Activated Sludge Type  
 Wastewater Treatment Plant  
 State Form 10829 (R3 / 11-08)

Signature of Certified Operator	Date (month ,day ,year)
Signature of principal executive officer or authorized agent	Date (month ,day ,year)

Name of Facility WWTP	Permit Number IN0000000	For MonthOf: May	Year 2010
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FINAL EFFLUENT															
		Flow		BOD				Total Suspended Solids				Ammonia			
Day Of Month	Day of Week	Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD5 - mg/l	CBOD5 - mg/l Weekly Average	CBOD5 - lbs	CBOD5 - lbs/day Weekly Average	Suspended Solids - mg/l	Suspended Solids - mg/l Weekly Average	Suspended Solids - lbs	Suspended Solids - lbs/day Weekly Average	Ammonia - mg/l	Ammonia - mg/l Weekly Average	Ammonia - lbs	Ammonia - lbs/day Weekly Average

**2. Reporting daily sample results:**

Enter data making sure that the correct number of significant figures is used for each parameter. When no monitoring or testing has been performed for a parameter, leave that cell blank.

Some parameters when collected in multiples per day can be averaged for that day (such as E. coli), but pH cannot be averaged. Data should be entered exactly as it was received from the laboratory, it cannot be altered. If more significant figures and/or different detection limits are required instruct the lab how the data is to be reported.

Only round data to the correct number digits or significant figures when all calculations are completed.

Refer back to Definitions and Reporting Protocol for more information on the following steps:

- 3. Calculate lbs (pounds)**
- 4. Calculate Weekly Averages**
- 5. Calculate Average, Maximum, and Minimum**
- 6. Complete the Monthly Removal Summary**
- 7. Complete the Comments box**

Comments for the Month (major repairs, breakdowns, process upsets and their causes, in-plant treatment process bypass, etc.):
<ol style="list-style-type: none"> <li>1. Include any problems with laboratory analysis, sample lost in processing, with BOD and E.coli if there were insufficient dilutions, applicable Method Detection Limit and Quantitation Limit if applicable.</li> <li>2. Include maintenance, and operational problems.</li> <li>3. Include explanations of permit violations, include any the 24 hour non-compliance reports.</li> </ol>

**8. Sign and date the report working phone number not one disconnected.**







**Worksheet 2:** Sections of a MRO follow. Complete the required calculations, weekly averages, pounds, and average weekly pounds, to the correct number of significant figures.

**Parameter**      **Significant figures**      **Limit lb/day**      **Significant figures**      **Limit mg/l**  
**CBOD<sub>5</sub>**                      **3547 (4 s.f) / 5320 (4 s.f)**                      **20/30 (1 or 2 s.f)**

Day Of Month	Day of Week	Flow		BOD			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD <sub>5</sub> mg/l	CBOD <sub>5</sub> mg/l Weekly Average	CBOD <sub>5</sub> lbs	CBOD <sub>5</sub> lbs/day Weekly Average
1	Sun	0.070		11			
2	Mon	0.090		8			
3	Tue	0.070					
4	Wed	0.065					
5	Thu	0.060		15			
6	Fri	0.062		17			
7	Sat	0.060		20			

**Answers Worksheet 2**

Calculate lbs (pounds) as follows:

pounds per day = concentration (in mg/L) x flow (in million gallons per day) x 8.34 pounds per gallon

$$11 \text{ mg/L} * 0.070 \text{ mgd} * 8.34 \text{ lb/gal} = 6.426$$

$$8 \text{ mg/L} * 0.070 \text{ mgd} * 8.34 \text{ lb/gal} = 6.008$$

$$15 \text{ mg/L} * 0.070 \text{ mgd} * 8.34 \text{ lb/gal} = 7.511$$

$$17 \text{ mg/L} * 0.070 \text{ mgd} * 8.34 \text{ lb/gal} = 8.796$$

$$20 \text{ mg/L} * 0.070 \text{ mgd} * 8.34 \text{ lb/gal} = 10.01$$

Day Of Month	Day of Week	Flow		BOD			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD <sub>5</sub> - mg/l	CBOD <sub>5</sub> - mg/l Weekly Average	CBOD <sub>5</sub> - lbs	CBOD <sub>5</sub> lbs/day Weekly Average
1	Sun	0.070		11		6.426	
2	Mon	0.090		8		6.008	
3	Tue	0.070					
4	Wed	0.065					
5	Thu	0.060		15		7.511	
6	Fri	0.062		17		8.796	
7	Sat	0.060		20		10.01	

Calculate Weekly Averages:

Average Weekly Effluent Flow Rate (MGD)  

$$\frac{0.070+0.090+0.070+0.065+0.060+0.062+0.060}{7} = 0.068$$

Average CBOD5 lbs/day Weekly Average=  

$$\frac{6.426+6.008+7.511+8.796+10.014}{5} = 7.75$$

Day Of Month	Day of Week	Flow		BOD			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD <sub>5</sub> mg/l	CBOD <sub>5</sub> mg/l Weekly Average	CBOD <sub>5</sub> lbs	CBOD <sub>5</sub> lbs/day Weekly Average
1	Sun	0.070		11		6.426	
2	Mon	0.090		8		6.008	
3	Tue	0.070					
4	Wed	0.065					
5	Thu	0.060		15		7.511	
6	Fri	0.062		17		8.796	
7	Sat	0.060	0.068	20	14.2	10.01	7.75

**Worksheet 3:** The following MRO has laboratory and plant data entered, complete the MRO. Using the following permit limits and MRO with Laboratory entered. Remember significant figures. The design flow: is 0.100 MGD. Again follow the steps for completing an MRO. NPDES limits given below the MRO.

1. Calculate the weekly average
2. Calculate the pounds per day
3. Calculate the weekly average
4. Calculate Average, Maximum, and Minimum

The following are on another “section” of a MRO

5. Complete the Monthly Removal Summary
6. Complete the Comments box.
7. Sign and date the report (even though there is not a signature line on this DMR)

Permit Limits Parameter	-----Loading-----		-----Concentration-----	
	Significant figures	Limit lb/day WK MO	Significant figures	Limit mg/l WK MO
CBOD	3/4	747/1195	1or 2	25/40
TSS	3/4	896/1344	2	30/45
Ammonia Nitrogen (S)	3/4	92.6/140.4	2	3.1/4.7
Ammonia Nitrogen (W)	4	119.5/179.3	2	4.0/6.0
D.O.			2	6.0
TRC			1	0.01/0.03
pH <i>s.μ.</i>			2	6.0/9.0
E. coli Colonies/100ml	Nearest whole number			

<b>Monthly Report of Operation</b> <b>Activated Sludge Type</b> <b>Wastewater Treatment Plant</b> State Form 10829 (R3 / 11-08) Page 3 of 4	Name of Facility			Permit Number		
	WWTP 2010			IN0032476		
	Month	Year	Plant Design Flow	Telephone Number		
	February	2011	0.100 mgd	123-456-7891		
Facility's e-mail address (if available):						
Certified Operator: Name		Class	Certificate Number	Expiration Date		
BIG BOSS, SUPT/OPRTR		II	1000	6/30/2009		

State Form 10829 (R/12-2006)

