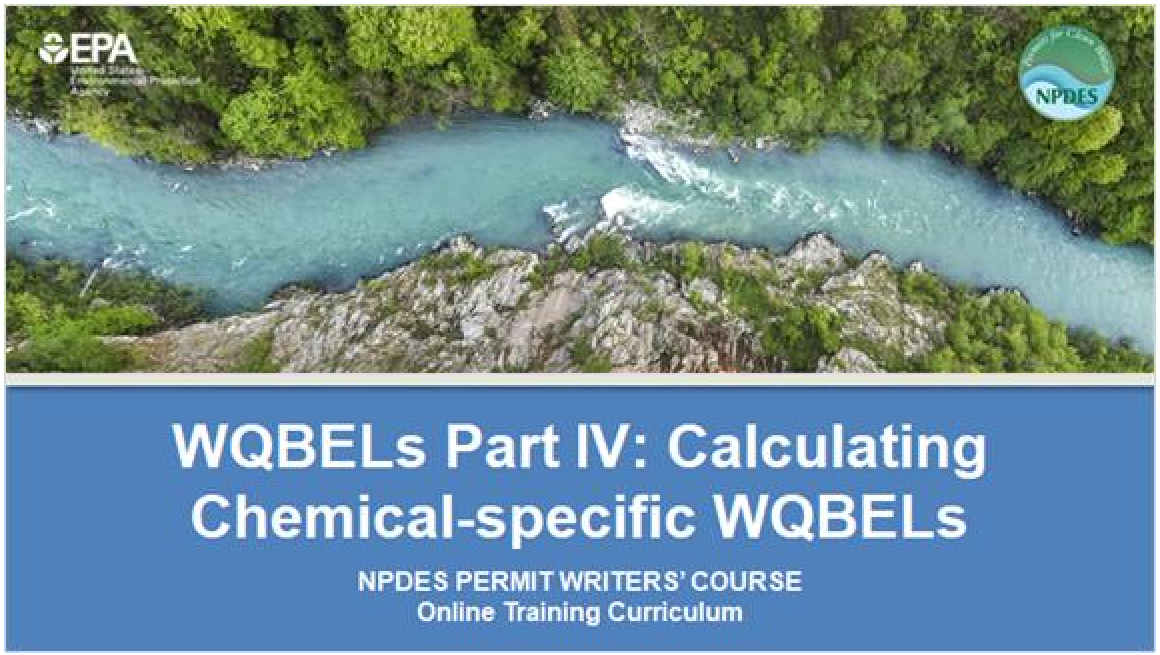
WQBELs Part IV: Calculating Chemical-specific WQBELs

1. NPDES Permit Writers' Course Online Training Curriculum

1.1 WQBELs Part IV: Calculating

Chemical-specific WQBELs



Notes:

Welcome to Part IV of a four-part series of presentations on establishing water quality-based effluent limitations in National Pollutant Discharge Elimination System, or NPDES, permits. The series is part of an online training curriculum sponsored by the U.S. Environmental Protection Agency's Water Permits Division.

This presentation addresses the topic of calculating water quality-based effluent limitations in NPDES permits. But before we get started with the presentation, I want to introduce our speakers and take care of a housekeeping item.

1.2 Presenters

Notes:

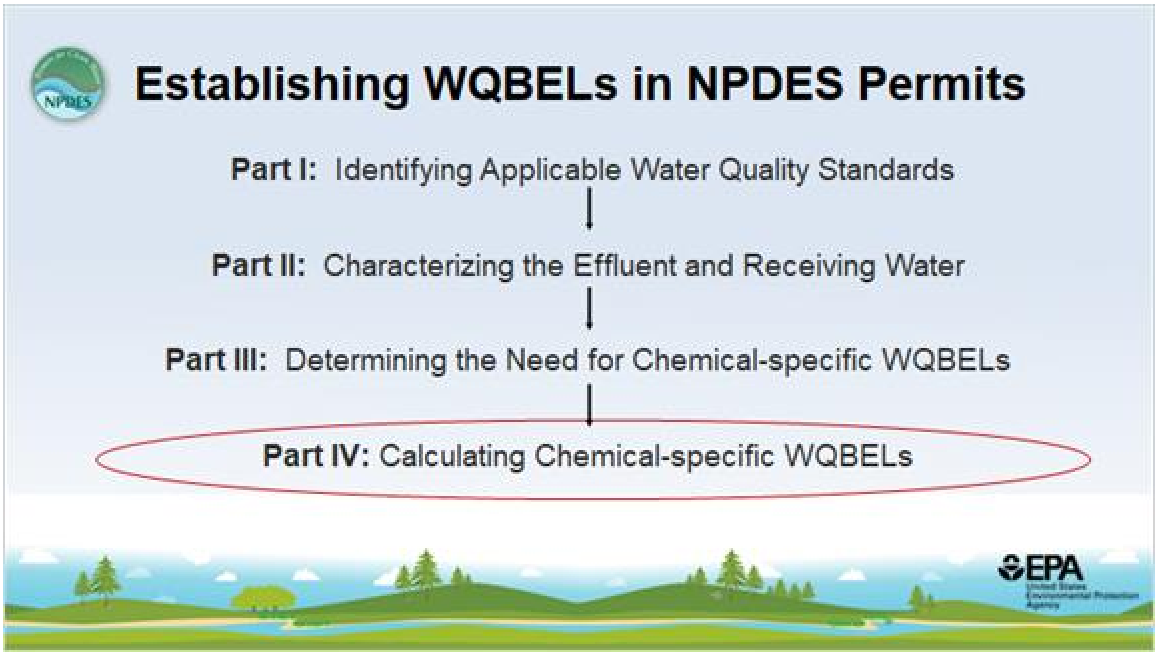
First the introductions.

Your speakers for this presentation are David Hair, an environmental engineer with the Water Permits Division of USEPA in Washington, DC, and me, Greg Currey, an environmental engineer with Tetra Tech, Incorporated in Fairfax, Virginia.

Now for that housekeeping item. You should be aware that the materials used in this presentation have been reviewed by USEPA staff for technical accuracy; however, the views of the speakers are their own and do not necessarily reflect those of USEPA. NPDES permitting is governed by the existing requirements of the Clean Water Act and USEPA's NPDES implementing regulations. These statutory and regulatory provisions contain legally binding requirements. The information in this presentation is not binding. Furthermore, it supplements, and does not modify, existing USEPA policy, guidance, and training on NPDES permitting. USEPA may change the contents of this presentation in the future.

