



Oregon Department of Environmental Quality

# Total Suspended Solids Antidegradation

## Guidance for major domestic facilities

Version 2.4, last revised on March 4, 2026

### Applicability

This memo provides Oregon Department of Environmental Quality guidance on how to determine if a new or increased total suspended solids, or TSS, mass load increase would be a de minimis lowering of water quality to determine if an antidegradation review is needed. This procedure applies to major domestic facilities.

For applicability to industrial facilities, contact the anti-degradation subject matter expert. For minor domestic wastewater facilities, biochemical oxygen demand, or BOD, and TSS are associated parameters, therefore, the TSS antidegradation determination may be based on the BOD finding. This memo uses similar principles summarized in a [May 2, 2018 memo from Jennifer Wigal](#) titled *Procedures to determine if a new or increased load would be a de minimis lowering of water quality* and this same memo is referenced in the text below.

### Methodology

The methodology for determining if a TSS mass load increase would be considered de minimis will parallel the procedure described in the May 2, 2018 memo noted above. That memo instructs permit writers to determine whether a mass load increase is considered de minimis by assessing the amount of assimilative capacity that is consumed by the increase. A de minimis lowering of water quality would be found if the assimilative capacity would be lowered by 2.5% or less. If the assimilative capacity would be lowered by more than 2.5% but less than or equal to 10%, the permit writer should assess cumulative impacts within the same assessment unit as outlined in the same 2018 memo.

For all situations, DEQ will track the allowed increases in mass loads and the associated reductions in capacity for future mass load increases.

### Procedure

Assess the decrease in the assimilative capacity by calculating the increase in TSS concentration downstream of the discharge. DEQ will use the percent values of 2.5 and 10 in the analysis for single and multiple, respectively, discharge with new or increased loads within an assessment unit. Refer to the 2018 memo for background on the percent values used for TSS evaluation.

For example, if an analysis determines, during critical conditions, a new or increased TSS load will cause the downstream TSS concentration to increase by 1.8%, the new or increased load would be considered a de minimis lowering of water quality. A full anti-degradation analysis would therefore be unnecessary.

#### Translation or other formats

Español | 한국어 | 繁體中文 | Русский | Tiếng Việt | العربية

800-452-4011 | TTY: 711 | [deqinfo@deq.oregon.gov](mailto:deqinfo@deq.oregon.gov)

There are two common situations when a TSS mass load increase is requested:

- 1. The mass load increase request is based on increase in design flow:** In this case, the downstream TSS concentration, after the effluent completely mixes (100%) with the receiving water, is determined using the following equation:

$$C_{\text{mixed}} = \frac{(Q_e \cdot C_e) + (Q_a \cdot C_a)}{Q_e + Q_a} = \frac{\frac{ML_e}{8.34} + (Q_a \cdot C_a)}{Q_e + Q_a}$$

Where:

$Q_e$  is the effluent design flow used to calculate the mass load limit (in millions of gallons per day, or MGD)

$Q_a$  is the upstream ambient flow (MGD)

$C_e$  is the effluent TSS concentration based limit used in the mass load limit calculation (mg/L)

$C_a$  is the upstream TSS concentration (mg/L)

$ML_e$  is the effluent mass load (lb/day) where

$$[ML_e \text{ lb/day} = Q_e \text{ million gallons/day} \cdot C_e \text{ mg/liter} \cdot 8.34 \frac{\text{lb} \cdot \text{liter}}{\text{milligram} \cdot \text{millions of gallons}}]$$

$C_{\text{mixed}}$  is the downstream TSS concentration (mg/L, at full mix)

8.34 = conversion factor  $\frac{\text{lb} \cdot \text{liter}}{\text{milligram} \cdot \text{millions of gallons}}$

The percent increase in the downstream TSS concentration is:

$$\% \text{ Increase } C_{\text{mixed}} = \frac{C_{\text{mixed } 2} - C_{\text{mixed } 1}}{C_{\text{mixed } 1}} \cdot 100$$

