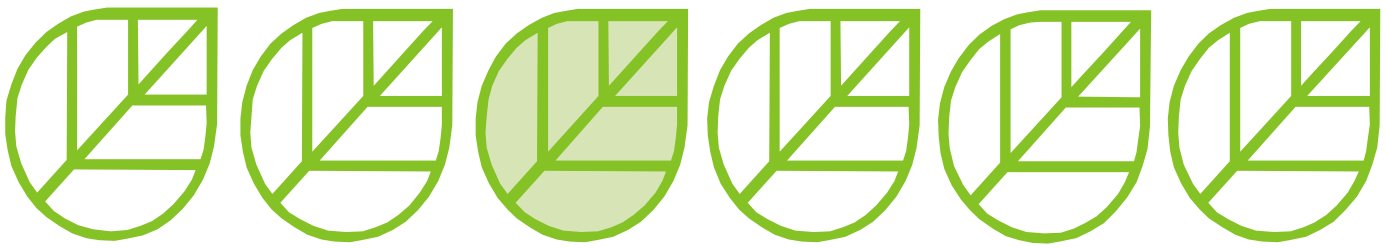
State of Ohio Environmental Protection Agency

PRETREATMENT PROGRAM:

Local Limits Guidance



Ohio Environmental Protection Agency
Division of Surface Water
Pretreatment Unit
P.O. Box 1049
Columbus, Ohio 43216-1049

September 1995

PRETREATMENT PROGRAM: LOCAL LIMITS GUIDANCE

Publicly-owned treatment works (POTWs) may need to develop new or revised local industrial user limitations intended to prevent pass through and interference. The purpose of this guidance is to assist POTWs in establishing a sound technical basis for local industrial user limitations and preparing justification for these limits for submittal to the Ohio EPA for review and approval. Minimum Ohio EPA requirements for local limits development are presented. Refer to U.S. EPA's "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program" (December 1987) for additional information.

Due dates for technical justification for local limits may be specified in the POTW's NPDES permit(s), Director's Final Findings and Orders, or during a pretreatment compliance inspection or audit performed by Ohio EPA. The nonpretreatment program POTW may be required to develop local limits if the POTW updates it's NPDES permit, if there is inhibition, or if there is a potential for this to occur. Ohio EPA must review and approve technical justification for local limits before limits are incorporated into the sewer use ordinance or industrial user control documents. Technical justification for local limits must be submitted in duplicate to:

Ohio Environmental Protection Agency
Division of Surface Water
Pretreatment Unit
P. O. Box 1049
Columbus, Ohio 43216-1049

Any questions regarding preparation or submittal of technical justification for local limits should be directed to Ohio EPA, Central Office Pretreatment Unit at (614) 644-2001.

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PRETREATMENT PROGRAM: LOCAL LIMITS GUIDANCE

INTRODUCTION

POTWS REQUIRED TO DEVELOP APPROVED PRETREATMENT PROGRAMS

The General Pretreatment Regulations (40 CFR 403) require that each publicly owned treatment works (POTW) required to develop a state approved pretreatment program must develop and enforce local limits to protect against pass through and interference which may be caused by industrial discharges to the treatment facilities. Limits are developed originally by POTWs as a prerequisite to pretreatment program approval. However, a large percentage of the local limits developed in the early days of the State of Ohio's U.S. EPA approved pretreatment program do not have a firm technical basis. In addition, POTW conditions change with time and will eventually be required to update their local limits to ensure a firm technical basis and address changing conditions. POTWs should reevaluate the technical basis of their local limits when there are changes at the industries or at the POTW. Local limits are dynamic and should be constantly evaluated.

POTWS WITHOUT APPROVED PRETREATMENT PROGRAMS

Some POTWs not having Ohio EPA approved pretreatment programs may be required to develop local limits. The Ohio Administrative Code gives Ohio EPA the authority to require any POTW to develop technically based local limits where the POTW receives pollutants contributed by industrial users which may cause or have caused pass through or interference at the POTW. Some POTWs not required to develop local limits may wish to do so to assure compliance with NPDES permit and sludge disposal requirements.