Now, let's begin.

1.3 Establishing WQBELs in NPDES Permits



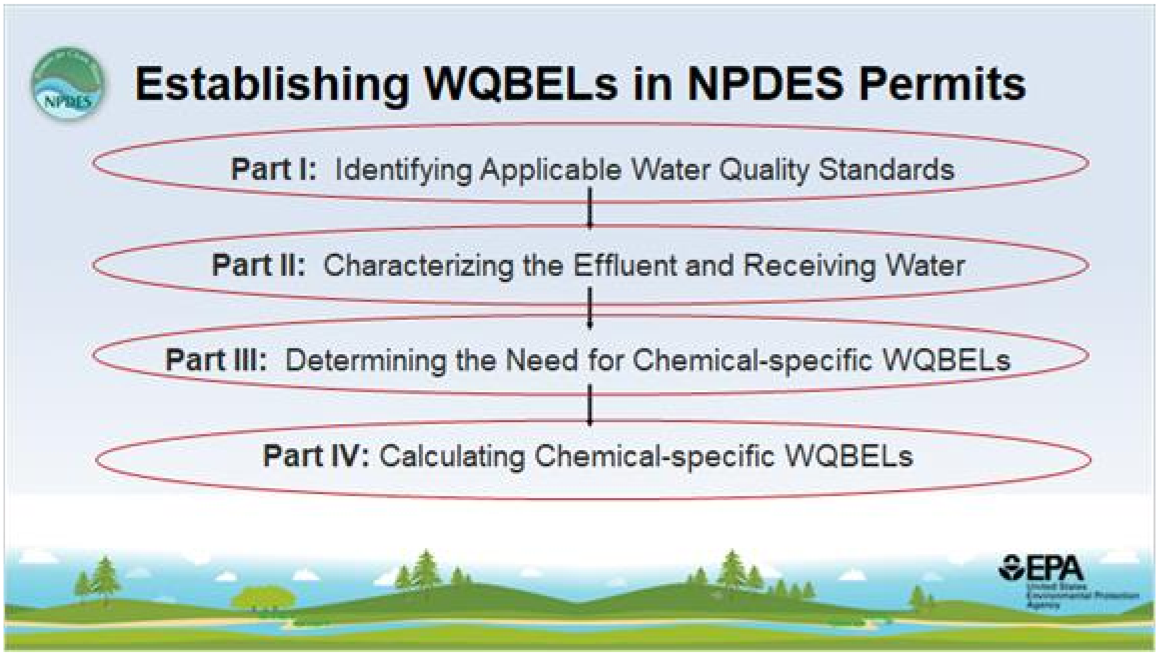
Notes:

As I mentioned, this presentation is Part IV of a four-part series on establishing water quality-based effluent limitations in NPDES permits.

We'll briefly review some of the key concepts from Parts I, II, and III of this series, but if you have not yet viewed these three presentations, we highly recommend that you do so before continuing. You can find them at the same location as this presentation on the "Training and Meetings" portion of USEPA's NPDES Web site.

Now, I'll turn it over to Dave for our quick review.

1.4 Establishing WQBELs in NPDES Permits



Notes:

Thanks Greg.

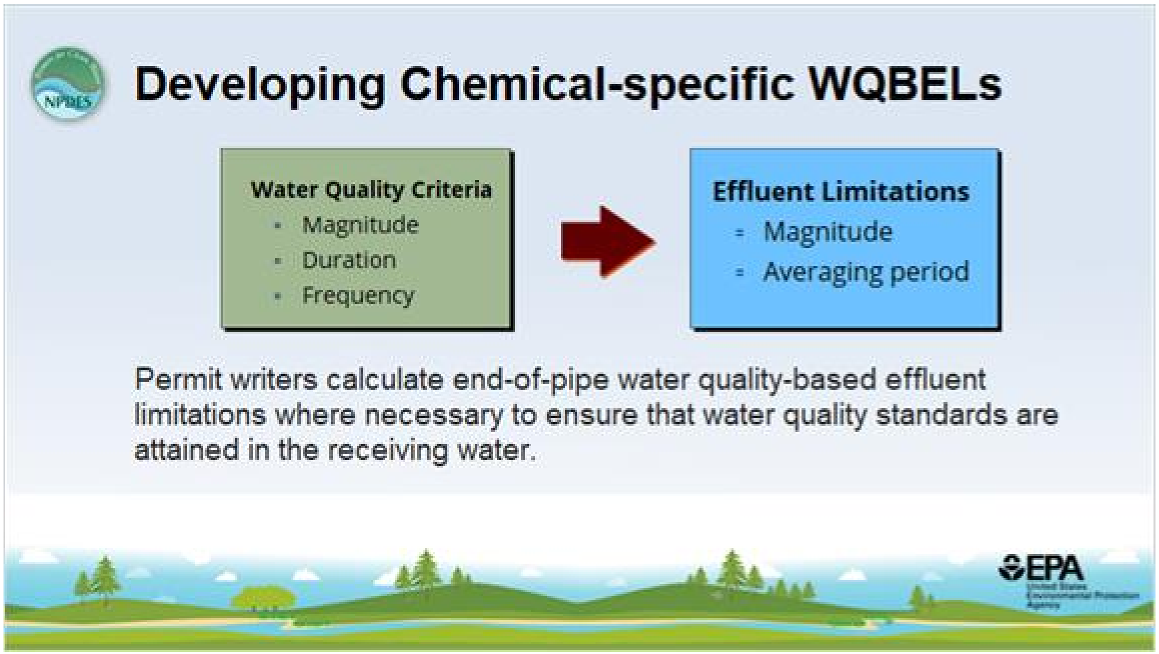
In Part I of this series on establishing water quality-based effluent limits in NPDES permits, we presented a brief overview of the water quality standards program, focusing on how these standards establish the basis for the water quality assessments conducted by NPDES permit writers.

In Part II of the series, we discussed the types and sources of effluent and receiving water data a permit writer, or water quality modeler, might need to assess the impact of the discharge on the receiving water. This part also discussed how permit writers establish a list of “pollutants of concern” for which these water quality impact assessments would be conducted.