**FINAL EFFLUENT**

Day Of Month	Day of Week	Flow		CBOD <sub>5</sub>				Total Suspended Solids				Ammonia			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD <sub>5</sub> - mg/l	CBOD <sub>5</sub> - mg/l Weekly Average	CBOD <sub>5</sub> - lbs/day	CBOD <sub>5</sub> - lbs/day Weekly Average	Susp. Solids - mg/l	Susp. Solids - mg/l Weekly Average	Susp. Solids - lbs/day	Susp. Solids - lbs/day Weekly Average	Ammonia - mg/l	Ammonia - mg/l Weekly Average	Ammonia - lbs	Ammonia - lbs/day Weekly Average
1	Sun	0.07		11				8				1.1			
2	Mon	0.09		8				5				1.2			
3	Tue	0.07													
4	Wed	0.065													
5	Thu	0.06		15				6				1.0			
6	Fri	0.062		17				7				0.9			
7	Sat	0.06	0.0681	20				8	6.8			1.1	1.06		
8	Sun	0.056		23				9				1.3			
9	Mon	0.063		24				11				1.3			
10	Tue	0.06						15							
11	Wed	0.06													
12	Thu	0.063		23				18				1.1			
13	Fri	0.062		22				17							
14	Sat	0.059													
15	Sun	0.056		23								2.0			
16	Mon	0.15		18				35				1.9			
17	Tue	0.16													
18	Wed	0.14		28				45				5.0			
19	Thu	0.11		24				35				4.8			
20	Fri	0.08		22				33				4.6			
21	Sat	0.065		29				36				5			
22	Sun	0.065		30				36				4.1			
23	Mon	0.17		22				29				3.3			
24	Tue	0.171													
25	Wed	0.16													
26	Thu	0.146		28				37				4.2			
27	Fri	0.09		22				39				3.9			
28	Sat	0.077		19				33				3.7			
29	Sun	0.078													
Avg															
Max															
Min															
Data															

MONTHLY REMOVAL SUMMARY					Total Monthly Flow:
Percent Removal	BOD5	S.S.	Ammonia	Phosphorus	(million gallons)
Primary Treatment	NA	NA			2.618
Secondary Treatment	NA	NA			
Tertiary Treatment	NA	NA			
Overall Treatment					Percent Capacity (actual low/design) 90.0%

Answers Worksheet 3

Day Of Month	Day of Week	FINAL EFFLUENT													
		Flow		BOD				Total Suspended Solids				Ammonia			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD5 - mg/l	CBOD5 - mg/l Weekly Average	CBOD5 - lbs	CBOD5 - lbs/day Weekly Average	Susp. Solids - mg/l	Susp. Solids - mg/l Weekly Average	Susp. Solids - lbs	Susp. Solids - lbs/day Weekly Average	Ammonia - mg/l	Ammonia - mg/l Weekly Average	Ammonia - lbs	Ammonia - lbs/day Weekly Average
1	Sun	0.070		11		6.426		8		4.673		1.1		0.6426	
2	Mon	0.090		8		6.008		5		3.755		1.2		0.9013	
3	Tue	0.070													
4	Wed	0.065													
5	Thu	0.060		15		7.511		6		3.004		1.0		0.5007	
6	Fri	0.062		17		8.796		7		3.620		0.90		0.4657	
7	Sat	0.060	0.068	20	14.2	10.01	7.75	8	6.8	4.006	3.812	1.1	1.1	0.5508	0.6122
8	Sun	0.056		23		10.74		9		4.206		1.3		0.6075	
9	Mon	0.063		24		12.618		11		5.783		1.3		0.6835	
10	Tue	0.060						15		7.510					
11	Wed	0.060													
12	Thu	0.063		23		12.092		18		9.463		1.1		0.5783	
13	Fri	0.062		22		11.383		17		8.796					
14	Sat	0.059	0.060	23.0			11.7		14		7.152		1.2		0.6231
15	Sun	0.056		23		10.748						2.0		0.9346	
16	Mon	0.150		18		22.532		35		43.81		1.9		2.378	
17	Tue	0.160													
18	Wed	0.140		28		32.712		45		52.57		5.0		5.842	
19	Thu	0.110		24		22.031		35		32.13		4.8		4.406	
20	Fri	0.080		22		14.687		33		22.03		4.6		3.071	
21	Sat	0.065	0.109	29	24.0	15.730	19.7	36	36.8	19.53	34.01	5.0	3.9	2.712	3.224
22	Sun	0.065		30		16.273		36		19.53		4.1		2.224	
23	Mon	0.170		22		31.210		29		41.14		3.3		4.682	
24	Tue	0.171													
25	Wed	0.160													
26	Thu	0.146		28		34.114		37		45.08		4.2		5.117	
27	Fri	0.090		22		16.523		39		29.29		3.9		2.929	
28	Sat	0.077	0.126	19	24.2	12.209	22.07	33	34.8	21.20	31.25	3.7	3.8	2.378	3.466
29	Sun	0.078													
Avg		0.090		21.4		15.72		23.1		19.06		2.71		2.190	
Max		0.171	0.126	30	24.2	34.11	22.066	45	36.8	52.57	34.01	5.0	3.89	5.842	3.466
Min		0.056	0.060	8	14.2	6.008	7.7508	5	6.8	3.004	3.812	0.90	1.1	0.4657	0.6122
Data		29	4	20	4	20	4	20	4	20	4	19	4	19	4
<b>MONTHLY REMOVAL SUMMARY</b>												Total Monthly Flow: (million gallons) 1.3			
Percent Removal				BOD5		S.S.		Ammonia		Phosphorus					
Primary Treatment				NA		NA									
Secondary Treatment				NA		NA						Percent Capacity (actual flow/design) 90.0%			
Tertiary Treatment				NA		NA									
Overall Treatment															

**Worksheet 4: Complete the Monthly Removal Summary**

Day Of Month	RAW SEWAGE				PRIMARY		SECONDARY		FINAL EFFLUENT			
	Influent Flow Rate (if metered) MGD	CBOD5 - mg/l	Susp. Solids - mg/l	Ammonia - mg/l	CBOD5 - mg/l	Susp. Solids - mg/l	CBOD5 - mg/l	Susp. Solids - mg/l	Flow	BOD	TSS	NH <sub>3</sub>
Average	0.273	100	150	8.7	77	53	25	36	0.272	13	3	3.5
Maximum	0.501	143	120	11.2	179	101	158	185	0.500	20	15	12
Minimum	0.19	28	22	4.8	37	31	5	11	0.189	2	1.9	2.5
No. of Data	31	31	31	31	31	31	31	31	31	31	31	31
MONTHLY REMOVAL SUMMARY					Total Monthly Flow:							
Percent Removal	BOD <sub>5</sub>	S.S.	Ammonia		(million gallons) 1.3							
Primary Treatment					Percent Capacity							
Secondary Treatment												
Tertiary Treatment												
Overall Treatment												
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 gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the 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.					Signature of Certified Operator				Date (month, day, year)			
					Signature of principal executive officer or authorized agent				Date (month, day, year)			

**Answers Worksheet 4**

Total Monthly Flow: is the sum of the influent flow.

Percent Capacity (Effluent Average Flow mgd/ Design Flow mgd) \* 100    (.272/.300)\*100 = 90.7

Percent Removal [(IN - OUT) / IN] \* 100

	BOD <sub>5</sub>		S.S.	
Primary	[(100-77)/100]*100	23.0	[(150-53)/100]*100	64.7
Secondary	[(77-25)/77]*100	67.5	[(53-36)/100]*100	32.1
Tertiary	[(25-13)/13]*100	48.0	[(36-3)/100]*100	91.7
Overall	[(100-13)/100]*100	87.0	[(100-3)/100]*100	97.0
<b>Ammonia</b>	[(8.7-3.5)/8.7]*100	59.8		

MONTHLY REMOVAL SUMMARY					Total Monthly Flow:	
Percent Removal	BOD <sub>5</sub>	S.S.	Ammonia		(million gallons) 1.3	
Primary Treatment	23.0	64.7			Percent Capacity	
Secondary Treatment	67.5	32.1				
Tertiary Treatment	48.0	91.7				
Overall Treatment	87.0	97.0	59.8			
					.300 mg/d	

Complete the Comments box.

