

Guidance for Utilizing MWRA's PFOS Local Limit Calculation Example

Michigan Waste & Recycling Association
Prepared by LimnoTech, April 2022



Glossary

Local Limits- WWTPs set limits on Industrial Users so that the WWTP meets their NPDES PFOS limit in their discharges to surface water and the WWTP avoids other potential operational issues (e.g., biosolids management). Note: the Michigan Statewide criteria for PFOS that is expected to be specified in most NPDES permits, where limits are needed, is 12 ng/l. Alternatively, 11 ng/L may be specified for discharges to water bodies that are used as drinking water sources.

Industrial Users (IUs)- landfills, platers and other industries that discharge wastewater to a WWTP

WWTP- Wastewater Treatment Plant

MWEA- Michigan Water Environment Association

Sewer Use Ordinance (SUO)- governs wastewater collection/treatment within the jurisdiction

Maximum Allowable Headworks Loading (MAHL)- the amount/mass of PFOS a WWTP can receive from all sources (including domestic wastewater) and still meet NPDES permit requirements

Maximum Allowable Industrial Loading (MAIL)- the amount/mass of PFOS a WWTP can accept from Industrial users and still meet NPDES permit requirements

Overview

Landfill leachate is very difficult to treat due to its complex matrix. MWRA contracted LimnoTech to assist landfills with a local limit strategy that identifies alternate options of how to determine environmentally protective local limits (when necessary) considering the characteristics of the WWTP and IU's that contribute to the treatment plant's influent. LimnoTech worked with EGLE and MWEA to develop an example method (Basis of Industrial User Need) for WWTPs to calculate PFOS local limits that consider user need, the treatability of industrial waste, and the variable IU source characteristics when developing limits. This is different from the more common approach of setting a single limit that all IUs must meet. WWTPs can allocate difficult-to-treat wastes their current loading (no treatment) while requiring that easier-to-treat wastes meet more stringent limits. EGLE and MWEA acknowledge this is a valid approach. It is included in EPA's local limit development guidance (2004)¹. However, EGLE and MWEA indicated that such alternate methods have rarely been used and believe there may be obstacles to implementing this approach. For example:

1. The WWTP, their board and other industrial users may consider this approach 'unfair.'
2. The calculation is more complicated/expensive than the more common calculation methods.
3. Administration may be more difficult/costly.
4. WWTP Sewer Use Ordinances may have to be modified to use this approach.
5. The WWTP has discretion on how to approach local limit development, including employing alternative approaches as described herein.

¹ https://www.epa.gov/sites/default/files/2015-10/documents/final_local_limits_guidance.pdf

Individual Landfills will want to work with their WWTP to adopt a more flexible approach to developing limits. For example, if the WWTP utilizes the Basis of Industrial User Need approach, the most appropriate best management practices can be implemented by each IU with the goal to minimize PFOS treatment costs. Difficult to treat users are less likely to be required to install leachate treatment for PFOS. This approach minimizes the overall cost to reduce the treatment plant headworks loading to an acceptable level.

Individual WWTPs select the local limit calculation method. That method is usually prescribed in their Sewer Use Ordinance. The WWTP calculates local limits and then submits them to EGLE for approval. Given the aforementioned obstacles to implementing the Basis of Industrial User Need approach, the WWTP will not propose it without encouragement from a landfill. It will be to the landfill's benefit to establish communications with the WWTP as soon as possible and begin encouraging the adoption of the Basis of Industrial User Need approach. At a minimum, the landfill will want to engage the WWTP when the WWTP receives a draft NPDES permit from EGLE requiring development of PFOS local limits. (Landfills can track permitting activities using EGLE's MiWaters system.²²)

To date, only the Great Lakes Water Authority (Detroit) WWTP has proposed local limits for PFOS (65 ng/l). This limit applies to all industrial users with PFOS, including landfills. To put the proposed limit (65 ng/l) in perspective, MWRA has sampled leachate from 35 landfills. The average PFOS level was 292 ng/l. Among the 35 landfills sampled, only one had a leachate PFOS concentration that met GLWA's proposed PFOS limit.

Landfills should begin to engage in informal discussions with their WWTPs as soon as possible, to allow them time to consider the idea and make whatever legal (Sewer Use Ordinance modification) and political (obtain buy in from their governing board) changes might be needed. Convincing WWTPs to change the way they calculate limits will not be easy or quick; landfills will also need to explain the benefits to their facilities and ratepayers.