In Part III, we discussed the NPDES regulatory requirement that establishes when water quality-based effluent limits are needed in NPDES permits. We noted that 40 CFR 122.44(d)(1)(i) requires that, “Limitations must control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic) which the Director determines are or may be discharged at a level which will ***cause***, have the ***reasonable potential to cause***, or ***contribute*** to an excursion above any state water quality standard, including state narrative criteria for water quality.” Because of the wording of this regulation, we refer the determination of the need for a water quality-based effluent limits as the “reasonable potential test” or “reasonable potential analysis.”

Where the reasonable potential analysis finds that a limit is needed, a permit writer must then calculate effluent limits necessary to control the discharge and ensure that it achieves the applicable water quality standards. The procedure for calculating these water quality-based effluent limits is what we’ll be covering in today’s presentation.

1.5 Developing Chemical-specific WQBELs



Notes:

So, picking up where we left off at the end of Part III, we're addressing the situation where we've determined that the discharge does have reasonable potential to cause or contribute to an excursion above an applicable water quality standard. That means that a limit is required, and we now need a process for determining how to calculate an effluent limitation that ensures compliance with the applicable water quality standards.

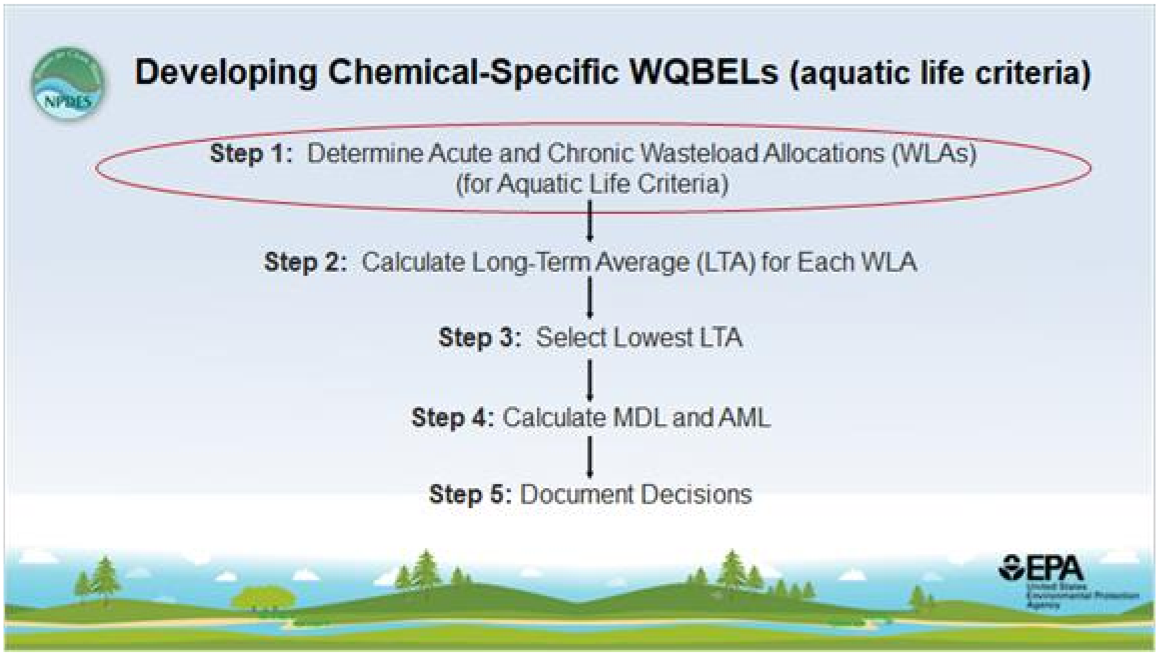
What we'll see is that we generally use the same water quality standards implementation procedures that we used to perform the "reasonable potential" analysis, but now we're trying to answer a different question. In this case the question is "how much of the pollutant can the facility discharge without causing a problem in the receiving water. The process involves using the applicable water quality criteria and then "back calculating" end-of-pipe effluent limitations derived from those criteria.

As we noted in previous presentations, water quality modeling can be pretty challenging, particularly where the effluent and receiving water are not completely mixed, where the pollutant of concern is non-conservative, or where there are multiple point and non-point sources in close proximity to each other.

In this presentation, however, we'll be focusing on a fairly straight forward situation. We'll be calculating chemical- or pollutant-specific water quality-based effluent limits derived from numeric water quality criteria for the protection of aquatic life.

And to guide us through the steps in this process, I'll turn it over to Greg.

1.6 Developing Chemical-Specific WQBELs (aquatic life criteria)



Notes:

Thanks for that review and preview Dave. You've set us up nicely for a detailed look at how we calculate water quality-based effluent limitations.

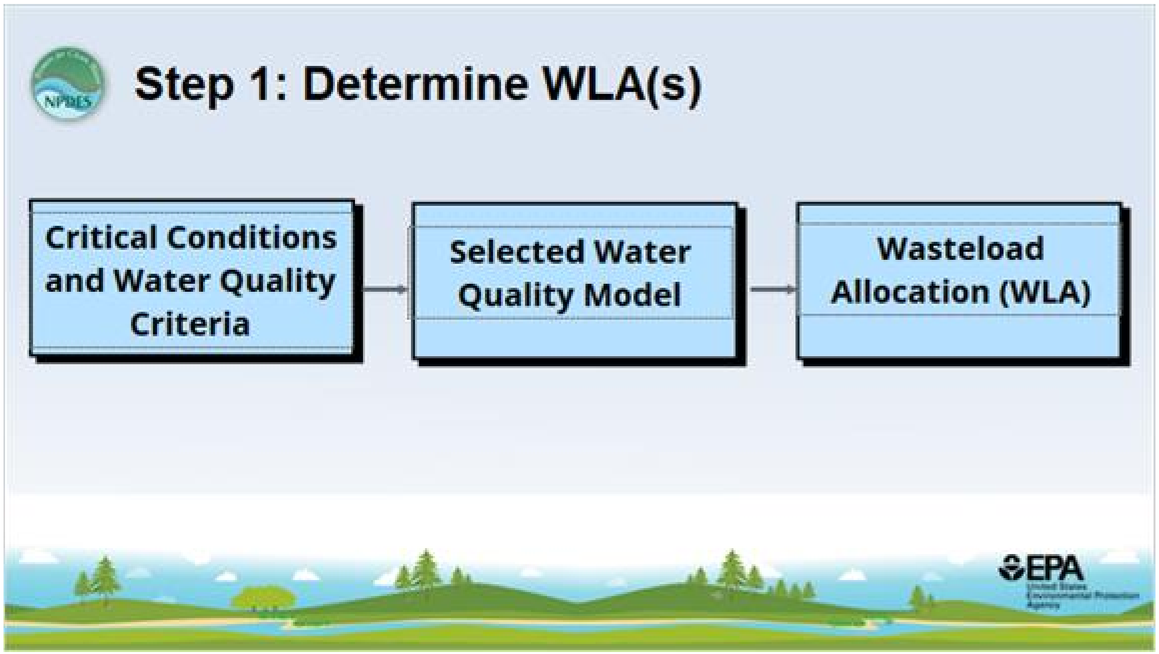
For this presentation we'll continue to use the methodology provided in EPA's 1991 *Technical Support Document for Water Quality-based Toxics Control* (in other words, the TSD).

