Mercury Level Currently Achievable and Permit Limit

5/28/2019

Level Currently Achievable

HAC 3 is expressed in the Federal variance rule as "the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance, and the adoption and implementation of a Pollutant Minimization Program." DEQ uses the term "Level Currently Achievable" to describe "the interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance." For an individual variance, the LCA can be expressed as a single number or set of numbers. In the case of the MDV, the LCA can be included as a methodology to calculate a single number or set of numbers based on effluent data from each facility.

In order to calculate the LCA for mercury for each facility, DEQ will use the most recent five years of mercury effluent data at the time of their permit issuance, with a minimum of eight non-consecutive samples that span at least two years. Each daily value is a single data point, even when the facility collects samples on three consecutive days, as required by the pretreatment program. The TSD methodology (Table E-1), with lognormal transformation and no auto-correlation, is used to calculate the 95th percentile of the effluent data distribution to describe the Level Currently Achievable. DEQ used data from four facilities to demonstrate how DEQ would calculate these levels. See the LCA values shown in the table below.

Procedure to establish LCA-based effluent limits

DEQ is proposing to establish LCA-based permit limits that apply as a quarterly average concentration. DEQ is not proposing limits based on a single sample, or based on averages over a shorter time period, for the following reasons:

- The criterion of concern is a human health criterion, based on a lifetime of exposure. Therefore, a short-term increase in effluent mercury concentration does not indicate a risk to human health, if the long-term average effluent mercury concentration remains low.
- Mercury sample concentrations are highly variable. Therefore a single sample or short-term average does not adequately characterize mercury concentrations.
- Municipal wastewater treatment systems are not specifically designed to remove mercury.
- Mercury concentrations are not under the control of the treatment system operators. For example, a spike in mercury concentrations can occur because of a single incident somewhere within a municipal collection system. The types of incidents that can cause this are beyond the control of the receiving treatment facility, and generally not indicative of a problem with the treatment system. In other words, they can occur even with optimized treatment operations.
- Receiving water mercury concentrations are absorbed and passed through the food chain to fish tissue over a period of time. Therefore, a short-term increase in effluent mercury concentration does not correspond to an increase in fish tissue mercury concentration. It is the overall, long-term water body concentration that impacts fish tissue mercury concentrations.

- Other states use long term averages in mercury variances. Michigan and other states uses a rolling annual average based on monthly or quarterly samples. Wisconsin uses a single sample limit under a rule the state developed for alternate effluent limitations for mercury.

Because many facilities sample mercury just once per quarter, a spike in mercury concentrations could cause an exceedance of the quarterly average, while not being indicative of a problem in treatment operations. Therefore, it is not appropriate to set a permit limit based upon the sampling results for a single quarter. Instead, DEQ proposes to define a violation of the maximum quarterly average permit limit as two consecutive quarters in which the quarterly average is above the 95th percentile of the distribution. Thus, one quarterly average above the 95th percentile is not a permit violation. However, if the quarterly average is above the 95th percentile again in the following sampling period, then the limit has been exceeded.

Most facilities that sample for mercury do so as part of their pretreatment programs. This sampling is typically conducted on three consecutive days, once per quarter. DEQ does not propose additional sampling. However, DEQ allows additional samples. If additional samples are collected, the results must be included when calculating the quarterly average.

