

Permit Guidance 8 Final	<h2>Concentration and Loading Limits/ Permits</h2>	
	Rule reference: OAC 3745-33-05(C)(1)	Ohio EPA, Division of Surface Water Revision 0, September 15, 1998
This internal guidance does not affect the requirements found in the referenced rule or statute.		

Introduction- Why this guidance?

This guidance explains how the effluent limitations requirements in the NPDES permits are affected by the new and amended surface water rules (Rule 3745-33-05 of the Ohio Administrative Code) that became effective on October 31, 1997.

Which permits are affected and why? (Applicable under dry weather condition). Do the permit writers need to include both loading and concentration limits in all permits?

All existing NPDES permits that do not have loading limitations for pollutants are affected and have to be revised to include loadings during renewal. This will not apply to those pollutants not expressible by weight, such as pH and temperature. New permits and modification to existing permits will be written according to the new rules. Rule 3745-33-05 (C)(1) requires the permit effluent table to state authorized discharge level of pollutants in terms of volume, weight in pounds (or kilograms) per day and **where appropriate**, concentration, except for those pollutants not expressible by concentration. It is important to note here that the flexibility of not including concentration limits for pollutants is only applicable for permit limits that are not water quality-based.

Does this mean all water quality based-permits must always have both loading and concentration limits ?

Yes. The water quality based-permit limits must have both types of limits. The pollutant in the permit shall be expressed as both a concentration value and a **corresponding** mass loading limit.

What does “corresponding” mass loading mean ? Are all permits issued with concentration limit and a corresponding mass loading limit?

Rule 3745-33-05(C)(1)(b) clarifies the meaning of the term “corresponding”. It states, “The mass loading limits shall be calculated using effluent flow rates that are consistent with those used in establishing the WQBELs that are expressed as concentrations, except as allowed under paragraphs (C)(1)(c) and (C)(1)(d) of this rule.” In other words, except under the two options, as explained under paragraphs (C)(1)(c) (wet weather conditions) and (C)(1)(d) (flow reduction practices), concentration and loading shall be based on the **same** flow that was used on the waste load allocation. That is 30-day average and 7-day average loadings must always correspond to 30-day average and 7-day average concentrations. The same procedure is applicable for calculating daily maximum limits.

NPDES permits have not been always issued with a concentration limit and a corresponding

mass loading limit. Though a vast majority of the permits have limits based on the same flow, there have been instances when, due to various reasons, best professional judgement has been used and permits have been issued with concentrations not matching corresponding mass loads. With the adoption of this rule, there is no longer such flexibility available. Attachments "A" and "B" give two examples (one municipal permit and one industrial permit, both issued prior to October 31, 1997) where concentrations for some parameters do not match corresponding loads as explained below.

Under Attachment "A", the concentration values for nitrogen, ammonia, and under Attachment "B", the concentration value for copper, do not match with corresponding loading values. Under the present rule, if either or both the exceptions (wet weather/water conservation) were not applicable to these two facilities, these permits could not have been issued due to inconsistent loads and concentrations.

Explain the two exceptions clearly and give concrete examples where the exceptions are applicable.

Wet weather conditions and water conservation and/or flow reduction practices are the two options where the permit writer can use discretion in recommending more appropriate than waste load based limits in the permit. The two options are explained below.

Exception 1. Wet weather option and examples :

Paragraph (C)(1)(c) under rule 3745-33-05 characterizes mass loadings based on appropriate flow rate during wet weather conditions. It states, " For facilities that, during wet weather conditions, are subject to flows that exceed dry weather treatment facility design conditions, the director may, upon review of supporting information, authorize mass loading limits based on a more appropriate flow rate."

See the following examples of how appropriate flows can be developed for both municipal and industrial discharges.

Municipal Discharges

Occasionally when POTWs have a combined sewer system, the question of developing an appropriate wet weather flow for calculating loading limits arises, as presented in state of Ohio CSO (combined sewer overflow) strategy dated March 1995. Where there is no combined sewer system, the permit writer will typically use average design flow for POTWs. Wet weather flow means the flow value determined during stress testing of the plant. During stress testing, the POTW identifies a wet weather flow that the plant can process and still be able to comply with the concentration limits in its permit. These concentration limits are 30-day and 7-day averages, and daily maximum concentration limits. Depending on the design of the plant, this wet weather flow may be a peak flow that can be treated for some period of time (not exceeding 24 hours a day) , or if enough historical data is available, it may be a daily maximum value.