Comments for the Month (major repairs, breakdowns, process upsets and their causes, in-plant treatment process bypass, etc.):

4. Include any problems with laboratory analysis, sample lost in processing, with BOD and E.coli if there were insufficient dilutions, applicable Method Detection Limit and Quantitation Limit if applicable.
5. Include maintenance, and operational problems.

Sign and Date the MRO.

## Transferring the Data to the DMR from the MRO

Generic DMR form

Upon receiving the DMR forms review them for accuracy. Check the NPDES permit limitations with the DMR Permit Measurement lines to make to ensure that the both limits are the same

Complete all empty white or lightly shaded boxes in the Sample Measurement rows. If boxes have asterisks printed in them they do not have to be completed.

All values below detection limits, on the DMR, should be indicated with a less than sign (<) and the detection limit or reporting limit. Make sure that the units are as in the permit.

Submit all forms even if there is no data to report; the checkbox labeled “No Discharge,” should be used when applicable.

If there is some other reason for missing data, note the information on the DMR, and attach an explanation.

When a permit contains both an average and a maximum limit for a parameter, and sampling is required only once in the monitoring period, the value must be placed in both the average and maximum boxes.

① **Permittee Name/Address:** make sure that all of the information (facility name, address, location, ATTN: line which would be the Operator of Record) is correct and complete.

**Facility Location** – Enter the address of the actual location of the wastewater treatment facility if it is different than the mailing address.

② **Permit Number:** The permit number begins with the state abbreviation followed by seven numbers and should match the number on the permit.

③ **Permitted Feature:** Is a permitted discharge point, (outfall), it has required monitoring by the NPDES permit. Each outfall number is specific to a discharge point (if there is more than one) and 001 generally refers to the primary discharge point. If more than one Outfall is permitted make sure to enter the correct data corresponding to the outfall listed.

④ **Monitoring Period:** Is the time period in which the report covers and it includes the first to the last day of the monitoring period, whether is it is monthly, quarterly, etc. Usually the permittee will only receive DMR forms for the required monitoring period. As designated on the report they are numeric and listed as month, day, and year.

⑤ **No Discharge:** if there was not any discharge from this particular outfall during the monitoring period check the No Discharge box, located in the upper right side of the DMR. If you did not have a discharge or flow from your facility for a specific outfall during the monitoring period, "No Discharge" must be indicated on the DMR. You may do indicate no discharge by either checking this box or writing "No Discharge" clearly across the DMR.

PARAMETER (301-311)	SAMPLE MEASUREMENT PERMIT REQUIREMENT	IDENTIFY OR DISCLOSE (301-311)			IDENTIFY OR DISCLOSE (301-311)			NO DISCHARGE	PERMIT	DATE
		ADDRESS	SALESLINE	UNITS	ADDRESS	SALESLINE	UNITS			
Nitrogen, NH3 total as(N) 00610 1 1 Effluent Gross	SAMPLE MEASUREMENT PERMIT REQUIREMENT			lb/d	*****		mg/L			
E. coli, colony forming (CFU) 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT PERMIT REQUIREMENT	*****	*****		*****		CUF/100ml			
E. coli, max daily sample result 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT PERMIT REQUIREMENT	*****	*****		*****	*****	CFU/100ml			
E. coli, total # of sample results 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT PERMIT REQUIREMENT	*****		Total Days Sample	*****	*****	# of days above 235			

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER BIG BOSS, SUPT/OPTR	TELEPHONE 123 456-7891	DATE 12 27 11
TYPED OR PRINTED	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

⑥ **Parameter:** It is the analyte that was analyzed, such as ammonia (NH<sub>3</sub>). Each box will give the parameter followed on the next line by a five digit number parameter code (for the analyte) and then a three digit code for the sampling location.

A parameter that is not monitored monthly will appear on the month that it is to be reported. Quarterly monitoring will appear on the forms in January to March, April to June, July to September, and October to December, Semi-Annual in January to June and July to December, and the Annual is in December, unless otherwise stated in the permit.

⑦ **Sample Measurement:** is two sections that are divided into columns (A) "Quantity or Loading" (with 2 columns) or (B) "Quality or Concentration" (with 3 columns). If there are asterisks (\*\*\*\*) in the boxes data is not required by the permit. Information obtained from the Monthly Report of Operations is entered in the Sample Measurement row (white boxes or lightly shaded blue on IDEM forms), for each corresponding parameter that is located at the bottom of the MRO (average, maximum, minimum, and data). Be sure to report the results in the correct row.

When a permit contains both an average and a maximum limit for a parameter, and sampling is required only once in the monitoring period, the value must be placed in both the average and maximum boxes. This occurs commonly with Mercury and with some other parameters as well.

This information is obtained from the NPDES Permit.

⑧ **Permit Requirement:** Is the actual permit limit in the lower shaded boxes. Verify that the DMR and the NPDES permit are the same by reviewing each of the parameters, quantity or loading rates limits, quality or concentration limits, units, frequency of analysis and sample type for accuracy. If it is not the same as the permit contact the person listed in the upper right side of the DMR.

⑨ **Units** - There are two columns for the units one each following "Quantity or Loading," and "Quality or Concentration." Data is to be reported in the same units as stated on the DMR. If necessary do the required calculations to obtain the correct reporting units. If data is not reported in the units delineated in the permit then this can generate either false compliance or false noncompliance in the EPA database, both of which are considered violations.

If data is not reported in the correct units is considered invalid and a violation of the permit.

⑩ **No. Ex.** - Number of Exceedances or Excursions. This column is used to record the number of results that exceeded the effluent limits in your permit. In the case of a maximum or minimum limit, each analysis that violates this limit shall be counted. Indiana permits limits are weekly averages /monthly averages, except a few parameters such as chlorine, E.coli...etc. There are instructions for the 2010 DMR on the Web at <http://www.in.gov/idem/5104.htm> that help explain how to count "excursions" (also called exceedences,) Below are comments from Don Daily, Chief of Inspections.

1. Monthly Average limits and Weekly Average limits only apply to Averaged values (not daily). (Of course, if you only collect one sample per week, that sample becomes the value that will be compared to the Weekly Average limit.)
2. Daily Maximum limits do apply to Daily values.
3. At a maximum, there can only be one Monthly Average exceedence per month for Loading and only one Monthly Average exceedence per month for Concentration, for any one parameter. If both Monthly Average Loading and Monthly Average Concentration are exceeded, the total Monthly Average excursion is 2.
4. At a maximum, there can only be one Weekly Average exceedence per week for Loading and only one Weekly Average exceedence per week for Concentration, for any one parameter. If there are 4 weeks in a month, that would be 8 Weekly Average excursions. If there are 5 weeks in a month, that would be 10.
5. Thus, for a parameter that has Weekly Average limits and Monthly Average limits (for both Loading and Concentration), the highest amount of excursions that can be counted for that month are 12 (for a five week month) or 10 (for a four week month) – regardless of how many samples were collected for that parameter.

①A **Frequency of Analysis:** enter in the upper row of this column, (white boxes or lightly shaded blue on IDEM forms), the *actual* number of days that the parameter was monitored, and in the lower shaded row is the minimum required by the permit. If the number of days exceeded the permit, report that number of days. If the number of samples submitted does not meet the permit requirement, enter a written explanation in the comments section or attach it to the DMR to reflect the actual type or frequency that was submitted.