COMPARISON OF LOCAL LIMITS TO CATEGORICAL STANDARDS

Federal categorical pretreatment standards, which are applicable to certain classes of industries, establish technology based minimum pretreatment standards for regulated classes of industry. However, categorical standards do not address POTW specific problems which may arise from discharges by categorically regulated industries. In addition, many types of industries which discharge significant quantities of pollutants are not regulated by categorical standards. Hence, there is a need for many POTWs to establish site specific discharge limits in order to protect the treatment facilities, receiving water quality, worker health and safety, and to allow for beneficial use of sludge.

POLLUTANTS TO BE LIMITED

Each POTW required to develop local limits must establish limits for arsenic, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, and zinc or demonstrate that limits are not necessary for individual pollutants. The POTW must also identify all other pollutants of concern, conservative and nonconservative, and evaluate the need for limits for these pollutants. A pollutant of concern may be defined as any pollutant found in the collection system in sufficient quantity to have a reasonable potential to cause pass through or interference at the treatment plant, pose a threat to worker health and safety, or to cause other problems within the collection system or at the treatment plant, such as explosions or obstruction in wastewater flow. The annual priority pollutant scan performed by POTWs with approved pretreatment programs is useful in identifying pollutants of concern. POTWs having approved pretreatment programs must develop local limits for each treatment plant included in the approved pretreatment program.

Local limits are most often associated with the control of toxic pollutants. However, if a POTW has experienced violations of NPDES permit effluent limits for conventional pollutants (such as BOD, TSS, ammonia, phosphorus, or oil and grease) it is recommended that the need for local limits for these pollutants be investigated.

MAINTAINING AN ADEQUATE DATABASE

Since local limits must be revised periodically, an ongoing monitoring program is recommended to support review and revision of local limits and identification of pollutants of concern. An effective ongoing monitoring program should include periodic sampling of influent, effluent, sludge, process inhibition, domestic/background wastewaters, and industrial wastewater discharges.

PRELIM

Many POTWS have found the PRELIM software to be useful in local limits development. PRELIM (which stands for pretreatment limits) is PC compatible and was developed by Science Applications International Corporation for U. S. EPA. Copies are available from U. S. EPA and Ohio EPA.

STEPS IN LOCAL LIMITS DEVELOPMENT

In order to establish or revise local limits, the following steps must be performed:

- Data collection for pollutants of concern
- Identification of limiting criteria
- Development of maximum allowable headworks loadings
- Allocation of available pollutant loadings to industry
- Submittal of technical justification to Ohio EPA

Each of these steps of the local limits development process are described in the following pages.

DATA COLLECTION FOR POLLUTANTS OF CONCERN

The first step in the limits development process is to collect and review monitoring data to be used to identify pollutants of concern and calculate the local limits. The POTW must determine representative values for the following items which influence maximum allowable headworks loadings:

- Pollutant removal efficiencies
- Domestic/background pollutant contributions
- Industrial pollutant contributions
- Total plant flow

Conditions at each POTW are unique, therefore site specific sampling information is to be used. Conditions at the POTW also vary with time, therefore, the most recent representative sampling information available must be employed. Where it is not feasible for the POTW to obtain actual sampling information, substituting literature values for site specific sampling may be acceptable, but generally is not recommended.

POLLUTANT REMOVAL EFFICIENCIES

Total POTW and process removal efficiencies must be determined for each pollutant of concern. Where NPDES monitoring data is available, a minimum of one year of influent, effluent, and sludge sampling must be used in the calculations. Removal efficiencies should be calculated on a loading basis, rather than on a concentration basis. A surrogate of one half the detection limit for concentrations below detectable limits should be employed in the calculations. Additional sampling may be needed to determine removal rates for pollutants for which no NPDES monitoring is available or for determining between process removal rates. One year of monitoring data is preferable, but where time is limiting, a minimum of seven consecutive days of 24 hour composite sampling will be accepted. Sampling and analyses must be conducted using the methods of 40 CFR 136. Hydraulic retention time should be accounted for during sampling where feasible. Influent samples should be obtained upstream from recirculating flows.

DOMESTIC/BACKGROUND CONTRIBUTIONS

Sampling must also be performed to determine pollutants contributed by domestic and other uncontrollable sources. A minimum of seven consecutive 24 hour composite samples must be obtained at a minimum of three separate locations within the service area where only domestic or uncontrollable wastewater flow is present. Since infiltration and inflow are components of background wastewaters, the POTW may wish to schedule background sampling to account for the influence of infiltration and inflow. This infiltration and inflow is to be considered part of the domestic flow.

