



# Permit Calculations and Definitions

Calculation definitions (NOTE – Definitions specified in permit language must be followed instead of the definitions in this document, unless MPCA staff provide written instructions to do otherwise.)

Limit type	Abbreviation	Calculation
12 Month Moving Average	12MoMovAve	Add all of the calendar month averages during the last 12 months and divide by 12. The 12 month period is defined as the current month and the previous 11 months.
12 Month Moving Average Intervention	12MoAveInt	Add all of the calendar month averages during the last 12 months and divide by 12. The 12 month period is defined as the current month and the previous 11 months. Exceedance is not recorded as a violation.
12 Month Moving Total	12MoTotal	Calculate the calendar month total kg/mo loading by multiplying the calendar month total effluent flow x calendar month average concentration x 3.785 for the current month and previous 11 months. Add all results to get the 12 month moving total.
5 Day Geometric Mean Intervention	5DayGeoInt	Multiply all sample values measured during a five-day period and calculate the $n^{th}$ root of the product $(a_1 \times a_2 \dots a_n)^{1/n}$ where n is the number of entries. Or determine the logarithm of each sample value, add all the logarithms together and divide by the number of sample values to get a log average value. Then convert this log average back to a base 10 number by finding the antilog of this number (calculate $10^{\text{log average value}}$ ). Report the highest 5 Day Geometric Mean. Exceedance is not recorded as a violation.
Annual Median	AnnMedian	List all samples values from lowest value to highest value. Report the middle value. If there is an even number of sample values, report the mean of the two middle sample values.
Calendar Month Average	CalMoAvg	Add all sample values measured during a calendar month and divide by the number of sample values.
Calendar Month Average Intervention	CalMoAvgI	Add all sample values measured during a calendar month and divide by the number of sample values. Exceedance is not recorded as a violation.
Calendar Month Flow-Weighted Mean	CalMoFWMn	Multiply each sample value measured during the calendar month by its respective individual flow, add these calculations together, and divide by the sum of the flows measured during the calendar month.

Limit type	Abbreviation	Calculation
Calendar Month Geometric Mean	CalMoGeoMn	Multiply all sample values measured during a calendar month and calculate the nth root of the product $(a_1 \times a_2 \dots a_n)^{1/n}$ where n is the number of entries. Or determine the logarithm of each sample value, add all the logarithms together and divide by the number of sample values to get a log average value. Then convert this log average back to a base 10 number by finding the antilog of this number (calculate $10^{\text{log average value}}$ ).
Calendar Month Max Intervention	CalMoMxInt	Highest sample value measured during a calendar month. Exceedance is not recorded as a violation.
Calendar Month Maximum	CalMoMax	Highest sample value measured during a calendar month.
Calendar Month Max of Daily Average	CIMoMxDAvg	Highest daily average calculated in a calendar month.
Calendar Month Minimum	CalMoMin	Lowest sample value measured during a calendar month.
Calendar Month Total	CalMoTot	Add all sample values measured during a calendar month.
Calendar Month Total Intervention	CalMoTotInt	Add all sample values measured during a calendar month. Exceedance is not recorded as a violation.
Calendar Quarter Average	CalQtrAve	Add all sample values measured during a calendar quarter and divide by the number of sample values measured during the quarter.
Calendar Quarter Maximum	CalQtrMax	Highest sample value measured during a calendar quarter.
Calendar Quarter Maximum Intervention	CalQtrMxIn	Highest sample value measured during a calendar quarter. Exceedance is not recorded as a violation.
Calendar Quarter Minimum	CalQtrMin	Lowest sample value measured during a calendar quarter.
Calendar Quarter Total	CalQtrTot	Add all sample values measured during a calendar quarter.
Calendar Week Geometric Mean	CalWkGeoMn	Please refer to the definition of 'Calendar Week' below. Multiply all sample values measured during a calendar week and calculate the nth root of the product $(a_1 \times a_2 \dots a_n)^{1/n}$ where n is the number of entries. Or determine the logarithm of each sample value, add all the logarithms together and divide by the number of sample values to get a log average value. Then convert this log average back to a base 10 number by finding the antilog of this number (calculate $10^{\text{log average value}}$ ).
Calendar Year Average	CalYrAvg	Add all sample values measured during a calendar year and divide by the number of sample values measured during the year.
Calendar Year Average Intervention	CalYrAvInt	Add all sample values measured during a calendar year and divide by the number of sample values measured during the year. Exceedance is not recorded as a violation.