The sampling frequency “shorthand” is determined as follows: The bottom (denominator) number would be the sampling period in the permit. For instance, 07 represents a week, 30 a month, and YR for a year. The numerator would be the actual number of days that samples were taken. Examples are:

<u>Code</u>	<u>Frequency of Sampling Required</u>
Report	Reporting purposes only (no limit)
1/1 or 31/31	Continuous monitoring
2/31	two times in a thirty-one day month
01/07	Once Per Week (Weekly)
01/01	Daily, One Per Day
01/DD	Once Per Discharge Day
01/YR	Once Per Year (Annually)
01/90	Once Every 3 Months (Quarterly)
01/30	Once Per Month (Monthly)
02/SH	Once Per Shift
01/BA	Once Per Batch
12/01	12 Times Per Day
03/07	3 Times Per Week
02/14	Every 2 Weeks
01/DW	Once Per Discharge Week
10/30	Times Per Month
WH/DS	When Discharge Occurs
02/07	Twice Per Week
02/90	Twice Quarterly
02/DS	Three Per Discharge
01/RN	Once Per Rn Event

①B **Sample Type:** The actual sample type used during the monitoring period is to be logged in the upper row (white boxes or lightly shaded blue on IDEM forms) and in the lower shaded box is the sample type required by the NPDES permit. If the sample submitted **is not the one specified by the permit**, enter a written explanation in the comments section or attach it to the DMR to reflect the actual type or frequency that was submitted.

On pre-printed DMR’s the sample type required by your permit is listed in the shaded boxes under each white box. Examples are:

<i>Description</i>	<i>Abbreviation</i>	<i>Description</i>	<i>Abbreviation</i>
Grab	GR	Meter	MT
Composite	CP	Recorder	RC
24-hour	COMP24	Occurs	OC
Composite			
Continuous	CONT	RCOTOT	RT
		(means <b>Recording</b> Totalizer and it is used for Total Flow for the monitoring period.)	
Calculated	CA	Totalizer	TOTALZ
Estimated	ES	Visual	VI
Instantaneous	IN	Measured	MS

①C **Name/Title Principal Executive Officer or Authorized Agent:** The name and title of the responsible person should be printed at the bottom of the form of each page. See your permit for information on who may sign the DMRs.

①D **Certification Statement:** It is very important that you read and understand this certification statement. By signing the DMR, you are certifying to IDEM, under penalty of law, that the information on the DMR is true and accurate.

①E **Signature: NO SIGNATURE STAMPS!!** Every page of the DMR must be signed by the authorized Principal Executive Officer or Authorized Agent. In the event a revised or corrected DMR is necessary, an original authorized signature and the date of the signature is required on each page. Check the **Revised** box at the top of each form that was revised.

①F **Date & Telephone Number** - The *actual* date that the DMR is signed by the Principal Executive Officer, certifying and authenticating the data submitted on the DMR and a contact phone number.

①G **Comments** - This section may contain clarifying information pertaining to the DMR.

①H **Page Numbers** - The number of each page is listed in the lower right hand corner of the DMR.

**REMINDERS**

- KEEP A COPY OF THE MRO AND DMR FOR YOUR RECORDS.
- If violations of permit requirements are reported, enter an explanation in the “Comments” section on the bottom of the DMR form describing the cause and corrective actions taken, and reference each violation by date. If not enough space at the bottom of the page, attach an additional sheet.
- As per IDEM: “Unless there was no discharge, FILL IN ALL BLANKS! If any fields are left blank, the federal ICIS-NPDES database automatically generates “non-receipt violations”, which may subject you to enforcement action. Fill in each empty box with an asterisk (\*) for “non-sampled conditional data” and explain the permit condition that allows for not reporting the results in the comments section at the bottom of the DMR form or on an attached page.”

**Worksheet 5:** Referencing the MOR below complete the following DMR.

**Monthly Report of Operations**

Day Of Month	Day of Week	FINAL EFFLUENT													
		Flow		BOD				Total Suspended Solids				Ammonia			
		Effluent Flow Rate (MGD)	Effluent Flow Weekly Average	CBOD5 - mg/l	CBOD5 - mg/l Weekly Average	CBOD5 - lbs	CBOD5 - lbs/day Weekly Average	Susp. Solids - mg/l	Susp. Solids - mg/l Weekly Average	Susp. Solids - lbs	Susp. Solids - lbs/day Weekly Average	Ammonia - mg/l	Ammonia - mg/l Weekly Average	Ammonia - lbs	Ammonia - lbs/day Weekly Average
29	Sun	0.078													
Avg		0.090		21		15.72		23		19.06		2.7		2.190	
Max		0.171	0.126	30	24	34.11	22.07	45	37	52.57	34.01	5.0	3.9	5.842	3.462
Min		0.056	0.060	8	14	6.008	7.751	5	6.8	3.004	3.812	0.90	1.1	0.4657	0.6122
Data		29	4	20	4	20	4	20	4	20	4	19	4	19	4
MONTHLY REMOVAL SUMMARY														Total Monthly Flow: (million gallons)	
Percent Removal			BOD5		S.S.		Ammonia		Phosphorus						2.618
Primary Treatment			NA		NA										
Secondary Treatment			NA		NA										
Tertiary Treatment			NA		NA										
Overall Treatment															90.0%
														Percent Capacity (actual flow/design)	

## Discharge Monitoring Report

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>Solids, total suspended</b>  00530 1 0 0 Effluent Gross	SAMPLE MEASUREMENT			lb/d	*****			mg/L			
	PERMIT MEASUREMENT	<b>896</b>	<b>1344</b>		X	<b>30</b>	<b>45</b>				Daily
<b>Nitrogen, ammonia total (as N)</b>  00610 1 0 0 Effluent Gross	SAMPLE MEASUREMENT			lb/d	*****			mg/L			
	PERMIT MEASUREMENT	<b>119.5</b>	<b>179.3</b>		*****	<b>4.0</b>	<b>6.0</b>				Daily
<b>BOD, carbonaceous, 05 day, 20 C</b>  80082 1 0 0 Effluent Gross	SAMPLE MEASUREMENT			lb/d	*****			mg/L			
	PERMIT MEASUREMENT	<b>747</b>	<b>1195</b>			<b>25</b>	<b>40</b>				Daily
<b>Flow, total</b>  82220 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	2.618	Mgal/d	*****	*****	*****				
	PERMIT MEASUREMENT		Report MO TOTAL								

### Answers Worksheet 5

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>Solids, total suspended</b>  00530 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	19.06	34.01	lb/d	*****	23	37	mg/L	0	1/1	COMP24
	PERMIT MEASUREMENT	<b>896</b>	<b>1344</b>			X	<b>30</b>				
<b>Nitrogen, ammonia total (as N)</b>  00610 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	2.190	3.462	lb/d	*****	2.7	3.9	mg/L	0	1/1	COMP24
	PERMIT MEASUREMENT	<b>119.5</b>	<b>179.3</b>			*****	<b>4.0</b>				
<b>BOD, carbonaceous, 05 day, 20 C</b>  80082 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	15.7	22.07	lb/d	*****	21	24	mg/L	0	1/1	COMP24
	PERMIT MEASUREMENT	<b>747</b>	<b>1195</b>				<b>25</b>				
<b>Flow, total</b>  82220 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	2.618	Mgal/d	*****	*****	*****		0	1/29	RCOTOT
	PERMIT MEASUREMENT		Report MO TOTAL								

In September 2008 IDEM published the fact sheet, Implementation of Rules Concerning E.coli Bacteria in Water of the State, which was effective on April 17, 2008. The rule established that 10% of the E.coli exceedence per month would not result in non-compliance issues when 10 or more than samples were analyzed per month.