This slide lays out the basic steps in the TSD process for developing chemical-specific water quality-based effluent limits derived from aquatic life criteria.

We're focusing on aquatic life criteria in this presentation because there are aquatic life criteria for many commonly occurring toxic pollutants, and because they illustrate the need to develop one set of effluent limitations that assure attainment of criteria expressed with more than one magnitude and averaging period.

Let's consider the first step in the process, which is determining the acute and chronic wasteload allocations that correspond to the acute and chronic aquatic life criteria.

1.7 Step 1: Determine WLA(s)



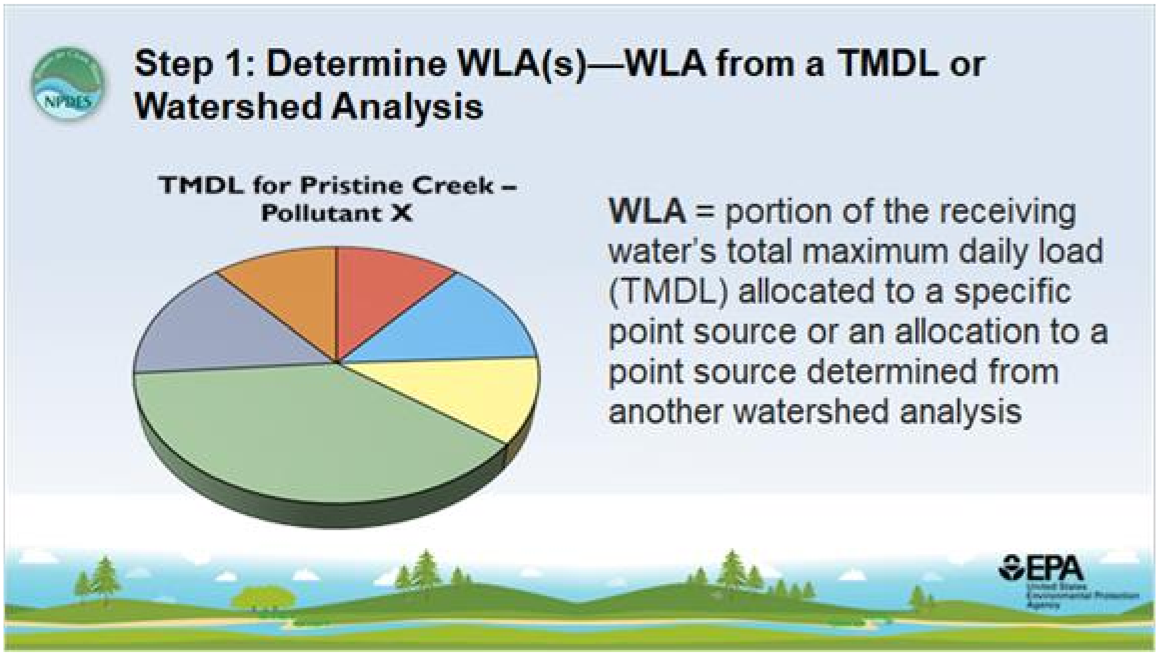
Notes:

You might remember from Part III of this series that, in the reasonable potential analysis, we used a water quality model to project the concentration of a pollutant downstream of a discharge under critical conditions.

Now, we are going to use that same water quality model, but instead of projecting a downstream concentration, we're going to adjust the input variables and use the model to calculate an allowable discharge concentration or an allowable loading, that will ensure that the instream water quality criterion is achieved. We'll call this allowable value the wasteload allocation, or WLA.

In general terms, you can think of a wasteload allocation as that portion of a receiving water's assimilative capacity that we assign to a point source discharger. As we'll see on the next few slides, there are a few ways a permit writer can establish a wasteload allocation.

1.8 Step 1: Determine WLA(s)—WLA from a TMDL or Watershed Analysis



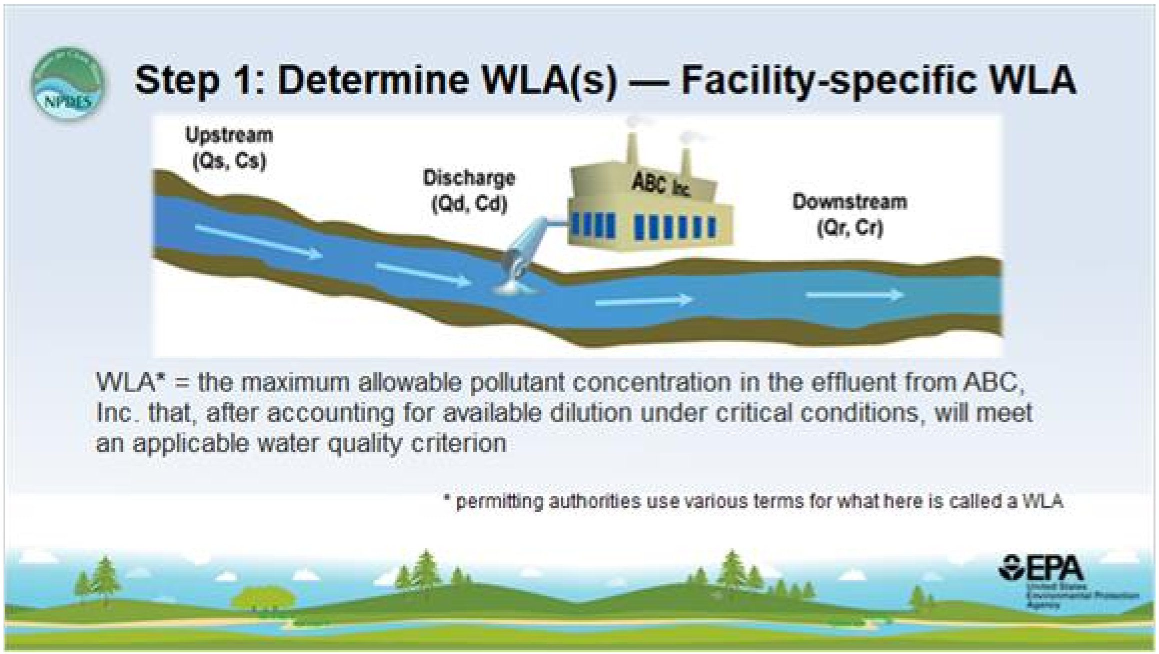
Notes:

Perhaps the easiest way for a permit writer to establish a wasteload allocation is where someone else has already calculated one for you.

If a TMDL or other watershed analysis has been developed for a pollutant of concern for the receiving water, and the facility that we're permitting contributes the pollutant to that water body, then a WLA for the point source should be available in the TMDL or watershed analysis.

The permit writer's job then, is to work with the state or EPA staff who develop and track TMDLs, and determine whether any current or planned TMDL might affect the facility that we're permitting. If the answer is "Yes," then the permit writer needs to identify the applicable wasteload allocation and ensure that the limits that we develop are consistent with the assumptions of the wasteload allocation in an EPA-approved TMDL.

1.9 Step 1: Determine WLA(s) — Facility-specific WLA



Notes:

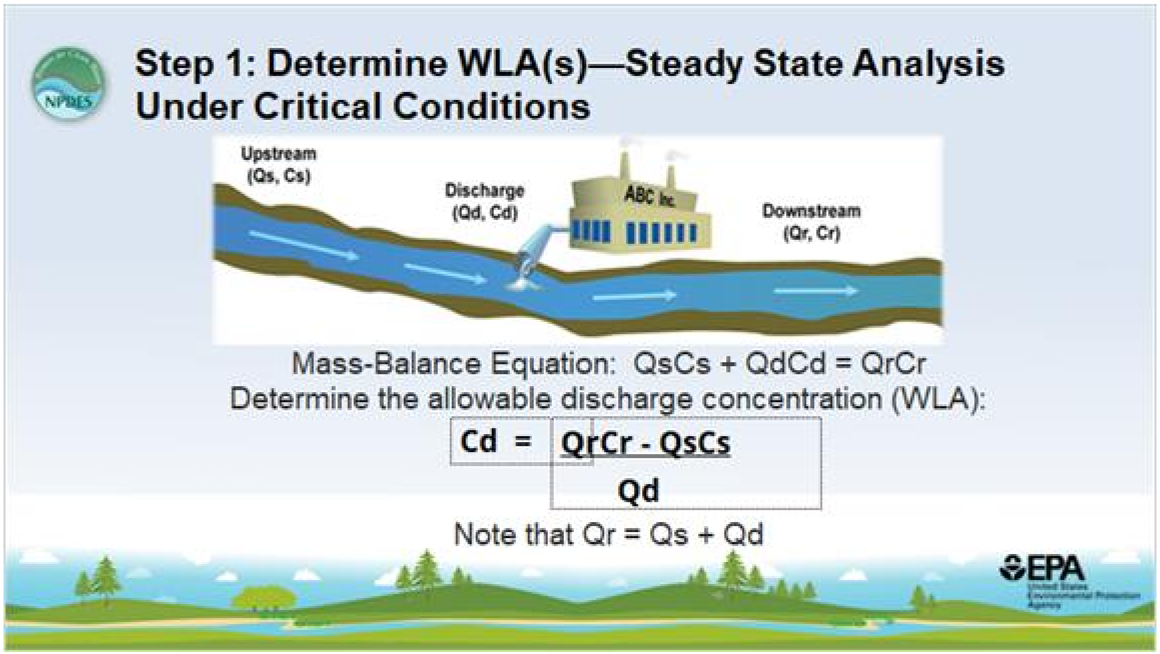
If, on the other hand, we don't have an applicable TMDL, we'll likely need to develop a facility-specific wasteload allocation to protect water quality.

The facility-specific WLA will be the maximum allowable pollutant concentration (or mass) in the effluent from the facility, in our example, ABC Incorporated, that, after accounting for available dilution under critical conditions, will meet an applicable water quality criterion.

While the TSD uses the term wasteload allocation for this facility-specific allocation, some states have come up with other terms to distinguish this type of allocation from a TMDL-based wasteload allocation. For example, one state refers to what we're calling a facility-specific wasteload allocation as an "effluent concentration allowance." Not a bad idea, but we'll stick with the TSD terminology for our presentation.

How do we determine this facility-specific WLA? Well, water quality models, of course.

1.10 Step 1: Determine WLA(s)—Steady State Analysis Under Critical Conditions



Notes:

To illustrate the process of calculating WLAs, our example will once again model a conservative pollutant discharged into a free-flowing river and assume rapid and complete mixing of the discharge with the receiving water. With these assumptions, we can use the simple mass-balance equation.

Recall that the principle behind the mass balance equation is that the amount (or mass) of the pollutant downstream of our outfall is equal to the mass of pollutant upstream plus the mass of pollutant in the discharge. This assumption of conservation of mass works well for most pollutants in the near-field, close to the discharge.

For more complex situations, we might add more facilities and terms to the model, such as reaction rates for non-conservative pollutants, or use a model specific to a lake or estuary, depending on the type of receiving water.

Remember, our objective at this point in the process is to calculate a WLA, which in our mass balance model is represented as the allowable discharge concentration (Cd).