Once the permit writer accepts the results of the stress testing and agrees on the appropriate wet weather flow, that wet weather flow will be used along with the concentration limits (already derived from waste load allocation or otherwise, using average design flow) in the

permit to calculate the new loading limits. This would be evaluated at the request of the permittee, through a permit modification request or renewal application, with a supporting antidegradation addendum. The exclusion provided at 3745-1-05(D)(1)(c) may apply to these requests for new loading limits. These wet weather loading limits are included in the effluent table in the permit. The footnote that references the flow states, “ The effluent loading limitations are established using the following flow value: **WET WEATHER MGD**. The average daily design flow of the treatment plant is **AVERAGE DESIGN FLOW MGD.**” Usually only limits like CBOD5 and TSS loadings are adjusted based on wet weather flow. The permit writer may also consider adjustment of loadings for other parameters if violations of loading limits are an issue and if the POTW requested increases for other parameters. The adjustment however, cannot go beyond what is requested by the entity in the antidegradation addendum. It is important to evaluate whether a POTW actually needs an expansion to handle dry weather flows. The agency does not intend to allow this kind of relief when a POTW is at or near its dry weather capacity. In addition, documentation of I/I work and any plant improvements for wet weather are required.

As explained above, the water quality-based concentration limits in the permit continue to be always calculated using the average design flow, and the facility must always comply with these concentration limits. Under low flow conditions (i.e., non-wet weather conditions), the water quality-based concentration limits protect the receiving water. Attachment “C” gives the typical example of effluent tables under wet weather conditions where loadings for all the parameters (including metals) have been adjusted, though concentrations are based on average design flow. It may be noted that there are no multiple tables that are tiered on flow, or that apply only during wet weather flow. The footnote that references the flow is highlighted.

Industrial Discharges

Most industrial dischargers that treat wastewater are not influenced by precipitation. The wastewater from industrial facilities usually consists of process wastewater and non-contact cooling water. Storm water discharges from these facilities are dependent upon precipitation and these discharges are separately regulated by a general storm water permit. Therefore, the question of developing wet weather flow for the vast majority of the industries does not often arise.

There are, however, some industries like coal plants where, though continuous discharge takes place during dry weather conditions, the wastewater volume increases during rainfall. The total volume of discharge, during rainfall, depends upon the amount of precipitation, the drainage area and runoff coefficient. These facilities are individually permitted. Loading limits for the parameters (like iron, manganese, TSS) are calculated based on the facility’s average representative flow during dry weather conditions.

During precipitation, when the effluent exceeds average flow, the alternate limits table, as used in coal permits, are applicable. The alternate tables have no loading limitations, only additional monitoring requirements for precipitation and settleable residue. The reason there is no separate wet weather loading limits in the permit is they are difficult to enforce. The monitoring results for precipitation, settleable solids and other usual parameters will indicate the change in

the effluent characteristics during wet weather conditions. The response to comment number 5 in the “summary of responses to comments” gives further explanation on this issue (see Cross Reference)

Exception 2. Water conservation and/or flow reduction option and examples:

Paragraph (C)(1)(d) of rule 3745-33-05 says, “ For facilities utilizing water conservation and /or flow reduction practices, the director may specify more appropriate mass and concentration limits based on wasteload allocation results as developed under Chapter 3745-2 of the Administrative Code.”

Ohio EPA encourages facilities to reduce discharge flows to the greatest extent possible. While asking facilities to reduce wastewater flow, Ohio EPA must also see that the flow reduction does not increase the effluent concentration to a level that exceeds Water Quality Standards. A scenario has been created in the following example, where effluent limitations, other than WLA recommended limitations, can be recommended for a facility that implements water conservation.

Scenario

Consider a discharger which falls under federal guidelines and permissible effluent limits are production based. The calculated BAT loads for zinc are 3.5 kg/day (average) and 6.0 kg/day (daily max.) and these are more stringent than OMZ (outside mixing zone)- based loads. The WLA is limited by IMZM because the effluent is mixing with a fairly large stream. The comparative results are as follows:

<i>Parameter</i>	<u>Concentration (ug/l)</u>		<u>Load (kg/day)</u>		<u>Basis</u>
	<i>Average</i>	<i>Daily Max.</i>	<i>Average</i>	<i>Daily Max.</i>	
Zinc	--	400 (IMZM based)	--	1.2	IMZM based load
Zinc	1170	2013	3.5	6.0	BAT
Zinc	1300 (OMZA based)	2413 (OMZM based)	3.88	7.17	WLA

Permit writer’s recommended table (optional)

<i>Parameter</i>	<u>Concentration (ug/l)</u>		<u>Load (kg/day)</u>		<u>Basis</u>
	<i>Average</i>	<i>Daily Max.</i>	<i>Average</i>	<i>Daily Max.</i>	
Zinc	--	400	3.5	6.0	BPJ