In essence the rule states that in order for wastewater treatment plant to be in compliance they must meet the following criteria:

1. That the geometric mean of *E. coli* of all samples analyzed in a calendar month does not exceed 125 colony forming (cfu) units or most probable number (mpn) per 100 ml.

2. When analyzing 10 or more samples per month that only 10% of the samples may exceed the 235 cfu or mpn as a daily maximum.

As a reference, for reporting *E. coli* an abbreviated DMR form is shown below.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
E. coli, colony forming units (CFU) 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		**** **	①	②	CFU/100mL		1/1	GRAB
	PERMIT MEASUREMENT				**** **	125 MO GEO	235 DAILY MX			Daily	GRAB
E. coli, maximum daily sample result 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	*****		**** **	*****	③	CFU/100 mL		1/1	GRAB
	PERMIT MEASUREMENT				**** **	*****	Report DAILY MAX			Daily	GRAB
E. coli, total number of sample results 51484 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	④		**** **	*****	⑤			31/31	GRAB
	PERMIT MEASUREMENT		Report MO TOTAL		**** **	*****	Report MO TOTAL			Monthly	RCOTOT
Chlorine, total residual 50060 PERMIT Effluent Gross	SAMPLE MEASUREMENT	*****	*****		**** **			mg/L		1/1	GRAB
	PERMIT MEASUREMENT				**** **	0.06 MO AVG	0.06 DAILY MAX			Daily	GRAB

The example demonstrates how *E. coli* data should be reported for a facility required to sample *E. coli* daily.

① Remember 1 daily value per 10 days *E. coli* values that are above 235 can be dropped for Daily Max.

Note: up to 1 daily *E. coli* value can be excluded from Daily Maximum reporting per 10 days of *E. coli* samples on the first *E. coli* line of the DMR:

1. If less than 10 days of *E. coli* samples are collected in a month, **zero** *E. coli* values can be excluded from the Daily Maximum reporting on line one of the DMR (applies to weekly and 2xWeek samplers).
2. If 10-19 days of *E. coli* samples are collected in a month, only **one** *E. coli* value (if it exceeds 235 cfu/100 ml) can be excluded from the Daily Maximum reporting on line one of the DMR (applies to 3xWeek samplers).
3. If 20-29 days of *E. coli* samples are collected in a month, up to **two** *E. coli* values (if they exceed 235 cfu/100 ml) can be excluded from the Daily Maximum reporting on the first *E. coli* line of the DMR (applies to 5xWeek samplers).

If 30-31 days of *E. coli* samples are collected in a month, up to **three** *E. coli* values (if they exceed 235 cfu/100 ml) can be excluded from the Daily maximum reporting on the first *E. coli* line of the DMR (applies to Daily samplers).

② The highest daily values, for the month, after the number of values allowed to be excluded have been excluded.

③ Report the actual highest daily value collected for the month, use all results even those that were excluded.

④ the total number days samples were collected for the month

⑤ the total number of days that samples were above the 235 limit

**Worksheet 6:** Complete the following MRO and DMR for Chlorine & E.coli.

Day Of Month	Residual Chlorine - Final	E. Coli - colony/100 ml
1	0.03	2
2	0.02	3
3	0.04	15
4	0.02	25
5	0.03	45
6	0.04	75
7	0.02	82
8	< 0.01	236
9	< 0.01	230
10	< 0.01	100
11	0.06	150
12	< 0.01	25
13	0.04	10
14	0.05	10
15	0.03	5
16	0.05	4
17	0.03	15
18	0.03	5
19	0.02	25
20	< 0.01	238
21	< 0.01	150
22	0.02	200
23	0.02	20
24	0.02	10
25	0.02	10
26	0.02	5
27	0.03	4
28	0.04	3
29	0.03	5
30	0.05	4
31	0.02	1
Avg.		
Max.		
Min.		
Data		

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>E. coli, colony forming units (CFU)</b> 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****			CFU/ 100 mL			GRAB
	PERMIT MEASUREMENT				*****	125 MO GEO	235 DAILY MX				Daily
<b>E. coli, maximum daily sample result</b> 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	*****		*****	*****		CFU/ 100 mL			GRAB
	PERMIT MEASUREMENT				*****	*****	Report DAILY MAX				Daily
<b>E. coli, total number of sample results</b> 51484 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****		Total # of samples taken for the month	*****	*****		Number of Results above 235			GRAB
	PERMIT MEASUREMENT		Report MO TOTAL		*****	*****	Report MO TOTAL				Monthly
<b>Chlorine, total residual</b> 50060 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****			mg/L			GRAB
	PERMIT MEASUREMENT				*****	0.06 MO AVG	0.06 DAILY MAX				Daily

### Answers Worksheet 6

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>E. coli, colony forming units (CFU)</b> 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****	18	230	CFU/ 100 mL	0	1/1	GRAB
	PERMIT MEASUREMENT				*****	125 MO	235 DAILY MX				Daily
<b>E. coli, maximum daily sample result</b> 51041 Y 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****	*****	238	CFU/ 100 mL	0	1/1	GRAB
	PERMIT MEASUREMENT				*****	*****	Report DAILY				Daily
<b>E. coli, total number of sample results</b> 51484 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	31	Total # of samples taken for the month	*****	*****	2	Number of Results above 235	0	1/31	GRAB
	PERMIT MEASUREMENT		Report MO TOTAL		*****	*****	Report MO TOTAL				Monthly
<b>Chlorine, total residual</b> 50060 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****	0.03	0.06	mg/L	1	1/1	GRAB
	PERMIT MEASUREMENT				*****	0.06 MO AVG	0.06 DAILY MAX				Daily

Day Of Month	Residual Chlorine - Final	E. Coli - colony/100 ml
Avg.	0.03	18
Max.	0.06	238
Min.	< 0.01	1
Data	31	31
1 sample >= 0.06		2 samples >= 235

**Worksheet 7:** Complete the following MRO and DMR for Chlorine & E.coli.

Day Of Month	Residual Chlorine - Final	E. Coli - colony/100 ml
1	0.03	125
2	0.04	
3	0.02	175
4	0.05	
5	0.07	
6	0.04	
7	0.02	215
8	< 0.01	63,200
9	0.02	
10	0.03	125
11	< 0.01	
12	0.04	
13	0.05	
14	0.05	10
15	0.03	10
16	0.03	
17	0.02	
18	0.04	74
19	0.03	
20	0.02	
21	< 0.01	186
22	0.02	150
23	0.04	
24	0.05	
25	0.04	
26	0.03	
27	0.03	26
28	0.04	150
29	0.05	
30	0.05	
31	0.02	
Avg.		
Max.		
Min.		
Data		

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>E. coli, colony forming units (CFU)</b> 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****			CFU/100 mL			GRAB
	PERMIT MEASUREMENT				*****	125 MO GEO	235 DAILY MX			3 Week	GRAB
<b>E. coli, maximum daily sample result</b> 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	*****		*****	*****		CFU/100 mL			GRAB
	PERMIT MEASUREMENT				*****	*****	Report DAILY MAX			3 Week	GRAB
<b>E. coli, total number of sample results</b> 51484 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****		Total # of samples taken for the month	*****	*****		Number of Results above 235			GRAB
	PERMIT MEASUREMENT		Report MO TOTAL		*****	*****	Report MO TOTAL			Monthly	RCOTOT
<b>Chlorine, total residual</b> 50060 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****			mg/L			GRAB
	PERMIT MEASUREMENT				*****	0.06 MO AVG	0.06 DAILY MAX			Daily	GRAB

**Answers Worksheet 6**

Avg.	0.03	133
Max.	0.07	<b>63200</b>
Min.	< 0.01	10
Data	31	12

1 sample >= 0.06    1 sample >=235

The Geometric Mean exceeds the permit limit 125.  
12 samples analyzed, and 10% of 12 is 1, therefore 1 sample could exceed the 235 daily max.  
E. coli exceeded the permit limit 235 on 1 day.