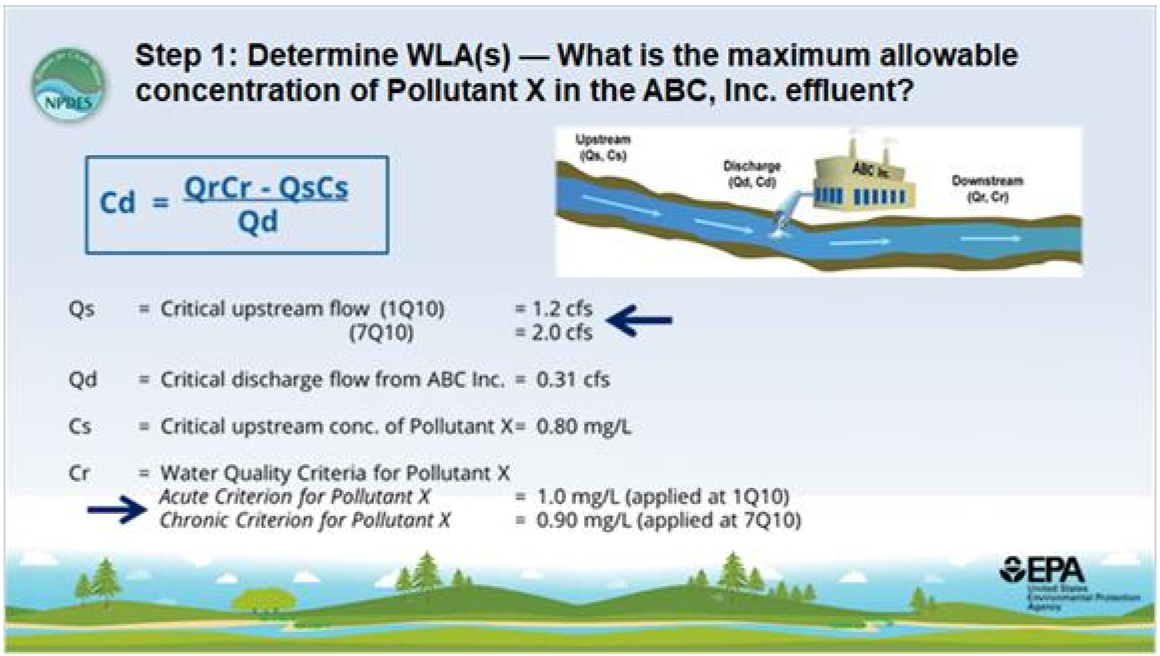
We want to determine the concentration of Pollutant X that may be discharged by ABC Inc. while still ensuring attainment of the water quality criterion for Pollutant X downstream of the discharge.

To make this assessment, we need to rearrange the mass balance equation to calculate the discharge concentration of the pollutant of concern (Cd) and determine values for each of the other variables in the equation.

Remember, this is a steady-state model, so we'll input one value for each of the variables to solve the equation.

Just as in the reasonable potential calculations, because we're only going to use a single value for each of these variables we want to be sure that the values we select reflect critical conditions for the discharge and the receiving water.

1.11 Step 1: Determine WLA(s) — What is the maximum allowable concentration of Pollutant X in the ABC, Inc. effluent?



Notes:

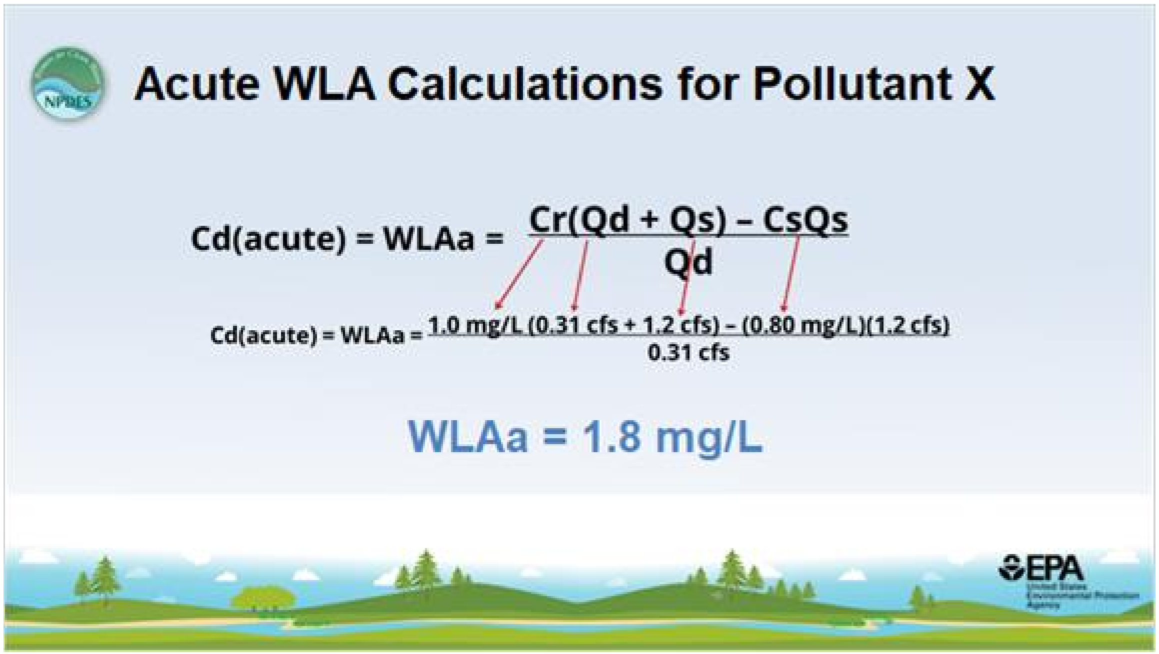
On this slide we have identified the critical conditions for calculating a wasteload allocation for the discharge of Pollutant X from ABC, Incorporated.

Notice that our hypothetical state agency has established both acute and chronic water quality criteria and the water quality standards indicate that the criteria are applied at two different critical upstream flows. In this example, the state applies the acute criterion at the 1Q10 low flow and the chronic criterion at the 7Q10 low flow.

Because there are two applicable criteria, we'll use the mass balance equation to calculate two different values for Cd-one corresponding to each criterion.

Also note that Cr (the downstream concentration) is now the criterion value. In other words, the criterion value is the target that we want to achieve downstream.