Limit type	Abbreviation	Calculation
Calendar Year Average Intervention-Quarter	CalYrAvl-Q	Add all sample values measured during each calendar quarter and divide by the number of sample values to obtain four calendar quarter averages. Add the four calendar quarter averages and divide by the number of calculated calendar quarter averages. Exceedance is not recorded as a violation.
Calendar Year Average-Quarter	CalYrAvg-Q	Add all sample values measured during each calendar quarter and divide by the number of sample values to obtain four calendar quarter averages. Add the four calendar quarter averages and divide by the number of calculated calendar quarter averages.
Calendar Year Maximum	CalYrMax	Highest sample value measured during a calendar year.
Calendar Year Maximum Intervention	CalYrMaxI	Highest sample value measured during a calendar year. Exceedance is not recorded as a violation.
Calendar Year Maximum Intervention-Quarter	CalYrMxl-Q	Highest sample value of four quarterly samples. Exceedance is not recorded as a violation.
Calendar Year Minimum	CalYrMin	Lowest sample value measured during a calendar year.
Calendar Year Minimum Intervention	CalYrMinI	Lowest sample value measured during a calendar year. Exceedance is not recorded as a violation.
Calendar Year Minimum Intervention-Quarter	CalYrMnl-Q	Lowest sample value of four quarterly samples. Exceedance is not recorded as a violation.
Calendar Year to Date Total	CalYTDTot	Add all sample values measured from the first of the calendar year to the end date of the current reporting period. When used for loading values (kg/yr), first calculate the calendar month total kg/mo loading by multiplying the calendar month total effluent flow x calendar month average concentration x 3.785, then add all loading values from the first of the calendar year to the end date of the current reporting period. Use the flow from the SD station, or if there is no SD value, then use the flow from the WS station.
Calendar Year to Date Total Intervention	CalYTDTotI	Add all sample values measured from the first of the calendar year to the end date of the current reporting period. When used for loading values (kg/yr), first calculate the calendar month total kg/mo loading by multiplying the calendar month total effluent flow x calendar month average concentration x 3.785, then add all loading values from the first of the calendar year to the end date of the current reporting period. Use the flow from the SD station, or if there is no SD value, then use the flow from the WS station. Exceedance is not recorded as a violation.
Calendar Year Total	CalYrTot	Add all sample values measured during a calendar year.
Calendar Year Total Intervention	CalYrTtInt	Add all sample values measured during a calendar year. Exceedance is not recorded as a violation.
Daily Average	DailyAve	Add all sample values measured during a 24-hour period and divide by the number of sample values measured during that 24-hour period.
Daily Average Intervention	DailyAvInt	Add all sample values measured during a 24-hour period and dividing by the number of sample values measured during that 24-hour period. Exceedance is not recorded as a violation.

Limit type	Abbreviation	Calculation
Daily Maximum	DailyMax	Highest 24-hour sample value measured in a calendar month. If highest single 24-hour max sample value in the calendar month exceeds summary limit, then calculation may be highest average sample value of 2-12 samples taken in a 24-hour period. The highest average sample value may be >summary limit without triggering violation due to reporting limits.
Daily Maximum Intervention Limit	DailyMxInt	Highest 24-hour sample value measured in a calendar month. If highest single 24-hour max sample value in the calendar month exceeds summary limit, then calculation may be highest average sample value of 2-12 samples taken in a 24-hour period. The highest average sample value may be >summary limit without triggering violation due to reporting limits. Exceedance is not recorded as a violation.
Daily Minimum	DailyMin	Lowest 24-hour sample value measured in a calendar month.
Four Day Average	4DayAvg	Add all sample values measured during four consecutive calendar days or four 24-hour periods and divide by the number of sample values measured during those same times. Report the maximum 4 day average for the month.
Hydrologic Year Average	HydroYrAve	Add all sample values measured during a hydrologic year (October 1 <sup>st</sup> ) and divide by the number of samples measured during that year.
Hydrologic Year to Date Total	HydrYTDTot	Add all sample values measured from the beginning of the hydrologic year (October 1 <sup>st</sup> ) through last month of reporting period.
Hydrologic Year Total	HydroYrTot	Add all sample values measured during a hydrologic year (October 1 <sup>st</sup> ).
Instantaneous Maximum	InstantMax	Highest sample value measured during time-unit.
Instantaneous Maximum Intervention	InstMaxInt	Highest sample value measured during time-unit. Exceedance is not recorded as a violation.
Instantaneous Minimum	InstantMin	Lowest sample value measured during time-unit.
Instantaneous Minimum Intervention	InstMinInt	Lowest sample value measured during time-unit. Exceedance is not recorded as a violation.
Maximum Calendar Week Average	MxCaWkAvg	Calendar weeks and months generally do not line up perfectly. For this calculation, include the entire week in the reporting month in which the calendar week ends. Add all sample values taken in each calendar week and divide by number of sample values reported in that calendar week. Report the highest calculated weekly average.
Minimum Calendar Month Average	MnCaMoAvg	Add all sample values reported during a calendar month and divide by the number of sample values reported. Report the lowest calculated calendar month average.