Chlorine exceeded permit limit 0.06 on 1 day

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
<b>E. coli, colony forming units (CFU)</b> 51041 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****	133	215	CFU/100 mL	1	3/7	GRAB
	PERMIT MEASUREMENT				*****	MO GEO	DAILY MX			3 Week	GRAB
<b>E. coli, maximum daily</b> sample result 51041 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	*****		*****	*****	63200	CFU/100 mL	0	3/7	GRAB
	PERMIT MEASUREMENT				*****	*****	Report DAILY MAX			3 Week	GRAB
<b>E. coli, total number of</b> sample results 51484 Y 0 0 Effluent Gross (Supplement)	SAMPLE MEASUREMENT	*****	12		*****	*****	1		0	12/31	GRAB
	PERMIT MEASUREMENT		Report MO TOTAL	Total # of samples taken for the month	*****	*****	Report MO TOTAL			Monthly	RCOTOT
<b>Chlorine, total residual</b> 50060 1 0 0 Effluent Gross	SAMPLE MEASUREMENT	*****	*****		*****	0.03	0.07	mg/L	1	1/1	GRAB
	PERMIT MEASUREMENT				*****	MO AVG	DAILY MAX			Daily	GRAB

Monthly Report of Operations and Discharge Monitoring Report non compliances can be cause by the following:

Missing or incomplete data such as:

Missing pages or forms

By not making sure that the proper form for each month is used. Not all parameters are reported each month.

Reporting sample, (influent and effluent), data, but the corresponding flows are not

Transcription errors from the log sheets to the MRO report and from the MRO to the DMR.

Incorrect calculation used for loading rates, averages, geometric mean, percent removal...

Data is reported with the incorrect units.

Data incorrectly transferred from the MRO to the DMR

Missing signatures and dates, not all of the pages were signed.

No Certified Operator certification number listed.

The person signing the report is not acknowledged by IDEM as having the authority to sign the report.

### Tips for Successful MRO and DMR Reporting

1. Signature – Each MRO and DMR page must be dated and submitted with an original signature no stamped or copy signatures.
2. Enter and verify all data (on the DMR all white boxes must be completed.)
3. Use the DMR provided by the IDEM to report data if there are errors on the report contact IDEM.
4. Only enter numeric values in the MRO and DMR. Report values that are less than the detection limit by entering “<MDL” where MDL is the numeric value of the detection limit used by your lab. Do not enter “ND”, “Non-detect”, “MDL”, etc.
5. Notify IDEM immediately if there are any permit violations. Remember to note comments and explanation of any violations with the reports.
6. IDEM must receive the reports by the 28<sup>th</sup> day of the following month.

## **Questions Collected From IDEM and the Internet Concerning MRO and DMR Reporting.**

**1. Would we need to explain why we were not reporting to the correct number of Significant Figures, in a case where the data from the lab does not have the correct number of significant figures?**

Yes. It is the permittee responsibility to make sure that all data is correct. A comment should be made concerning the incorrect number of significant figures and the laboratory should be contacted as how the data is to be reported.

**2. Who is responsible, if the lab Method Detection Limit is greater than required by the permit?**

The permittee is ultimately responsible for their DMR and should discuss this with their laboratory.

**3. Example: a permit limit for BOD and TSS has 4 significant figures, but you can only get 2 significant figures for BOD and TSS. Is 2 significant figures OK to report?**

You can only report as many significant figures as the analytical precision allows, so in this case you could only report 2 significant figures.

**4. If the number of significant figures in the permit limit is 2, can we analyze to three significant figures?**

Yes, the permittee can analyze their samples to more significant figures than the permit limit states, but when reporting on the DMR, the Sample Measurement value must be in the same number of significant digits as the permit limit states.

**5. If the phosphorus limit is 1.0 (2 significant figures) and our lab result is .067, do we enter .067?**

Yes, .067 is 2 significant figures.

**6. Why is 0.7 not two significant figures?**

This is because the 0 before the decimal point is not a significant figure.

**7. If we have more precise data than the number of significant figures required, do we report to the more precise number?**

No, you report to the number of significant figures that the permit limit specifies.

**8. In the number 123.00 why are the trailing zeroes significant?**

The decimal point before the two zeroes makes them significant.

**9. How do I report “too numerous to count” *E. coli* samples?**

IDEM request that instead of reporting TNTC, or too numerous to count, report 63,200 because it is more statistically provable.

**10. Who can sign a DMR?**

See permit for authorized signatory official. An authorization for anyone other than the person designated in the permit must be on file with the Regulatory Agency and signed by the permit signatory authority.

**11. Do I have to sign each page of my MRO and DMR?**

Yes. Each page must be signed. If any revisions are submitted, that revised page must also have an original signature and new signature date.

**12. Who receives copies of the MROs and DMRs?**

IDEM unless otherwise requested.

**13. Do I have to send a copy of a non-compliance report for my state permit to EPA?**

No. Copies of state required reports are not required to be submitted to EPA.

**14. Who must submit MROs and DMRs?**

Any facility that has been issued an NPDES permit which requires sampling and monitoring (typically sewage treatment plants and industrial facilities with a wastewater or storm water discharge to surface waters).

**15. Where are MROs and DMRs submitted?**

MROs and DMRs must be submitted to the IDEM

**16. When are MROs and DMRs due?**

MROs and DMRs for NPDES permits must be received by IDEM by the 28th day of the month following the monitoring period. (For example, the September DMR must be received by October 28.)

**17. What happens if the MRO and DMR are submitted late?**

It is a violation of the permit if a DMR is not received by the required due date. If a DMR is submitted late, the operator should include an explanation for the late submittal either in the “Comments” section on the DMR or on a separate sheet of paper sent with the DMR.

**18. Is it a violation if MROs and DMRs are not submitted?**

Yes, failure to **submit MROs and DMRs** is a violation of the permit and state and federal law and is considered a “significant violation.”

**19. Do MROs and DMRs have to be signed, and by whom?**

Yes. The DMR and MRO must be signed by the “Principal Executive Officer or an Authorized Agent. The MRO must also be signed by the certified operator. They verify that the data being submitted is true, correct, and were collected in accordance with the permit conditions. All MROs and DMRs submitted to IDEM have to have the signatures. Signing reports that contains fraudulent data is a violation of both federal and state law and can result in severe penalties including fines, imprisonment, and revocation of an operator’s license.

**20. What if there were no discharges from my facility for the monitoring period? Do I still need to send the DMR if I could not sample?**

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

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

All samples collected at compliance monitoring locations and analyzed using an EPA approved method for parameters listed in the permit must be reflected on the DMR, even if these exceed the number required by the permit. All daily discharge data must be recorded on the MRO. The DMR is only a summary of data for the month.

**22. What if I have a violation of my permitted effluent limitations?**

Identify your violations and provide an explanation of what caused the violations and how you are correcting the situation that caused the violations on IDEM’s Non-Compliance Reporting Form, and submit

the form immediately to IDEM. You will also need to report the sum of all violations for each parameter in the “NO EX” (Number of Excursions or Exceedances) column of the DMR.

**23. How do I determine the number of excursions (NO EX)?**

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

So a parameter (such as residual chlorine) with Daily Maximum and Monthly Average limits for concentration could have up to 31 Daily Maximum excursions per month, plus up to 1 Monthly Average excursion for a maximum total of up to 32 excursions (1 Mo Ave Conc. + 31 Daily Maximum Conc.) per 31-day month for the applicable parameter.