INDUSTRIAL POLLUTANT CONTRIBUTIONS

As a minimum, a value for total wastewater flow must be determined. In addition, POTWs which do not use the uniform concentration limit method for allocating available industrial pollutant loadings must establish representative pollutant contributions for each industry. One to three years of POTW and industrial user self monitoring data must be evaluated in order to establish representative industrial pollutant contributions. In all cases, Ohio EPA recommends that the POTW obtain and/or evaluate sufficient monitoring information to assess the impact of the new local limits on each industrial user.

TOTAL POTW TREATMENT PLANT FLOW

A representative value for total plant flow is another important parameter in the local limits development calculations. One to three years of POTW flow monitoring data should be evaluated to establish a representative flow value. Actual plant flows are to be used rather than plant design flow.

IDENTIFICATION OF LIMITING CRITERIA

The second step in the limits development process is to select applicable limiting criteria. Limiting criteria may include:

- NPDES permit limits
- Waste load allocations (if no NPDES permit limits)
- Biological process inhibition
- Sludge disposal
- Water quality standards
- Collection system problems
- Worker health and safety

NPDES PERMIT LIMITS

The NPDES permit for each treatment plant may contain effluent limitations for some or all of the pollutants for which local limits are to be established. NPDES permits may only contain daily maximum limits or both daily maximum and monthly average limits. Where the NPDES permit contains both daily maximum and monthly average limits, the POTW has the option of deriving one set of not to exceed local limits based on the monthly average NPDES permit limits, or developing both daily maximum and monthly average local limits. If the POTW chooses to establish daily maximum and monthly average local limits, two sets of local limits calculations must be performed: one using the daily maximum NPDES limits as the limiting criteria, and the second set using the monthly average NPDES limits as the limiting criteria. If the NPDES permit does not contain effluent limitations, Ohio EPA may provide waste load allocations in Part II of the NPDES permit, which can be used to determine maximum allowable headworks loadings based on pass through.

BIOLOGICAL PROCESS INHIBITION

Pollutants may cause toxicity to biological processes, such as activated sludge, trickling filters, nitrification, or sludge digestion. The POTW must evaluate the potential for pollutants to disrupt biological processes when local limits are developed. Unless site specific information on biological process inhibition is available, the **MINIMUM** reported inhibition threshold in the literature must be used for process inhibition values in the local limits calculations. This means that most often, POTWs must consult the literature for biological process inhibition values. In some cases, biological processes at the POTW may be exposed to concentrations of pollutants in excess of the minimum reported threshold in the literature without any disruption in plant performance. In these cases, it may be acceptable for the POTW to substitute pollutant concentrations which have occurred in the applicable biological process without causing any disruption in plant performance for the process inhibition value.

SLUDGE DISPOSAL

The POTW must consider any applicable constraints on its sludge disposal practices, and establish sludge disposal criteria. Local limits should prevent restriction of sludge disposal options caused by dischargers from industrial users. Factors influencing sludge disposal options may include site area, site life, federal and state sludge disposal regulations and guidelines for land application of sludge; RCRA characteristic

testing (toxicity characteristic leaching procedure) for landfilling of sludge; or air quality restrictions for incineration of sludge.

WATER QUALITY STANDARDS

Where there are no NPDES limits or waste load allocation criteria for a pollutant or pollutants for which local limits are being developed, the POTW may wish to use water quality standards as a basis for local limits. Ohio's water quality standards are contained in Chapter 3745-1 of the Ohio Administrative Code.

COLLECTION SYSTEM PROBLEMS

The POTW may wish to consider potential problems in the collection system as a basis for establishing local limits. Collection system problems may include fire or explosion hazards, corrosion, flow obstruction, worker health and safety, or other site specific issues.

DEVELOPING MAXIMUM ALLOWABLE HEADWORKS LOADINGS

The third step in the limits development process is to calculate maximum allowable headworks loadings based on each limiting criterion. Maximum allowable headworks loadings based on all applicable criteria for each pollutant are then compared and the lowest allowable loading values are selected. A safety factor must then be applied to the entire maximum allowable headworks loadings and domestic/background contributions are subtracted to establish the pollutant loadings available for industry. Equations for each of the limiting criteria are presented below.