Where: "mixed 1" is the initial downstream TSS concentration and "mixed 2" is the downstream TSS concentration after the increased or new load

The units in this equation resolve as follows:

$$C_{\text{mixed}} \text{ mg/L} = \frac{Q_e \text{ MGD} \cdot C_e \frac{\text{mg}}{\text{L}} + Q_a \text{ MGD} \cdot C_a \frac{\text{mg}}{\text{L}}}{Q_e \text{ MGD} + Q_a \text{ MGD}}$$

OR

$$C_{\text{mixed}} \frac{\text{mg}}{\text{L}} = \frac{\frac{ML_e \frac{\text{lb}}{\text{day}}}{8.34 \frac{\text{lb} \cdot \text{L}}{\text{mg} \cdot \text{MG}}} + Q_a \text{ MGD} \cdot C_a \frac{\text{mg}}{\text{L}}}{Q_e \text{ MGD} + Q_a \text{ MGD}} = \frac{ML_e \frac{\text{lb}}{\text{day}} \cdot \frac{1 \text{ mg} \cdot \text{MG}}{8.34 \text{ lb} \cdot \text{L}} + (Q_a \text{ MGD} \cdot C_a \frac{\text{mg}}{\text{L}})}{Q_e \text{ MGD} + Q_a \text{ MGD}} = \frac{\frac{\text{mg}}{\text{L}} \cdot \text{MGD}}{\text{MGD}}$$

An example of a scenario where this equation would be applicable is as follows: A permittee requests an increase in their permitted TSS mass load. For example, their existing monthly average TSS mass load limit is 500 lbs/day, 2 MGD ADWDF, and have a concentration based effluent limit of 30 mg/L monthly and they're requesting it to be increased to 700 lbs/day, with a 2.8 MGD ADWDF, and the same concentration based effluent limit of 30 mg/L.

- 2. The concentration based effluent limit increases resulting in a mass load limit increase request (effluent flow does not change):** In this case, the percent increase in TSS at complete mix can be calculated using the single equation below:

$$\% \text{ Increase } C_{\text{mixed}} = \frac{C_{e2} - C_{e1}}{C_a(S - 1) + C_{e1}} \cdot 100$$

Where:

$C_{e2}$  is the new TSS effluent limit concentration (mg/L)

$C_{e1}$  is the existing TSS effluent limit concentration (mg/L)

$S$  is the dilution at 100% mix ( $([Q_e + Q_r]/Q_e)$ )

Typically, facilities request increases to the set of mass load or concentration limits (e.g. monthly, weekly and daily). Only the monthly average limit will be used for these assessments. The analysis is relative to the amount of increase being requested so the results for assessing against the monthly average limit will be the same for the other limits. This will simplify the analysis while still assessing whether an increase results in a de minimis lower of water quality. The receiving stream flow statistic to be used is the 30Q5 during the season in which the limit applies. The average TSS concentration upstream from the outfall for the time period being assessed should be used for the ambient TSS concentration.

An example of a scenario where this equation would be applicable is as follows: *A permittee requests an increase in their permitted TSS concentration but their effluent design flow remains unchanged. For example, their existing monthly average permitted TSS concentration is 15 mg/L and they're requesting the limit to be 20 mg/L.*

## Examples

### 1. Mass load increase request based on increase in design flow

City of Walnut is requesting a TSS winter mass load increase. The following information for the analysis is below:

Existing design flow ( $Q_{e1}$ ) = 1.5 mgd

New design flow ( $Q_{e2}$ ) = 2.5 mgd

Existing monthly average TSS mass load limit ( $ML_{e1}$ ) = 130 lb/day

Proposed monthly average TSS mass load limit ( $ML_{e2}$ ) = 210 lb/day

Receiving stream flow – 30Q5 ( $Q_a$ ) = 1200 cfs (776 mgd)