It must be noted here that this loading (3.5 kg/day average and 6.0 kg/day daily max.) which is higher than 1.2 kg/day is allowed because the permittee has done flow conservation and the recommended limits do not exceed WQ-based load limits. This is a case where the Director has the flexibility of not recommending IMZM - based loads though it is more stringent than

loads derived from WLA. ***It is important to understand that unlike OMZA or OMZM based loads, IMZM based loads are not derived from mass balance calculations because IMZM is not dependent upon the dilution available in the receiving stream.*** This increased load (not bound by IMZM- based load) will be helpful to facilities expanding their production and thereby resulting in higher load but implementing flow reduction practices. Of course, any loading increases must be reviewed by antidegradation requirements. If there is no flow conservation, the recommended limits would be as given below :

<i>Parameter</i>	<u>Concentration (ug/l)</u>		<u>Loading (kg/day)</u>		<u>Basis</u>
	<i>Average</i>	<i>Daily Max.</i>	<i>Average</i>	<i>Daily Max.</i>	
Zinc	--	400	--	1.2	WQS

Cross reference:

Summary of Responses to Comments Concentration / Loading Limit Guidance

For more information contact:

Ohio EPA, Division of Surface Water
 Industrial or Municipal Permit group leader (614) 644-2001

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ATTACHMENT "A"

This example shows the concentration values for nitrogen, ammonia do not match corresponding loading values.

Part I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

- During the period beginning on the effective date of this modification and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from outfall 1PK00005001. See Part II, **OTHER REQUIREMENTS**, for locations of effluent sampling.

EFFLUENT CHARACTERISTIC			DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
Reporting Code	Units	Parameter	Concentration Specified Units		Loading kg/day		Meas. Freq.	Sample Type
			30 day	7 day	30 day	7 day		
00010	°C	Water Temperature	-	-	-	-	Daily	Continuous Max. Ind. Therm.)
00530	mg/l	Total Suspended Solids	20	30	454*	681*	3/Week	Composite
00556	mg/l	Oil and Grease	Not to exceed 10 at any time				½ Weeks	Grab
00610	mg/l	Nitrogen, Ammonia (NH₃)						
		(Summer)	1.3	2.0	45	68	3/Week	Composite
		(Winter)	3.6	5.4	136	204	3/Week	Composite
00665	mg/l	Phosphorus, Total (P)	-	-	-	-	1/Week	Composite
31616	#/100ml	Fecal Coliform (Summer Only)	1000	2000	-	-	3/Week	Grab
50050	MGD	Flow Rate	-	-	-	-	Daily	Continuous
80082	mg/l	CBOD ₅	15	23	341*	522*	3/Week	Composite

- The pH (Reporting Codes 00402 (minimum) and 00401 (maximum)) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored continuously and reported daily. The critical values (minimum and maximum) shall be reported.
- If the entity uses chlorine for disinfection, the Chlorine Residual (Reporting Code 50060) shall be maintained at a level not to exceed 0.020 mg/l and shall be monitored daily by multiple grab sample. (Summer only)** The critical (high) value shall be reported.
- The Dissolved Oxygen (Reporting Code 00300) shall be maintained at a level of not less than 5.0 mg/l and shall be monitored daily by continuous sample. The critical (low) value shall be reported.

* The average effluent loading limitations are established using the following flow value: 6.0 MGD.

** See Part II, Items G and J.

ATTACHMENT "B"

This example shows the concentration value of copper, total recoverable does not match with corresponding loading value.

Part I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

- During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from outfall 11O00005001***. See Part II, **OTHER REQUIREMENTS**, for locations of effluent sampling.

<u>EFFLUENT CHARACTERISTIC</u>			<u>DISCHARGE LIMITATIONS</u>				<u>MONITORING REQUIREMENTS</u>	
Reporting Code	Units	Parameter	Concentration Specified Units		Loading* kg/day		Meas. Freq.	Sample Type
			30 day	Daily	30 day	Daily		
01094	µg/l	Zinc, Total Recoverable	-	-	-	-	1/Month	Calculated
01118	µg/l	Chromium, Total Recoverable	-	-	-	-	1/Month	Calculated
50050	MGD	Flow Rate	-	-	-	-	Daily	Calculated
99984	µg/l	Nickel, Total Recoverable	-	-	-	-	1/Month	Calculated
99988	µg/l	Lead, Total Recoverable****	-	-	-	-	1/Month	Calculated
99989	µg/l	Copper, Total Recoverable	-	120	-	0.213	1/Month	Calculated
99990	µg/l	Cadmium, Total Recoverable****	-	-	-	-	1/Month	Calculated
99995	mg/l	Cyanide, Free**	-	-	-	-	1/Month	Calculated

* Effluent loading limitations based on a flow of 0.53 MGD.