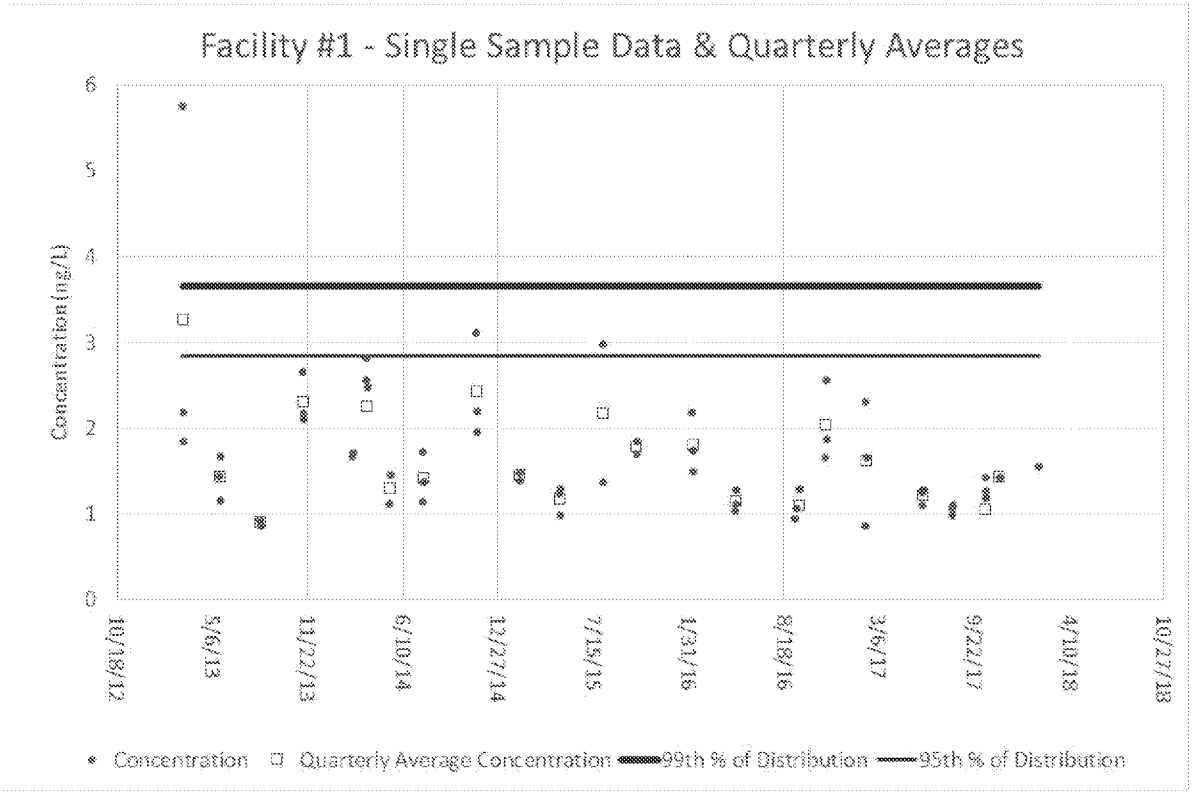
Using this approach, the LCA values and permit limits for the four facilities based on the 2013-2018 data would be:

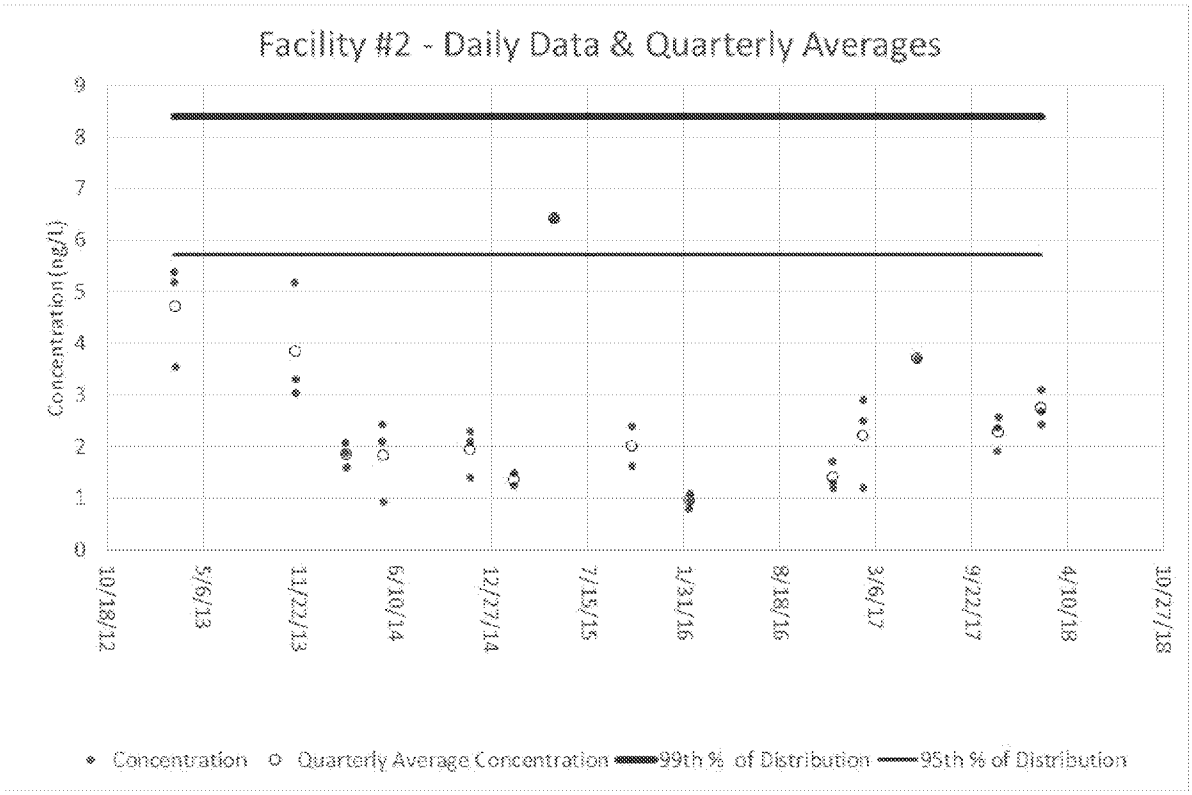
Facility	LCA (ng/L) (95th percentile)	Permit Limit is Two Consecutive Quarters in which the Quarterly Average Effluent Concentration (ng/L) Exceeds:
Facility 1	2.8	2.8
Facility 2	5.7	5.7
Facility 3	4.3	4.3
Facility 4	2.9	2.9