1.12 Acute WLA Calculations for Pollutant X

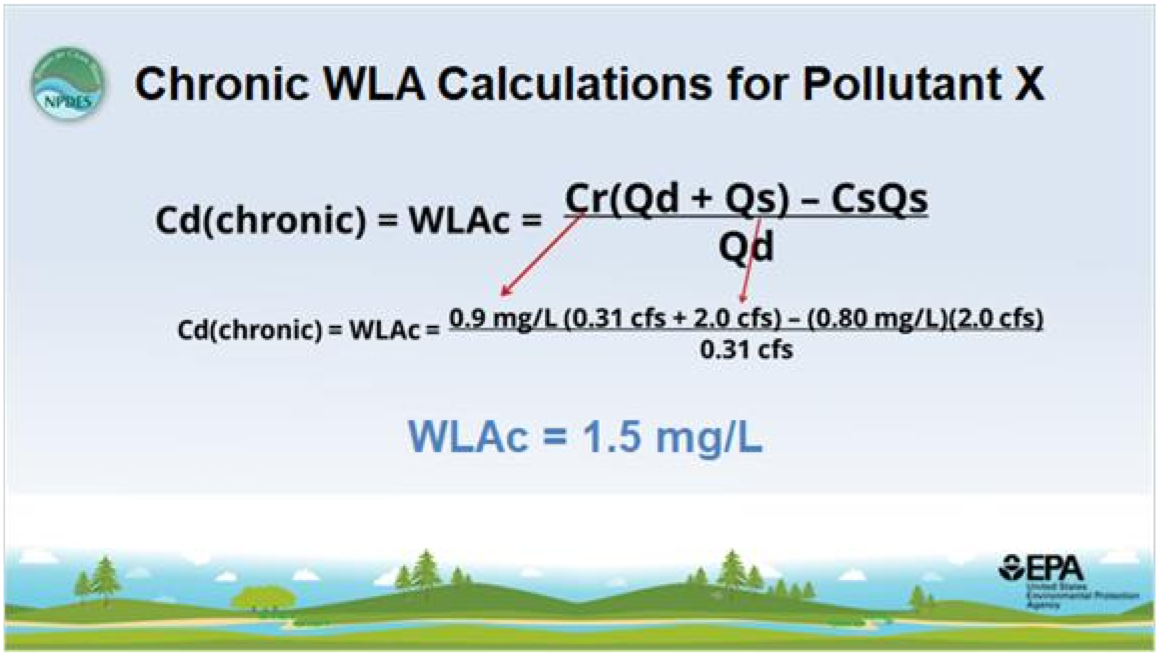


Notes:

Here is the calculation for the acute wasteload allocation, which is represented in the mass balance equation as Cd acute.

On the right-hand side of the equation, we plug in the acute criterion concentration (Cr), the critical effluent and upstream receiving water flows (Qd and Qs), and the critical upstream concentration of Pollutant X (Cs) and we calculate a wasteload allocation of 1.8 mg/L for attainment of the acute water quality criterion.

1.13 Chronic WLA Calculations for Pollutant X



Notes:

On this slide we have done the same thing for the chronic criterion.

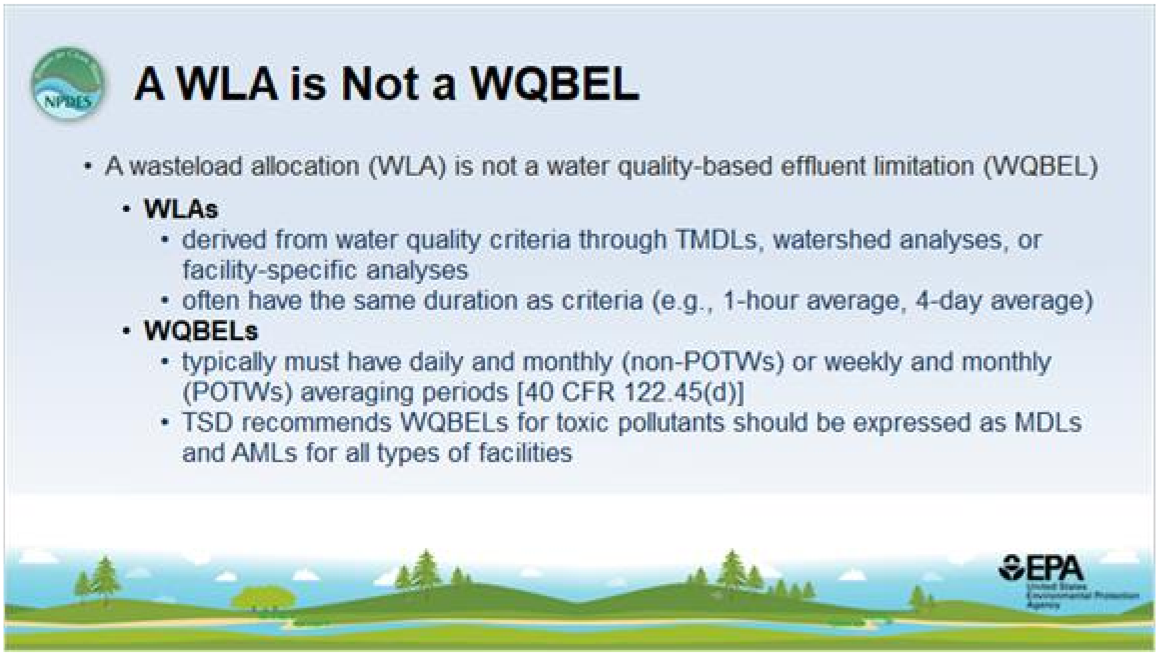
Note that on the right hand side of the equation the water quality criterion concentration and the critical flow upstream of the discharge are different from those used in our previous calculation. These values correspond to the chronic criterion magnitude and critical stream flow provided in the state's water quality standards.

This equation gives us a chronic wasteload allocation of 1.5 mg/L.

Now we have two WLAs for Pollutant X. Are these the permit limits?

Well, not quite….

1.14 A WLA is Not a WQBEL



Notes:

"Why not?" you might ask.

Recall from the discussion of water quality criteria in Part I of this series, that the aquatic life water quality criteria, and thus the wasteload allocations derived from the criteria, have unique duration components. EPA's aquatic life criteria recommendations typically express acute criteria as 1-hour average values and chronic criteria as 4-day average values.

We're going to base our effluent limits on the wasteload allocations we just calculated, however, effluent limits typically don't have the same averaging periods as the wasteload allocations.