Landfills might consider the following approach:

1. Establish a relationship with the WWTP manager/Municipal Government
 - a. Discuss mutual dependencies: grit and biosolids disposal at landfills, leachate disposal at WWTPs.
 - b. Discuss costliness/difficulties for PFOS leachate treatment
 - c. Discuss the 'Basis of Industrial User Need' local limit development approach
 - i. No approach is "fair" to all. The common default calculation method, equal concentration, requires more removal from high concentration users. This could be considered unfair to those IUs. The 'Basis of Industrial User Need' can be a cost-effective way for society and WWTP ratepayers to manage PFOS.
 - ii. Determine whether the Sewer Use Ordinance (SUO) allows it. If not, the landfill must work with the WWTP to have the SUO modified; otherwise, the local limit calculation prescribed in the SUO must be used.

²² [Home - MiWaters \(state.mi.us\)](https://www.state.mi.us/miwaters)

- iii. Determine whether the WWTP manager is amenable to considering the approach. If not, the landfill must decide whether (and when) to elevate the issue.
 - iv. If the WWTP manager seems amenable to the 'Basis of Industrial User Need' approach, determine if the Sewer Use Ordinance allows this method. If not, then it must be modified by the municipality. This process will take many months
- 2. Stay abreast of EGLE requirement to establish local limits
 - a. If local limits are required for the landfill's WWTP, ask the WWTP manager to develop local limits using methods allowed in their Sewer Use Ordinance AND MWRA's 'Basis of Industrial User Need' approach.
 - b. Offer assistance for local limit development
 - i. Encourage a small safety factor (EPA recommends at least 10%, EGLE suggested a much higher factor.) The lower the safety factor, the more PFOS that can be discharged to the WWTP.
 - ii. Consider offering to pay the extra costs for developing local limits using the 'Basis of Industrial User Need' method. Note: It is important to develop the 'Basis of Industrial User Need' limits before local limits using the WWTP's default calculation method are developed and published, to avoid confusion and "political" issues if limits for industrial users are changed.

Specific Instructions for Developing Limits using the 'Basis of Industrial User Need' Method

1. Select individual (or groups of) Industrial Users with treatability or other challenges (such as landfills)
2. Allocate Industrial Users selected in step 1 their baseline (existing) loading
3. Allocate remaining Maximum Allowable Industrial Loading (MAIL) to other Industrial Users
4. The WWTP decides allocation that's best for community

The details are illustrated in the attached spreadsheet, reproduced below. The bottom 5 rows of this spreadsheet include color coded steps for using the 'Basis of Industrial User Need' calculation method and comparing it to the 'Equal Concentration' method. For this example, column R shows two landfills being allocated their current PFOS concentrations (200 and 700 ng/l, respectively). As a result, *other industrial users' limits* drop from a uniform possible limit of 125 ug/L (Column L) to 99 ug/l (Column R). It's likely that WWTP managers will require assistance understanding and implementing the 'Basis of Industrial User Need' calculation method.

Columns T - Y convert Industrial User limits from concentration to mass-based limits. If a landfill has the potential to reduce flows, mass-based limits can reduce or eliminate treatment requirements while providing the same level of environmental protection. However, each landfill and WWTP situation is different, and landfills should carefully evaluate the benefits and risk of mass-based limits.

The Excel spreadsheet provided with this plan, developed and vetted by LimnoTech, is available for MWRA member use and can be customized for any WWTP's industrial user base.