Receiving stream average TSS concentration ( $C_a$ ) = 2.0 mg/L

$$\text{Existing TSS concentration at 100\% mix downstream: } C_{\text{mixed}1} = \frac{\frac{ML_{e1}}{8.34} + Q_a \cdot C_a}{Q_{e1} + Q_a} = \frac{\frac{130 \frac{\text{lb}}{\text{day}}}{8.34 \frac{\text{lb} \cdot \text{L}}{\text{mg} \cdot \text{MG}}} + 776 \text{ mgd} \cdot 2.0 \frac{\text{mg}}{\text{L}}}{1.5 \text{ mgd} + 776 \text{ mgd}} = 2.01619 \text{ mg/L}$$

$$\text{New TSS concentration at 100\% mix downstream: } C_{\text{mixed}2} = \frac{\frac{ML_{e2}}{8.34} + Q_a \cdot C_a}{Q_{e2} + Q_a} = \frac{\frac{210 \frac{\text{lb}}{\text{day}}}{8.34 \frac{\text{lb} \cdot \text{L}}{\text{mg} \cdot \text{MG}}} + 776 \text{ mgd} \cdot 2.0 \text{ mg/L}}{2.5 \text{ mgd} + 776 \text{ mg}} = 2.02592 \text{ mg/L}$$

TSS increase at 100% mix downstream:

$$\% \text{ Increase } C_{\text{mixed}} = \frac{C_{\text{mixed}2} - C_{\text{mixed}1}}{C_{\text{mixed}1}} \cdot 100 = \frac{2.02592 \text{ mg/L} - 2.01619 \text{ mg/L}}{2.01619 \text{ mg/L}} \cdot 100 = 0.4826\%, \text{ rounds to } 0.48\%$$

In this example, a de minimis lowering of water quality would be found because the assimilative capacity would be lowered by 2.5% or less.

## 2. Concentration based effluent limit increases resulting in mass load limit increase request (effluent flow does not change)

City of Maple is requesting an increase of their monthly average TSS concentration:

Existing design flow ( $Q_e$ ) = 1.5 mgd

Existing monthly average TSS limit ( $C_{e1}$ ) = 10 mg/L

Proposed monthly average TSS limit ( $C_{e2}$ ) = 20 mg/L

Receiving stream flow ( $Q_a$ ) = 1200 cfs (776 mgd)

Receiving stream TSS concentration ( $C_a$ ) = 2.0 mg/L

100 % dilution ( $S$ ) = 518 ( $[1.5 \text{ mgd} + 776 \text{ mg}]/1.5 \text{ mgd}$ )

$$\% \text{ Increase } C_{\text{mixed}} = \frac{C_{e2} - C_{e1}}{C_a(S - 1) + C_{e1}} \cdot 100 = \frac{20 \frac{\text{mg}}{\text{L}} - 10 \frac{\text{mg}}{\text{L}}}{10 \frac{\text{mg}}{\text{L}} + (518 - 1) \cdot 2 \frac{\text{mg}}{\text{L}}} \cdot 100 = 0.957854\%, \text{ rounds to } 1.0\%$$

In this example, a de minimis lowering of water quality would be found because the assimilative capacity would be lowered by 2.5% or less.

### Contact

Emma Prichard, Senior NPDES Permit Writer

[Emma.PRICHARD@deq.oregon.gov](mailto:Emma.PRICHARD@deq.oregon.gov)

503-875-7301

### Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age, sex, religion, sexual orientation, gender identity, or marital status in the administration of its programs and activities. Visit DEQ's [Civil Rights and Environmental Justice page](#).

## Revision History

Revision	Date	Changes	Primary Editor
1.0	April 30, 2024	Initial publishing.	Steve Schnurbush
2.0	Oct. 22, 2024	Minor revision to language containing no policy change. Added date and version number to top of document. Added revision history.	Emma Prichard
2.1	Dec. 2, 2024	Added explanation of units for first equation.	Emma Prichard
2.2	April 2, 2025	Removed tracking of TSS increases, tracking contained in separate document and GIS database.	Emma Prichard
2.3	April 9, 2025	Converted to updated DEQ General Public Document Template Format. No changes to process.	Emma Prichard
2.4	March 3, 2026	DEQ Communication Review. Minor language changes. No changes to process.	Emma Prichard