Limit type	Abbreviation	Calculation
Minimum Calendar Week Average	MinCalWkAv	<p>Calendar weeks and months generally do not line up perfectly. For this calculation, include the entire week in the reporting in which the calendar week ends.</p> <p>Add all sample values taken in each calendar week and divide by number of sample values reported in that calendar week. Report the lowest calculated weekly average.</p>
Monthly Average of Daily Maximum	MonAvDayMx	Add all daily maximum calculations in a calendar month and divide by number of daily maximum calculations.
Season to Date Total	SeasTDTot	<p>Add all sample values measured during specified season.</p> <p>Calculate the calendar month total kg/mo loading by multiplying the calendar month total effluent flow x calendar month average concentration x 3.785, then add all loading values from the beginning of the season to the end of the season. Use the flow from the SD station, or if there is no SD value, then use the flow from the WS station.</p>
Single Value	SingleVal	<p>Single measured value.</p> <p>If multiple samples are taken, the calculation to be done varies by permit.</p>

Other calculations	Calculation
Loading/Quantity	<p>For all loading/quantity calculations: Calculate loading for each day that you have concentration and flow data, by multiplying daily concentration x daily flow x 3.785. Use the flow from the SD station, or if there is no SD flow value, then use the flow from the WS station.</p> <p>For average loading (e.g. CalMoAvg or CalQtrAve), add all daily loading calculations and divide by the number of daily loading calculations in the reporting period.</p> <p>For maximum weekly averages (MaxCalWkAvg) add all sample values taken in a calendar week and divide by the number of sample values in that week then report the highest weekly average.</p> <p>For loading reported in kg/yr, first calculate the calendar month total kg/mo loading by multiplying the calendar month total effluent flow x calendar month average concentration x 3.785, then add all those values together based on the Limit Type (CalYDTot, 12MoTotal, SeasTDTot) to get kg/yr.</p>
Percent Removal	Subtract the effluent sample value from the corresponding influent sample value. Divide the resulting number by the corresponding influent sample value and multiply by 100.

## General definitions

Time terms	Definition
Day	24 hour period associated with a calendar date OR 24 hour period that begins with the date and time of the FIRST reported sample result associated with a "day".
Calendar Week	Sunday through Saturday, inclusive. If a Calendar Week covers part of two different months, include the data for the entire Calendar Week in the month in which the calendar week ends.
Week Period within a Calendar Month	Calendar weeks and months generally do not line up perfectly. For calculations like Maximum Calendar Week Average, Minimum Calendar Week Average and Calendar Week Geometric Mean, include the entire week in the reporting month in which the calendar week ends.
Calendar Month	First day through last day of a given month, inclusive.
Calendar Quarter	One of: January 1 <sup>st</sup> - March 31 <sup>st</sup> ; April 1 <sup>st</sup> - June 30 <sup>th</sup> ; July 1 <sup>st</sup> - September 30 <sup>th</sup> , or October 1 <sup>st</sup> - December 31 <sup>st</sup> , inclusive.
Season (Cropping Season)	September 1 <sup>st</sup> - August 31 <sup>st</sup> , inclusive.
Calendar Year	January 1 <sup>st</sup> - December 31 <sup>st</sup> , inclusive.
Calendar Year to Date	January 1 <sup>st</sup> to an end of Reporting Period date that is before December 31 <sup>st</sup> of same year and includes no partial months.
Hydrologic Year	October 1 <sup>st</sup> - September 30 <sup>th</sup> , inclusive.
12 Months	Calendar Months, beginning with the "current" month (most recently reported month, or selected month) and including the previous 11 months.

Other terms	Definition
Average	Add all reported sample values and divide by the number of sample values.
Flow-weighted Mean	Multiply each individual sample value by its corresponding individual flow, add the results, and divide the total by the sum of the respectively reported flows.
Geometric Mean	Multiply all sample values and calculate the nth root of the product $(a_1 \times a_2 \dots a_n)^{1/n}$ where n is the number of entries.
Loading/Quantity	Concentration multiplied by Flow multiplied by 3.785 conversion factor.
Maximum	Highest reported sample value.
Mean	Add all reported sample values, divided by the number of sample values.
Median	The middle sample value measured from all reported sample values, sorted from lowest value to highest value. If there is an even number of reported values, the median is then defined to be the mean of the two middle sample values.
Minimum	Lowest reported sample value.
Reported Value	Single value obtained from single or composite sample.
To Date Total	Add all sample values beginning with the current Period of monitoring and going back to the beginning of the Reporting Period.
Total	Add all reported sample values.