



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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OFFICE OF  
WATER

MEMORANDUM

SUBJECT: Calculation of Production-Based Effluent Limits

FROM: J. William Jordan, Chief *J. William Jordan*  
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TO: Regional Permits Branch Chiefs

The purpose of this memorandum is to clarify the procedure for calculating production-based effluent limitations and to provide guidance on the use of alternate limitations. Many effluent guidelines are expressed in terms of allowable pollutant discharge rate per unit of production. To determine permit limits, these standards are multiplied by an estimate of the facility's actual average production.

Section 122.45(b) of the NPDES permit program regulations sets forth the requirements for calculating production-based effluent limitations. The central feature of this section is the requirement that limitations be based upon a "reasonable measure of the actual production of the facility", rather than upon design capacity. Interpretation of this requirement has proven confusing in the past. This memorandum provides recommendations for developing production-based limitations and alternate limitations. The Agency is also planning to revise this portion of the regulations, and has revised Part III of Application Form 2C, in order to clarify language which might lead to the use of inappropriate production-based limitations.

Background

The proper application of production-based effluent limitation guidelines is dependent upon the methodology that is used to develop the guidelines. When most guidelines are developed, a single long term average daily production value and its relationship to flow are determined. This is combined with effluent concentration data collected from plants to form the basis of the guideline standards. Variability factors are developed on concentration data obtained from samples taken during periods of varying production. The variability factors and performance data are then used to derive the guideline standards.

Calculation of Limitations

To apply these guidelines, permit writers should determine

a single estimate of the expected production over the life of the permit using the long term average production from the plant's historical records. Usually, a five year production history would be used to derive this value. This single production value is then multiplied by both the daily maximum and monthly average guidelines limitations to obtain permit limits. In determining this single estimate, the permit writer should take into account the distribution of production by analyzing data taken as frequently as possible. For most cases, monthly data compiled from daily data would be sufficient.

The permit writer should avoid the use of a limited amount of production data in estimating the production for a specific facility. For example, the data from a particular month may be unusually high and thus lead to the derivation of effluent limitations which are not actually reflective of normal plant operations. As previously explained, effluent limitations guidelines already account for some of the variations which occur within long term production rates. Therefore, the use of too short a time frame in the calculation of production based limitations for a specific industrial facility may lead to "double accounting" of the variability factors.

In some cases, the historical data may show large random or cyclic fluctuations in production rates, of either a short or long term nature. In those situations, it may be appropriate to have alternate limits which are applicable at some increased production rate (see discussion of Alternate Limits) or setting the limit based upon a level of production higher than the average (e.g. 10-20 percent or higher).

However, the primary objective is to determine a production estimate for a facility which approximates the long term average production rate (in terms of mass of product per day) which can reasonably be expected to prevail during the next term of the permit. The following example illustrates the proper application of guidelines:

Example: Company A has produced 331,500 tons, 292,000 tons, 304,000 tons, 284,000 tons, and 312,000 tons per year for the previous five years. The use of the highest year of production (331,500 tons per year) might be an appropriate and reasonable measure of expected production. One check on this could be to determine if maximum yearly values are within a certain percent of the average, such as 20 percent.

One of several methods may be appropriate to convert from the annual production rate to average daily production. One method takes the annual production rate and divides it by the number of production days per year. To determine the number of production days, the total number of normally scheduled non-production days are subtracted from the total days in a year.

This method is appropriate in cases where the plant

discharges intermittently as a direct result of production flows. In cases where the plant discharges continuously, even on days when there are no production activities, other methods may be appropriate.

If Company A normally has 255 production days per year, which are approximately equal to the number of discharge days, the annual production rate of 331,500 tons per year would yield an average daily rate of 1,300 tons per day. If pollutant X has an effluent limitation guideline of 0.10 lbs./1000 lbs. for the monthly average and 0.15 lbs./1000 lbs. for the maximum daily average, the effluent limitations would be calculated as follows:

Monthly Average Limit (Pollutant X)

$$1,300 \frac{\text{tons}}{\text{day}} \times \frac{2000 \text{ lbs.}}{\text{ton}} \times \frac{0.10 \text{ lbs.}}{1000 \text{ lbs.}} = 260 \text{ lbs./day}$$

Daily Maximum Limit (Pollutant X)

$$1,300 \frac{\text{tons}}{\text{day}} \times \frac{2000 \text{ lbs.}}{\text{ton}} \times \frac{0.15 \text{ lbs.}}{1000 \text{ lbs.}} = 390 \text{ lbs./day}$$

In the example above, the production during the highest year of the last five years was used as the estimate of production. This estimate is appropriate when production is not expected to change significantly during the permit term. However, if historical trends, market forces, or company plans indicate that a different level of production will prevail during the permit term, a different basis for estimating production should be used.

Alternate Limits

If production rates are expected to change significantly during the life of the permit, the permit can include alternate limits. These alternate limits would become effective when production exceeds a threshold value, such as during seasonal production variations. Definitive guidance is not available with respect to the threshold value which should "trigger" alternate limits. However, it is generally agreed that a 10 to 20 percent fluctuation in production is within the range of normal variability, while changes in production substantially higher than this range (such as 50 percent) could warrant consideration of alternate limitations. The major characteristics of alternate limits are best described by illustration and example:

Example: Plant B has produced 486,000 tons, 260,400 tons, 220,000 tons, 240,800 tons, and 206,500 tons per year for the previous five years. The high year is significantly higher than the rest and the permittee has made a plausible argument that production is expected to return to that level. The guideline for pollutant X is 0.8 lbs./1000 lbs. for the monthly average and 0.14 lbs./1000 lbs. for the maximum daily average.

mum. The alternate effluent limitations could be calculated as follows:

Primary Limits:

- o Basis of calculation: 260,400 tons/yr. = 1,050 tons/day (248 production days per year)
- o Applicable level of production: less than 1,050 tons per day average production rate for the month

Monthly Average Limit

$$1,050 \frac{\text{tons}}{\text{day}} \times 2000 \frac{\text{lbs.}}{\text{ton}} \times \frac{0.08 \text{ lbs.}}{1000 \text{ lbs.}} = 168 \text{ lbs./day}$$

Daily Maximum Limit

$$1,050 \frac{\text{tons}}{\text{day}} \times 2000 \frac{\text{lbs.}}{\text{ton}} \times \frac{0.14 \text{ lbs.}}{1000 \text{ lbs.}} = 294 \text{ lbs./day}$$

Alternate Limits:

- o Applicable threshold level of production = more than 1,260 tons/day average production rate for the month (20 percent above normal production levels)
- o Basis of calculation: 486,000 tons/yr. = 1,350 tons/day (based upon historical data and to be applicable beyond a 20 percent increase in production)

$$\text{Monthly Average Limit} = 216 \text{ lbs./day}$$

$$\text{Daily Maximum Limit} = 378 \text{ lbs./day}$$

Alternate limits should be used only after careful consideration and only when a substantial increase or decrease in production is likely to occur. In the example above, the primary limits would be in effect when production was at normal levels. During periods of significantly higher production, the alternate limits would be in effect. When production reverted to normal levels, the primary limits would have to be met. The thresholds, measures of production, and special reporting requirements must be detailed in the permit.

If you have any questions concerning the calculation of production-based limitations or the use of alternate limitations, please call me or have your staff contact James Taft at (202/FTS-426-7010).