A parameter (such as TSS) with Weekly Maximum and Monthly Average limits for both Concentration and Loading could have a maximum of 12 excursions (1 Monthly Average Loading + 5 Maximum Weekly Loading + 1 Monthly Average Concentration+ 5 Maximum Weekly Concentration) per month.

**24. What if we have a limit of 400, is >200 an excursion?**

Yes. Because of the greater than symbol, >200 would be treated as an excursion. In fact “>200” implies that the 400 (maximum) limit has been infinitely exceeded.

**25. How do I report “too numerous to count” *E. coli*?**

In Indiana an NPDES Permittee can report TNTC on the DMR for fecal coliform and *E. coli* when applicable, although a more specific count/number is preferred. Note: “TNTC” is often recorded in the EPA database as “63,200” as per statistical analysis.

**26. How do I calculate and report 7-day averages?**

We recognize that calendar weeks and calendar months rarely coincide. Therefore, for the purpose of calculating and reporting 7-day averages, you should follow the process below:

- a. a week is defined as Sunday through Saturday
- b. Calculate the averages of all sample data obtained for each week.
- c. Record the weekly average on Saturday.
- d. the weekly average is to be reported in the month in which most of the days of the week occurred.

**27. I received a letter from EPA telling me that the State has NPDES authority. Do I have to send any more reports to EPA?**

Once you have received a letter from EPA transferring enforcement authority for your facility to an approved NPDES state, you no longer need to send DMRs, non-compliance reports, etc., to EPA, unless you receive a specific request or action from EPA.

**28. What should I do if my DMRs are missing parameters or it looks different than I think they should?**

**A:** Be sure to look at the most current permit limits and monitoring requirements. The requirements on the forms should be identical to those listed on the limits and monitoring pages of your most current permit. If they are different contact the person whose name/phone number is in the upper right-hand corner of the DMR form to request corrections if needed.

**29. Do I still have to submit forms for monitoring locations where there is no activity?**

Yes. If the monitoring location (station) is listed in your permit, you should have a form for it. All forms must be submitted for each station. If there is no activity, the “No Flow” or “No Discharge” box at the top of the form should be checked.

**30. Can I send my daily value data in on my own computer form?**

**A:** Yes, as long as all the information on the Indiana MMR/MRO forms are presented on the facility-generated MMR/MRO, and all necessary signatures/dates/identifications (permit ID, date, etc.) are on it.

**31. On my DMR there is more than one blank for a parameter I am only required to sample once. Which box do I fill in?**

**ALL** blank white boxes (or lightly shaded) should be filled in. You may only be required to sample (e.g., pH once per month) but that one sample must be compared to both its lower (minimum) limit and its upper (maximum) limit. If you only sample once but the DMR requires a calendar month average and a daily maximum, record the single value in **BOTH** blank white boxes and this will prevent missing data violations in the EPA database!

**32. I missed my quarterly influent sampling for April – June. Can I make it up in July?**

Missed sampling in one monitoring period cannot be made up in another monitoring period. The enforcement staff assigned to your facility may ask you to take additional samples in the new quarter, but this data should be reported in the monitoring period in which it was taken. Additional sampling will not remove the violations generated for the missed sampling in the previous monitoring period. Samples may be taken anytime during the 90-day monitoring period and reported on the DMR at the end of the quarter. (e.g., Sample taken April 22nd must be recorded on the June DMR.) Always attach a note to the DMR/MRO explaining why the sampling criteria (including frequency) are not met, per monitoring period, when applicable.

**33. How do I round numbers and ratios?**

Permits sometimes require the rounding of numbers or ratios. These numbers or ratios should be rounded as follows:

(1) If the digit 6, 7, 8, or 9 is dropped, increase preceding digit by one unit.

Example: a calculated parameter of 1.06 should be rounded to 1.1 and reported as a violation of the permit limit if the permit limit is 1.0.

(2) If the digit 0, 1, 2, 3, or 4 is dropped, do not alter the preceding digit.

Example: a calculated parameter of 1.04 should be rounded to 1.0 and reported to EPA as compliant with the permit limit if the permit limit is 1.0.

(3) If the digit 5 is dropped, round off preceding digit to the nearest even number. Example: a calculated ratio of 1.05 should be rounded to 1.0 and reported to EPA as compliant with the permit limit if the permit limit is 1.0.

**34. What do I do if I took one sample and have *PERMIT REQUIREMENT* for both *DAILY MX* and *DAILY MIN* or *DAILY MX* and *30DA\_AVG*?**

Along with the numeric limit, you will see a term such as *DAILY MX* (Daily Maximum), *DAILY MIN* (Daily Minimum) or *30DA\_AVG* (30-day Average). If you are only required to collect one sample during the monitoring period (once per year), the *DAILY MX* and *DAILY MIN* or *DAILY MX* and *30DA\_AVG* values will be the same.

Example: If your DMR asks for both a *DAILY MX* and a *DAILY MIN* for one parameter and you have collected only one sample, enter the same numeric value in both blank boxes.

**35. What do I do if I took more than one sample and have *PERMIT REQUIREMENT* for both *DAILY MX* and *DAILY MIN*?**

If more than one sample was collected and there are *DAILY MX* and *DAILY MIN* requirements, report the greater of the values for the *DAILY MX* and the lesser of the values for the *DAILY MIN* in the *SAMPLE MEASUREMENT value* box.



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment

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E. coli DMR Reporting

For each 10 E.coli daily values collected, one value exceeding 235 may be excluded when determining your Daily Max to be reported on the DMR, Row 1. But ALL daily values must be reported on the MRO and ALL must be used to determine the Monthly Geometric Mean.

When counting the number of daily values collected in a month, count the number of days E.coli is sampled. If more than one E.coli sample is taken on the same day, the results of all those samples must be averaged and the average is the value reported on the MRO as the daily value for that day.

3 Rows are now included on the DMR for E.coli Reporting:

1st Row: E.coli, compliance data 51041 I 0 0

These values are used to determine compliance with your permit.

- The Monthly Geometric Mean - use all daily values for the month - do not exclude any daily values - even if one or more daily values greater than (>) 235 are allowed to be excluded when determining the Daily Max to be reported in Row 1.
Daily Max - this is the highest daily value for the month, after the number of values allowed to be excluded have been excluded (as per above).

2nd Row: E. coli, maximum daily sample result 51041 Y 0 0

This value will not be used for compliance purposes.

- Report the actual highest daily value collected for the month - do not exclude any daily values - even if it was a value >235 allowed to be excluded for purposes of Daily Max reporting on Row 1.

3rd Row: E. coli, total number of sample results 51484 Y 0 0

These values will not be used for compliance purposes.

- In the first empty box, report the number of days E.coli was sampled during the month, from the MRO.
In the second empty box, report the total number of days where the E.coli value was >235 - do not exclude any, including any that are allowed to be excluded for Daily Max reporting on Row 1.

05/26/10

Frequencies of Analysis

The following code/description choices are listed in the EPA database for use by NPDES permit writers and for use by NPDES DMR submitters:

Table with 2 columns: Name, Description. Rows include 01/01 Daily, 01/02 Once Every 2 Days, 01/03 Once Every 3 Days, 01/04 Once Every 4 Days, 01/05 Once Every 5 Days, 01/06 Once Every 6 Days, 01/07 Weekly, 01/08 Once Every 8 Days, 01/09 Once Every 9 Days, 01/10 Once Every 10 Days, 01/11 Once Every 11 Days, 01/12 Once Per 12 Days.