NPDES PERMIT LIMITS, WASTE LOAD ALLOCATION

$$L_{hw} = \frac{8.34 * C_{crit} * Q_{potw}}{1 - R_{potw}}$$

Where:

L_{hw} = Maximum allowable headworks loading (lbs/day)
C_{crit} = NPDES permit limit (mg/l) or waste load allocation (mg/l)
Q_{potw} = POTW average flow (MGD)
R_{potw} = Removal efficiency across POTW as a decimal
8.34 = Unit conversion factor

BIOLOGICAL PROCESS INHIBITION

$$L_{hw} = \frac{8.34 * C_{crit} * Q_{potw}}{1 - R}$$

DIGESTER PROCESS INHIBITION

$$L_{hw} = \frac{8.34 * C_{crit} * Q_{dig}}{R_{potw}}$$

Where:

L_{hw} = Maximum allowable influent loading (lbs/day)
C_{crit} = Minimum threshold inhibition concentration (mg/l)
Q_{potw} = POTW average flow (MGD)
R = Removal efficiency prior to affected process as a decimal
Q_{dig} = Digester average flow (MGD)
R_{potw} = Removal efficiency across POTW as a decimal

SLUDGE DISPOSAL

To calculate maximum allowable headworks loadings based on sludge disposal considerations, first sludge disposal criteria expressed as a unit of pollutant per unit of sludge must be calculated. Sludge criteria may be based on an annual application rate limit for a given pollutant, on a cumulative application limit, or on both. Where both annual and cumulative sludge applications apply, the more stringent of the sludge criteria calculated should be used in calculating the maximum allowable headworks loadings. Sludge criteria expressed in mg/kg dry sludge may be calculated as follows:

$$C_{\lim(a)} = \frac{(AAR * SA) mg/kg\, dry\ sludge}{Q_{sldg} * (PS/100) * 3046}$$

$$C_{\lim(c)} = \frac{(CAR * SA) mg/kg\, dry\ sludge}{SL * Q_{sldg} * (PS/100) * 3046}$$

Where:

$C_{lim(a)}$ = Annual sludge application criteria (mg/kg dry sludge)
$C_{lim(c)}$ = Cumulative sludge application criteria (mg/kg dry sludge)
AAR = Annual sludge application limit (lbs/acre/year)
CAR = Cumulative sludge application limit (lbs/acre over site life)
SA = Site area (acres)
SL = Site life (years)
Q_{sldg} = Sludge flow to disposal (MGD)
PS = Percent solids in sludge to disposal
3046 = Unit conversion factor

The calculated sludge disposal criteria or the "503" criteria may then be substituted for C_{slcrit} in the following equation to calculate the maximum allowable headworks loadings:

$$L_{hw} = \frac{8.34 * C_{slcrit} * (PS/100) * Q_{sldg}}{R_{potw}}$$

Where:

L_{hw} = Maximum allowable headworks loading (lbs/day)
C_{slcrit} = Sludge disposal criterion (mg/kg dry sludge)
PS = Percent solids of sludge to disposal
Q_{sldg} = Sludge flow to disposal (MGD)
R_{potw} = Removal efficiency across POTW (as a decimal)

If the POTW incinerates or landfills their sludge, the maximum allowable headworks loading must also be calculated. Refer to the U.S. EPA's "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program" (December 1987).

WATER QUALITY STANDARDS
COLLECTION SYSTEM PROBLEMS

Refer to the U.S. EPA's "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program"(December 1987).

ALLOCATING POLLUTANT LOADINGS TO INDUSTRY

Once these calculations have been performed, the POTW must then determine the pollutant loadings available for industrial users using the most stringent maximum allowable headworks loading. A safety factor is applied to this value and the domestic/ background pollutant loadings are subtracted, leaving the available pollutant loadings for industry.