** See Part II, Item G.

*** See Part II, Item F.

**** See Part II, Item H.

- The pH (Reporting Code 00400) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored 1/2 weeks by grab sample.
- Samples taken in compliance with monitoring requirements specified above shall be taken at Sampling Stations described in Part II, **OTHER REQUIREMENTS**.

ATTACHMENT "C"

This example shows though average design flow is 12.5 mgd, the loadings are based on wet weather flow of 20 mgd.

Part I, A. - **FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

- During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from outfall 2PF00001001. See Part II, **OTHER REQUIREMENTS**, for locations of effluent sampling.

EFFLUENT CHARACTERISTIC			DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
Reporting Code	Units	Parameter	Concentration Specified Units		Loading* kg/day		Meas. Freq.	Sample Type
			30 day	7 day	30 day	7 day		
00010	°C	Water Temperature	-	-	-	-	Daily	Continuous Max. Ind. Therm.)
00530	mg/l	Total Suspended Solids	20	30	1516	2274	Daily	Composite
00556	mg/l	Oil and Grease	Not to exceed 10 at any time				1/Month	Grab
00610	mg/l	Nitrogen, Ammonia (NH ₃)	-	-	-	-	Daily	Composite
00665	mg/l	Phosphorus, Total (P)	1.0	1.5	76	114	1/Week	Composite
31616	#/100ml	Fecal Coliform (Summer Only)	1000	2000	-	-	Daily	Grab
50050	MGD	Flow Rate	-	-	-	-	Daily	Continuous
80082	mg/l	CBOD ₅	14	21	1061	1592	Daily	Composite

- The pH (Reporting Codes 00402 (minimum) and 00401 (maximum)) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored continuously and reported daily.
- If the entity uses chlorine for disinfection, the Chlorine Residual (Reporting Code 50060) shall be maintained at a level not to exceed 0.5 mg/l and shall be monitored daily by grab sample (Summer only) until the date specified in Item 1 in the Schedule of Compliance. Beginning on May 1, 1999, the Chlorine Residual shall be maintained at a level not to exceed 0.038 mg/l and shall be monitored continuously with the highest value reported daily (Summer only).**
- The Dissolved Oxygen (Reporting Code 00300) shall be monitored continuously with the lowest value reported daily.

* **The average effluent loading limitations are established using the following flow value: 20 MGD. The average daily design flow of the treatment plant is 12.5 MGD.**

** See Part II, Items H and I.

ATTACHMENT "C" Contd.

Part I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from outfall 2PF00001001. See Part II, **OTHER REQUIREMENTS**, for locations of effluent sampling.

EFFLUENT CHARACTERISTIC			DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
Reporting Code	Units	Parameter	Concentration Specified Units		Loading* kg/day		Meas. Freq.	Sample Type
			30 day	Daily Max.	30 day	Daily Max.		
00615	mg/l	Nitrogen, Nitrite (NO ₂)	-	-	-	-	1/2 Weeks	Composite
00620	mg/l	Nitrogen, Nitrate (NO ₃)	-	-	-	-	1/2 Weeks	Composite
01118	µg/l	Chromium, Total Recoverable	-	-	-	-	1/Month	Composite(1)
01220	µg/l	Chromium, Dissolved Hexavalent	-	-	-	-	1/Month	Grab(2)
99983	µg/l	Zinc, Total	58	83	4.4	6.3	1/2 Weeks	Composite(1)
99984	µg/l	Nickel, Total Recoverable	-	-	-	-	1/Month	Composite(1)
99988	µg/l	Lead, Total Recoverable	-	-	-	-	1/Month	Composite(1)
99989	µg/l	Copper, Total Recoverable	-	-	-	-	1/Month	Composite(1)
99990	µg/l	Cadmium, Total Recoverable	7.0	16	0.5	1.2	1/2 Weeks	Composite(1)
99993	µg/l	Mercury, Total(3)	0.012	1.1	0.0009	0.083	1/2 Weeks	Composite(1)
99995	mg/l	Cyanide, Free(4)	0.051	0.076	3.9	5.8	1/2 Weeks	Grab(2)

* **The average effluent loading limitations are established using the following flow value: 20 MGD. The average daily design flow of the treatment plant is 12.5 MGD.**

- (1) See Part II, Item L.
- (2) See Part II, Item M.
- (3) See Part II, Item I.
- (4) See Part II, Item Q.