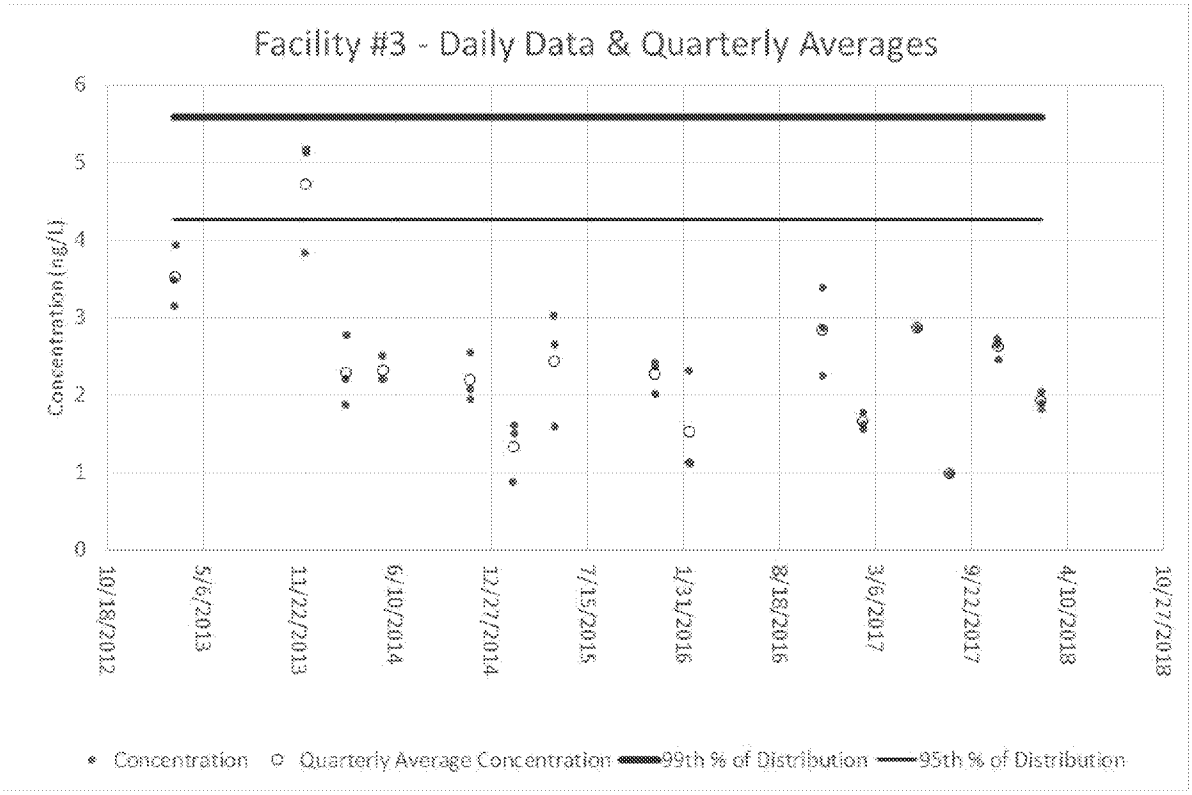
Examination of Data

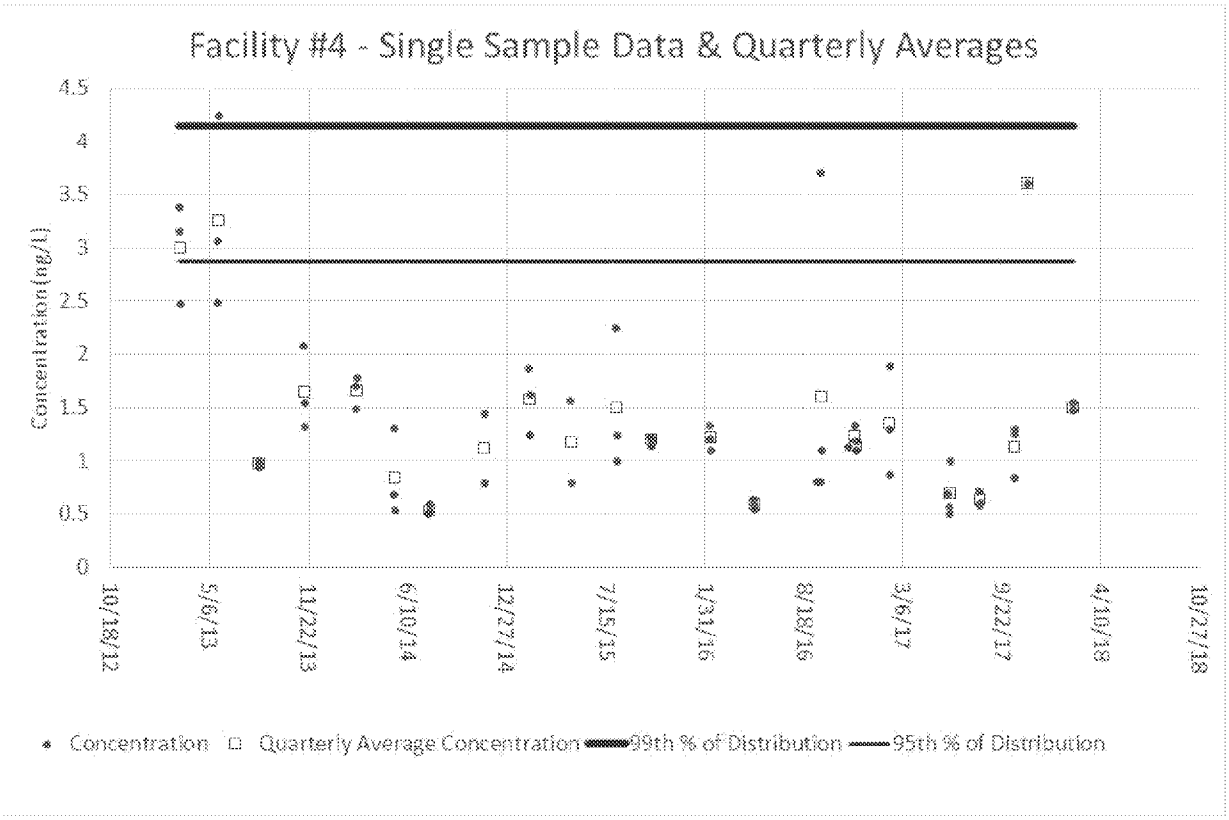
DEQ compared quarterly averages to the proposed 95th percentile maximum quarterly average target using effluent data from these four facilities and eight additional facilities in the Willamette basin. Comparison for the four facilities used in this example is shown below. The thinner red line is equivalent to the LCA and the quarterly average target. Quarterly average effluent concentrations are shown as the squares for each quarter.

Using these data and data for the eight other facilities, five of the twelve facilities exceeded their respective quarterly average targets in at least one quarter. However, only one facility (Facility #4, as shown below) exceeded this target in two consecutive quarters. This occurred in the first two quarters of the data period. There was a clear downward trend in the first part of the data period, and the quarterly average never exceeded the target in subsequent quarters.


Facility #1 - Single Sample Data & Quarterly Averages
Concentration (ng/L)
0
1
2
3
4
5
6
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
3/6/17
9/22/17
4/10/18
10/27/18
Concentration
Quarterly Average Concentration
99th % of Distribution
95th % of Distribution


Facility #2 - Daily Data & Quarterly Averages
Concentration (ng/L)
0
1
2
3
4
5
6
7
8
9
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
3/6/17
9/22/17
4/10/18
10/27/18
Concentration
Quarterly Average Concentration
99th % of Distribution
95th % of Distribution


Facility #3 - Daily Data & Quarterly Averages
Concentration (ng/l)
0
1
2
3
4
5
6
10/18/2012
5/6/2013
11/22/2013
6/10/2014
12/27/2014
7/15/2015
1/31/2016
8/18/2016
3/6/2017
9/22/2017
4/10/2018
10/27/2018
Concentration
Quarterly Average Concentration
99th % of Distribution
95th % of Distribution


Facility #4 - Single Sample Data & Quarterly Averages
Concentration (ng/l)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14
7/15/15
1/31/16
8/18/16
3/6/17
9/22/17
4/10/18
10/27/18
Concentration
Quarterly Average Concentration
99th % of Distribution
95th % of Distribution