SAFETY FACTOR

A safety factor must be applied to the maximum allowable headworks loading to account for any uncertainty in measured input values and to protect the POTW during periods of industrial noncompliance with local limits. A minimum 10% safety factor is required, however, a 20% safety factor is recommended in most cases. Safety factors greater than 30% are not recommended. POTWs should reevaluate local limits whenever there is a substantial change in the industrial loading to the POTW, rather than apply a large safety factor to account for changes in wastewater contributions. Use of a large safety factor does not constitute an appropriate substitute for periodic review and revision of local limits. The main factors that should be considered when determining a safety factor are as follows:

* Potential industrial growth, resulting in new and/or increased industrial discharges to the POTW.

* Potential slug loadings (e.g., as a result of chemical spills) of pollutants which might affect POTW operation/performance.

* Variability and measurement error associated with POTW design/performance parameters used in deriving local limits (e.g., removal efficiencies, POTW flow data, domestic/background pollutant levels, etc.)

DOMESTIC/BACKGROUND CONTRIBUTIONS

Domestic/background flow is estimated by subtracting the total industrial flow from the total plant flow: $Q_{dom} = Q_{potw} - Q_{ind}$ in order to account for inflow/infiltration. The domestic/ background loading may then be estimated for each pollutant as follows:

$$L_{dom} = C_{dom} * Q_{dom} * 8.34$$

Where:

L_{dom} = Domestic/background loading (lbs/day)
C_{dom} = Domestic/background pollutant concentration (mg/l)
Q_{dom} = Domestic/background flow (MGD)
(May vary for each pollutant if uniform concentration limits using only industrial contributory flow are employed)
8.34 = Unit conversion factor

CALCULATING AVAILABLE INDUSTRIAL LOADINGS

The pollutant loadings available for industrial users may then be calculated as follows:

$$L_{ind} = (L_{hw} * (1 - SF)) - L_{dom}$$

Where:

L_{ind} = Available loading for industry (lbs/day)
SF = Safety factor expressed as a decimal
L_{hw} = Most stringent maximum allowable headworks loading (lbs/day)
L_{dom} = Domestic/background loading (lbs/day)

The next step is to allocate the available pollutant loadings to the industrial users. Any of the following accepted methods for allocating available industrial loads may be used by the POTW:

- Uniform concentration limits
- Uniform concentration limits using only industrial contributory flows
- Mass proportion allocation
- Selected industrial reduction
- Individual loading allocation

UNIFORM CONCENTRATION LIMITS

Using this method, the POTW develops industrial user limits which are applied equally to all industrial users. Its advantages are relative ease of calculation and application and that it is not necessary for the POTW to know effluent characteristics for each pollutant regardless of the level of pollutants in each industry's discharge. This may result in relatively stringent limits when compared to other methods of allocation. The following equation is employed:

$$C_{\lim} = \frac{L_{all}}{8.34 * Q_{ind}}$$

Where:

C_{lim} = Uniform concentration limit (mg/l)
L_{all} = Allowable industrial loading (lbs/d)
Q_{ind} = Total industrial flow (MGD)

UNIFORM CONCENTRATION LIMITS USING INDUSTRIAL CONTRIBUTORY FLOWS

Using this method, the POTW establishes a common discharge limit for all industrial users identified as having pollutant concentrations in process wastewaters at concentrations greater than domestic/background wastewaters. The flow from a particular industrial user is considered either as part of the domestic/ background flow or as part of the industrial contributory flow in calculating limits for each pollutant, depending on the concentration of the pollutant present in that industrial user's wastewater before pretreatment. Industries not considered to have any contributory flow for a given pollutant must be restricted in individual control documents to discharging that pollutant at or below background levels. One advantage of this method is that a more prudent use of the available industrial loading is achieved, because the available pollutant loadings are granted only to those industries that have pollutants in the raw wastewater at levels above background. A disadvantage of this method is that the POTW must have detailed knowledge of each industrial user's raw wastewater characteristics. The following equation is employed:

$$C_{\lim} = \frac{L_{all}}{8.34 * Q_{cont}}$$

Where:

C_{lim} = Uniform concentration limit for contributing industries (mg/l)

L_{all} = Allowable industrial loading (lbs/day)
Q_{cont} = Industrial contributory flow (MGD)
(may be different for each pollutant)

