

Understand your River Eutrophication Standard (RES) Limit

What is a RES limit?

A River Eutrophication Standard (RES) limit is a total phosphorous effluent limit assigned to a wastewater treatment facility in a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit. RES limits are designed to protect downstream waters from excess algae, otherwise known as eutrophication. A RES limit is the total amount of phosphorus that can be discharged from a wastewater treatment facility and still be protective of the downstream eutrophication water quality standards that were adopted in 2015 to protect aquatic life in rivers and streams from the negative impacts of excess algae. RES limits are applicable from June 1 – September 30 each year.

How is my RES limit calculated?

In 2015, RES were adopted in Minnesota Rules, and MPCA began evaluating the need for phosphorus limits in NPDES/SDS Permits on a watershed basis. Watershed characteristics vary throughout the state. As a result, the Minnesota Pollution Control Agency (MPCA) utilizes various methods to analyze watershed characteristics and develop phosphorus limits throughout the state. The two most common approaches are the use of a water quality model or a mass balance approach. Use of a water quality model is the preferred method, when available. Water quality models simulate current conditions and the pollutant reductions necessary to protect the river. Limits are derived from pollutant reduction scenarios. The steps to complete watershed reviews using a mass balance approach are listed below. The chosen method depends on the watershed, data and tools available. For a more detailed explanation on methods, see MPCA's [Procedures for implementing river eutrophication standards in NPDES wastewater permits in Minnesota](#) :

1. **Review river water quality data.** Water quality data are reviewed downstream of each Wastewater Treatment Plant (WWTP) located within each watershed. These data are used to calculate a long-term summer average for total phosphorus (criterion), chlorophyll-a and biological oxygen demand (response). Using these data, it is determined if the river or stream meets or exceeds RES downstream of the WWTP.
2. **Reasonable potential analysis is done for the WWTP(s) within the reach.** If the water quality data downstream of a WWTP exceeds RES and the effluent concentration at the WWTP is also greater than RES, the WWTP has reasonable potential to contribute to the exceedance. Federal regulations require a water quality based effluent limit to be set if reasonable potential is found. It is important to note that all downstream reaches are required to be reviewed, not just the immediate downstream reach from the WWTP, and the potential impact from facilities is based upon their full authorized pollutant load.
3. **Calculate the Waste load Allocation (WLA) for the WWTP.** If WWTPs within a watershed have the reasonable potential to exceed RES, a gross WLA is calculated. This gross WLA is then divided among affected upstream facilities so that each contributor has an individual allocation.

4. **Translate the WLA into a permit limit.** The individual WLA assigned to a WWTP is required to be achieved over a long-term multi summer period. As a result, a 2.1 multiplier is used to express the long term average WLA as a monthly limit in the WWTP's NPDES/SDS Permit. The multiplier is used to take into account the WWTP's monthly performance, which will operate at a margin below the monthly permitted limit. As a result, over a long-term multi summer period, the WLA will be achieved. RES limits are typically expressed as a kilogram per day (kg/d) monthly limit from June 1st-September 30th but can also be expressed as a concentration for particularly sensitive reaches.
5. **Compare limits for all downstream surface waters to determine which limit and other requirements should be included in the permit.** If other downstream factors result in more stringent limits, the permit will only include the most restrictive limit that applies to the WWTP's discharge. Factors may include a final Total Maximum Daily Load for a specific waterbody.

Why is there language in my permit text with a different “long term average” number?

In the “Facility Specific Requirement” section for your surface discharge station in your permit, you will see language regarding a long-term average (multi-summer) concentration or mass. This is your actual WLA calculated and assigned to the WWTP in step 3 above (prior to applying the multiplier). This number is not included in your limits and monitoring table as it is a WLA that is expected to be met over a long-term multi-summer period. Achievement of the WLA will be reviewed when permits are reissued. By using the multiplier, the WWTP is able to use data over a longer period of time to determine if the WWTP is meeting the WLA and making the reductions necessary to protect for the downstream river or stream impairment.

Available Resources

Watershed Reviews available upon request, Contact MPCA Data Desk to request: datadesk.mPCA@state.mn.us
MPCA Phosphorus Page: <https://www.pca.state.mn.us/water/phosphorus-wastewater>