Guidance for Utilizing MWRA's PFOS Local Limit Calculation Example

Local Limits Calculation Spreadsheet

| | A | B | C | D | E | F | H | J | L | N | P | R | T | U | V | W | X | Y | |
|----|---|----------------------------------|--|-----------------------|--------------------|------------------------------|-----------------------|-----------------|------------------------|-------------------------------------|-------------------------------------|---|-----------------------|-----------------------|------------------------|-------------------------------------|-------------------------------------|---|--|
| 1 | PFOS WQBEL | 12 ng/l | | | | | | | | | | | | | | | | | |
| 2 | Safety Factor (SF) | 30% | | | | | | | | | | | | | | | | | |
| 3 | WWTP flow | 25 MGD | | | | | | | | | | | | | | | | | |
| 4 | PFOS MAHL | 2502 lbs/d 10 ⁶ | (MAHL = Maximum Allowable Headworks Load) | | | | | | | | | | | | | | | | |
| 5 | PFOS MAHL w SF | 1751 lbs/d 10 ⁶ | | | | | | | | | | | | | | | | | |
| 6 | Background | 797 lbs/d 10 ⁶ | | | | | | | | | | | | | | | | | |
| 7 | MAIL | 955 lbs/d 10 ⁶ | (MAIL = Maximum Allowable Industrial Load) | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | CONCENTRATION | | | | | | MASS LIMITS | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | |
| 12 | | Industrial User (IU) Information | | | | | | | | | | | | | | | | | |
| 13 | Special Allocation for: | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | Uniform Concentration | IU Contribution | IU 2 Basis of IU Needs | Leachate A & IU 2 Basis of IU Needs | Leachate B & IU 2 Basis of IU Needs | Leachate A & B & IU 2 Basis of IU Needs | Uniform Concentration | IU Contribution | IU 2 Basis of IU Needs | Leachate A & IU 2 Basis of IU Needs | Leachate B & IU 2 Basis of IU Needs | Leachate A & B & IU 2 Basis of IU Needs | |
| 15 | | Flow | PFOS | Load | Percentage of load | IU Treatability Scale (1-10) | ng/l | ng/l | ng/l | ng/l | ng/l | ng/l | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | |
| 16 | Source | MGD | ng/l | lbs/d 10 ⁶ | | | ng/l | ng/l | ng/l | ng/l | ng/l | ng/l | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | lbs/d 10 ⁶ | |
| 17 | | | | | | | | | | | | | | | | | | | |
| 18 | Background | 23.88 | 4 | 797 | 29% | 10 | 4 | 4 | 4 | 4 | 4 | 4 | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | |
| 20 | Leachate A | 0.05 | 200 | 83 | 3% | 7 | 102 | 106 | 125 | 200 | 105 | 200 | 43 | 44 | 52 | 83 | 44 | 83 | |
| 21 | Leachate B | 0.03 | 700 | 175 | 6% | 7 | 102 | 106 | 125 | 121 | 700 | 700 | 26 | 26 | 31 | 30 | 175 | 175 | |
| 22 | Industry 1 | 0.30 | 150 | 375 | 14% | 4 | 102 | 106 | 125 | 121 | 105 | 99 | 255 | 265 | 314 | 302 | 263 | 248 | |
| 23 | Industry 2 | 0.20 | 20 | 33 | 1% | 7 | 102 | 106 | 20 | 20 | 20 | 20 | 170 | 177 | 33 | 33 | 33 | 33 | |
| 24 | Industry 3 | 0.50 | 300 | 1254 | 46% | 4 | 102 | 106 | 125 | 121 | 105 | 99 | 427 | 443 | 524 | 505 | 439 | 415 | |
| 25 | Industry 4 | 0.04 | 0 | 0 | 0 | NA | 102 | | | | | | 34 | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | | |
| 27 | Totals for WWTP | 25.00 | | 2718 | | | | | | | | | | | | | | | |
| 28 | Industrial Loading | | | 1921 | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | | | |
| 30 | Industrial flow with PFOS | 1.08 | | | | | | | | | | | | | | | | | |
| 31 | Total Industrial flow to WWTP | 1.12 | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | |
| 33 | Methodology for Exploring Allocations considering treatability | | | | | | | | | | | | | | | | | | |
| 34 | Step 1: Develop Uniform Concentration Limits | | | | | | | | | | | | | | | | | | |
| 35 | Step 2: Develop IU Contribution Limits | | | | | | | | | | | | | | | | | | |
| 36 | Step 3: Allocate their baseline loading to all facilities < IU Contribution Limit (97 ng/l). In this case, Industry 1 reallocated from 97 to 20 ng/l. The concentration limit for other IUs rises to 125 ng/l. | | | | | | | | | | | | | | | | | | |
| 37 | Step 4: Sequentially allocate the baseline loading to facilities with treatability or other challenges the WWTP deems significant. In this case, revised concentration limits drop to 105 - 121 ng/l (columns N and P). | | | | | | | | | | | | | | | | | | |
| 38 | Step 5: Examine allocation of baseline loading to groups of facilities. In this case, Revised concentration limits drop to 99 ng/l (column R). | | | | | | | | | | | | | | | | | | |