MASS PROPORTION ALLOCATION

Using this method, the POTW employs the ratio of the available pollutant loading for industry to the current loading from industry for each pollutant to derive local limits. The ratio for each pollutant is multiplied by the current loading from each industrial user to generate the local limit. The advantage of this method is that it grants industrial users pollutant loadings on an as needed basis, allowing for optimal allocation of the available pollutant loadings. However, this method has several disadvantages. One is that when the current industrial loading exceeds the available loading, all industries are required to reduce pollutant loadings by the same proportion, which may be unfair to some industries, and cost prohibitive or technically unrealistic for others. Another disadvantage is that limits are industry specific, and the POTW must have detailed knowledge of each industry's effluent quality. They must also perform calculations for each industry which may become tedious when there is a large number of industrial contributors. The following equations are employed:

$$L_{all}(x) = \frac{L_{curr}(x) * L_{all}}{L_{curr}(t)}$$

$$C_{\lim}(x) = \frac{L_{all}(x)}{8.34 * Q(x)}$$

Where:

$L_{all}(x)$ = Loading allocated to industrial user x (lbs/day)
$L_{curr}(x)$ = Current loading from industrial user x (lbs/day)
$L_{curr}(t)$ = Total current industrial user loading (lbs/day)
L_{all} = Allowable industrial loading (lbs/day)
$C_{lim}(x)$ = Concentration limit for industrial user x (mg/l)
$Q(x)$ = Flow from industrial user x (MGD)

SELECTED INDUSTRIAL REDUCTION

Using this method, the POTW requires a reduction in pollutant loadings from specific industrial users. This method is employed when existing industrial loadings exceed allowable industrial loadings. The POTW identifies industries which will be required

to reduce pollutant loadings on the basis of wastewater treatability information. This method seeks to reduce pollutant loadings in a cost effective manner by requiring reductions from only significant dischargers of a pollutant on a case by case basis. An advantage of this method is that it may bring about the greatest pollutant reductions at the lowest cost, where pollutant reductions are necessary. One disadvantage is that since uniform pollutant reductions are not imposed on all industrial users, the POTW's decisions may come under close scrutiny by industrial users. Another disadvantage is that the POTW may need to have detailed information on industrial user effluent characteristics and wastewater treatability. The following equations are employed:

$$L_{all}(x) = L_{curr}(x) * (1 - R(x))$$

$$C_{\lim}(x) = \frac{L_{all}(x)}{8.34 * Q(x)}$$

Where:

$L_{all}(x)$ = Allowable loading from industrial user x (lbs/day)
$L_{curr}(x)$ = Current loading from industrial user x (lbs/day)
$R(x)$ = POTW selected pollutant removal efficiency for industrial user x, as a decimal
$C_{lim}(x)$ = Concentration limit for industrial user x (mg/l)
$Q(x)$ = Flow from industrial user x (MGD)

INDIVIDUAL LOADING ALLOCATION

Using this method, the POTW allocates available pollutant loadings to industrial users on an individual basis. The sum of allocations for each pollutant must not exceed the total available loading for industry.

SUBMITTING TECHNICAL JUSTIFICATION FOR LOCAL LIMITS

Technical justification for new or revised local limits must be submitted to Ohio EPA for review and approval prior to incorporation into the sewer use ordinance and/or control documents. Technical justification for retaining existing local limits must also be submitted to Ohio EPA for review where required. The POTW **MUST** submit the following information in order to demonstrate an adequate technical basis for local limits:

1. POTW treatment plant process schematic or a detailed narrative of the POTW treatment plant processes.

2. Domestic/background pollutant contributions; process inhibition thresholds; POTW pollutant removal efficiencies; sludge disposal criteria; POTW, industrial, and domestic/ background flows; and where applicable, effluent quality measured or assumed for industrial users.

3. Supporting assumptions, methodologies, and calculations used in establishing the items required in number 2 above.

4. A comparison of maximum allowable headworks loadings based on all applicable limiting criteria in tabular form.

5. The proposed local limits. Where industry specific local limits are proposed, the limits for each industry must be included.

If your POTW has an approved pretreatment program and revisions to local limits are proposed, technical justification for local limits must be submitted as a pretreatment program modification request. Refer to Ohio EPA's Pretreatment Program: Modification Guidance (September 1989) for program modification procedures.