Table with 2 columns: Name, Description. Rows include 01/13 Once Every 13 Days, 01/14 Once Every 2 Weeks, 01/21 Once Every 3 Weeks, 01/28 Once Every 4 Weeks, 01/2Y Once Every 2 Years, 01/30 Monthly, 01/3H Once Every 3 Hours, 01/4M Once Every 4 Months, 01/4Y Once Every 4 Years, 01/5M Once Every 5 Months, 01/5Y Once Every 5 Years, 01/60 Once Every 2 Months, 01/6M Once Every 6 Months.

Name	Description
01/7M	Once Every 7 Months
01/8H	Once Every 8 Hours
01/90	Quarterly
01/99	Instantaneous
01/9M	Once Every 9 Months
01/BA	Once Per Batch
01/BD	Once Before Discharge
01/DD	Once Per Daily Discharge
01/DM	Once Per Monthly Discharge
01/DQ	Once Every Dsc Quarter
01/DS	Once Per Discharge
01/DW	Once Per Weekly Discharge
01/EP	Once Every Permit Cycle
01/EV	Once Every Event
01/FA	Once Per Facility
01/FY	Once/First Year of Permit
01/HR	Once Every Hour
01/HV	Once Every Harvest
01/OC	Once Every Occurance
01/PT	Once Per Permit Term
01/RN	Once Per Rn Event
01/RP	Once Per Prt Period
01/SH	Once Per Shift
01/SN	Once Per Season
01/US	Once per Use
01/WD	Once Every Weekday
01/WL	Once Per Well
01/YR	Annual
02/01	Twice Per Day
02/02	Twice Per Week
02/07	Twice Every Week
02/12	Twice Every 12 Days
02/30	Twice Per Month
02/5Y	Twice Every 5 Years
02/90	Twice Every Quarter
02/BA	Twice Per Batch
02/DA	2 Days Every Week
02/DD	Twice Per Drawdown
02/DM	Twice Every Month

Name	Description
02/DS	Twice Per Discharge
02/DW	Twice Every Discharge Week
02/HR	Twice Every Hour
02/PT	Twice Per Permit Term
02/RP	Twice Per Rpt Period
02/SH	Twice Every Shift
02/SN	Twice Every Season
02/YR	Semiannual
03/01	Three Per Day
03/05	Three Every 5 Days
03/07	Three Per Week
03/08	Three Every 8 Days
03/12	3 Per 12 Hours
03/30	Three Per Month
03/5Y	Three Every 5 Years
03/6M	Three Every 6 Months
03/90	Three Every Quarter
03/BA	Three Every Batch
03/DS	Three Per Discharge
03/DW	3 Days Every Week
03/RP	Three Per Prt Period
03/SN	Three Per Season
03/YR	Three Per Year
04/01	Four Per Day
04/07	Four Per Week
04/30	Four Per Month
04/90	4 Times Every Quarter
04/BA	Four Every Batch
04/HR	4 Times Every Hour
04/RP	Four Per Rpt Period
04/SN	Four Per Season
04/YR	Four Per Year
05/01	Five Per Day
05/07	Weekdays
05/08	Five Every 8 Days
05/30	5 Times Every Month
05/90	Five Every Quarter
05/BA	Five Every Batch
05/DS	Five per Discharge

Name	Description
05/DW	5 Days Every Week
05/WK	Five Per Week
06/01	Six Per Day
06/07	Six Every Week
06/30	Six Per Month
06/90	Six Every Quarter
06/SH	6 Every Operating Shift
06/YR	Six Per Year
07/14	7 Per 2 Weeks
07/30	7 Times Every Month
07/WD	Weekly When Discharging
07/WK	Seven Per Week
08/01	Eight Every Day
08/30	Eight Every Month
08/BA	Eight Every Batch
09/01	Nine Per Day
09/30	Nine Per Month
09/99	See Permit
10/30	Ten Per Month
11/30	11 Per Month
12/01	12 Per Day
12/30	Twelve Per Month
13/30	13 Per Month
14/30	14 Per Month
15/30	15 Per Month
16/01	16 Per Day
16/30	16 Per Month
17/30	17 Per Month
18/01	18 Per Day
18/30	18 Per Month
19/30	19 Per Month
20/30	Twenty Per Month
21/30	21 Per Month
22/30	22 Per Month
23/30	23 Per Month
24/01	Hourly
24/30	24 Per Month
24/HR	24 Times Every Hour
25/30	25 Per Month

Name	Description
26/30	26 Per Month
27/30	27 Per Month
28/30	28 Per Month
29/30	29 Per Month
48/01	Every 1/2 Hour
60/HR	60 Per Hour
66/66	Wpc Plan
77/77	Contingent
88/88	Cleaning
99/99	Continuous
AL/EV	All Events
AL/RN	Alternating Run
BI/WK	Biweekly
CL/OC	Chlorination/Occurances
DL/DS	Daily When Discharging
ED/WL	End Of Well
ESTMT	Estimate
EV/2H	Every 2 Hours
LF/PT	Life Of The Permit
MEASD	Measured
MM/WD	Monthly When Discharging
N/R	Not Reported
REPRT	Report
UPREQ	Upon Request
WH/DS	When Discharging
WH/MN	Measured When Monitor
XX/XX	Frequency as Reported

v. June 2010

## Sample Types

Here is the range of sample type codes and descriptions listed in the EPA database, as per NPDES permits and for NPDES Dischargers in the USA. The ones that Indiana NPDES Permits require most often seem self-explanatory, but feel free to contact IDEM if you have questions.

RT = RCOTOT means Recording Totalizer and it is used for Total Flow for the monitoring period.

Name	Description
01	COMP-1
02	COMP-2
03	COMP-3
04	COMP-4
05	COMP-5
06	COMP-6
08	COMP-8
10	COMP10
12	COMP12
16	COMP16
1H	AVG-1H
20	COMP20
22	BATCH
24	COMP24
28	COMP28
2H	AVG-2H
2Y	2YRAVG
3G	3GR/HR
4C	4DA24C

Name	Description
4G	4GR24H
4H	AVG-4H
5G	5GR45M
72	COMP72
96	COMP96
99	COMPWK
AH	HRDALL
BA	BAILED
C3	CS0-3
C6	CS0-60
C9	CS0-90
CA	CALCTD
CG	CMPGRB
CN	CONTIN
CP	COMPOS
CR	CK REQ
CS	CORSAM
CT	CERTIF
CU	CURVE
DA	DAILAV
DS	DISCRT
ES	ESTIMA
FI	FLOIND
G2	GRAB-2
G3	GRAB-3
G4	GRAB-4
G5	GRAB-5
G6	GRAB-6
G7	GRAB-7
G8	GRAB-8
G9	GRAB-9
GC	CNTGRB
GH	5GR24H
GM	GRAB10
GR	GRAB
IM	IMERSN
IN	INSTAN
IS	INSITU
IT	IMRSTB

Name	Description
MC	MATHCL
MF	MAGFLO
MP	MATHCP
MS	MEASRD
MT	METER
NA	NOT AP
NR	NOTRPT
OC	OCCURS
PC	PMPCRV
PF	PARFLU
PL	PMPLOG
R4	RNG-4A
RA	RAGUAGE
RC	RCORDR
RD	RNG-DA
RE	RECORD
RF	RCDFLO
RG	RANG-C
RP	REPRES
RT	RCOTOT
S1	SQBTH1
S2	SQBTH2
S3	SQBTH3
SB	SQBCHR
SC	SC0-15
SD	SURFSP
SE	SNGLES
SM	SUMATN
SR	SGLRDG
SS	STAT-SH
ST	STATIC
TI	TIMEMT
TM	TOTALZ
UN	UNKNOWN
VI	VISUAL
WE	WEIR

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