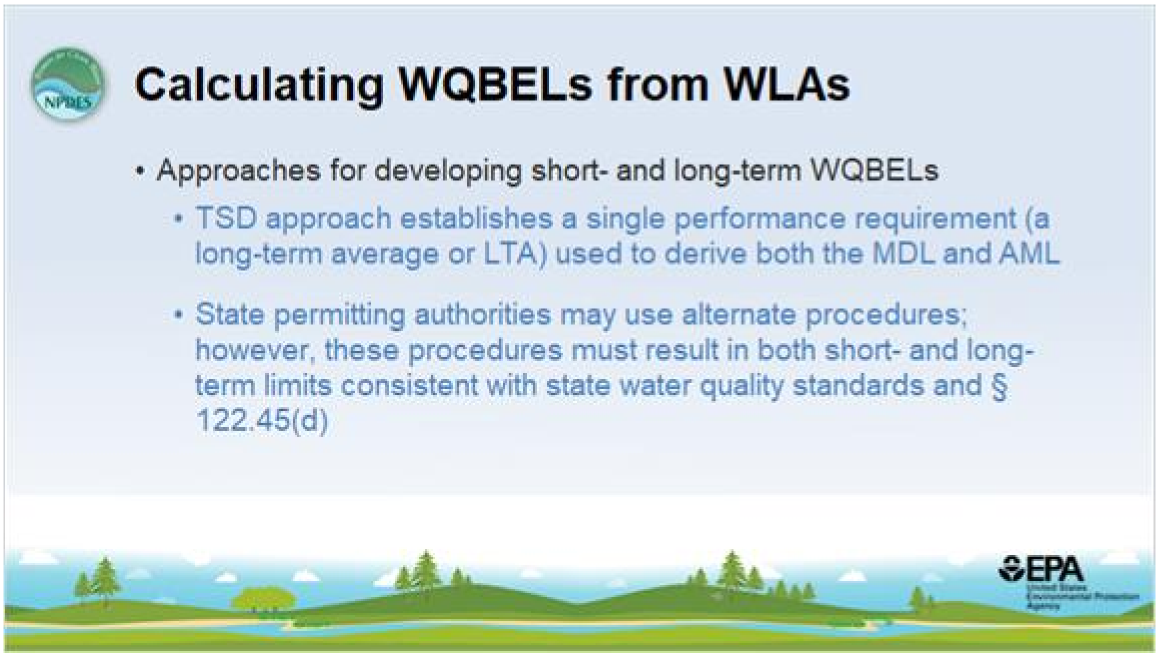
For continuous dischargers, 40 CFR 122.45(d) requires that, unless impracticable, effluent limitations for facilities that are not publicly-owned treatment works be expressed as average monthly limitations and maximum daily limitations and effluent limitations for POTWs be expressed as average weekly limitations and average monthly limitations. An exception to this general rule is for toxic pollutants. The TSD indicates that it is generally impracticable to apply average weekly limits for toxic pollutants and recommends that water quality based effluent limits for toxic pollutants be expressed as average monthly limits and maximum daily limits for all types of facilities.

Also, we might have additional WLAs developed from human health or wildlife criteria, each with its own unique averaging period.

The bottom line is that our wasteload allocations incorporate unique duration components, and without some additional considerations, we shouldn't simply apply the calculated values as water quality-based effluent limits.

So, what, you might ask are these additional considerations? Well, we're going use a mathematical procedure that takes the different averaging periods into account and allows us to develop both a maximum daily limit and an average monthly limit from our 1-hour average and 4-day average wasteload allocations.

1.15 Calculating WQBELs from WLAs



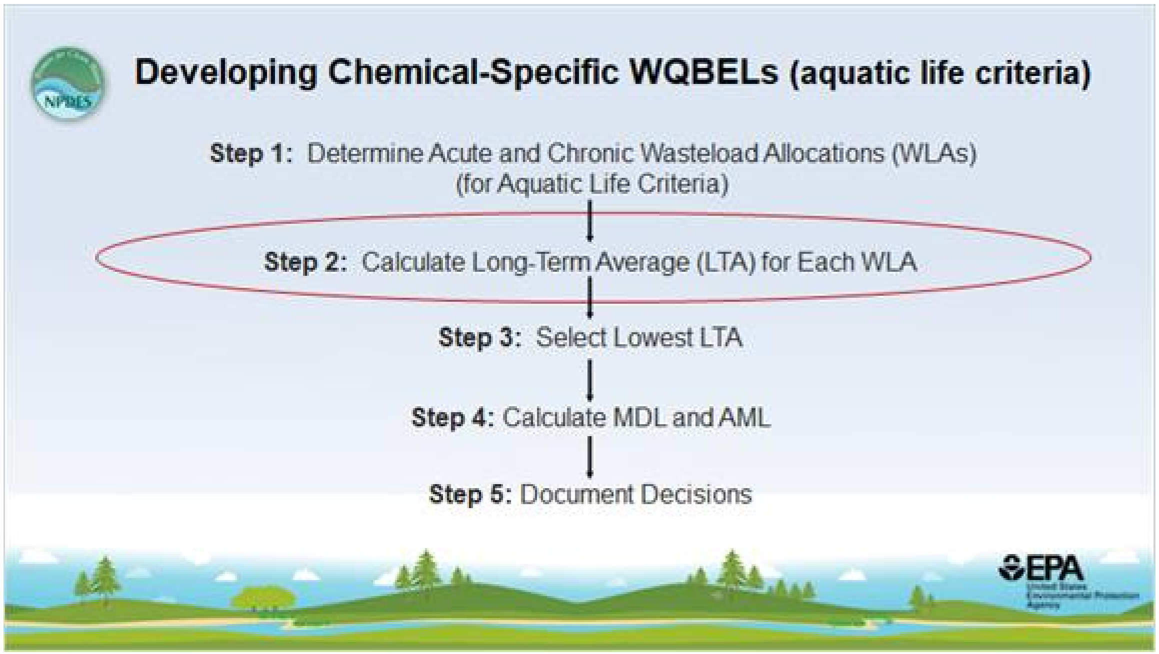
Notes:

And the TSD provides us with the approach to do just that.

By taking the intermediate step of calculating a long-term average (or LTA) performance requirement from the 1-hour average wasteload allocation and a long-term average performance requirement from the 4-day average wasteload allocation, we can establish a single performance requirement (the distribution represented by the most restrictive LTA) that we can then use to derive both the maximum daily limit and the average monthly limit. These limits will assure attainment of both the acute and chronic criteria downstream of the discharge.

State permitting authorities might use different procedures from what we're going to present here to derive effluent limits from wasteload allocations; however, the state procedures must result in both short- and long-term limits consistent with the state water quality standards and the NPDES regulations.

1.16 Developing Chemical-Specific WQBELs (aquatic life criteria)

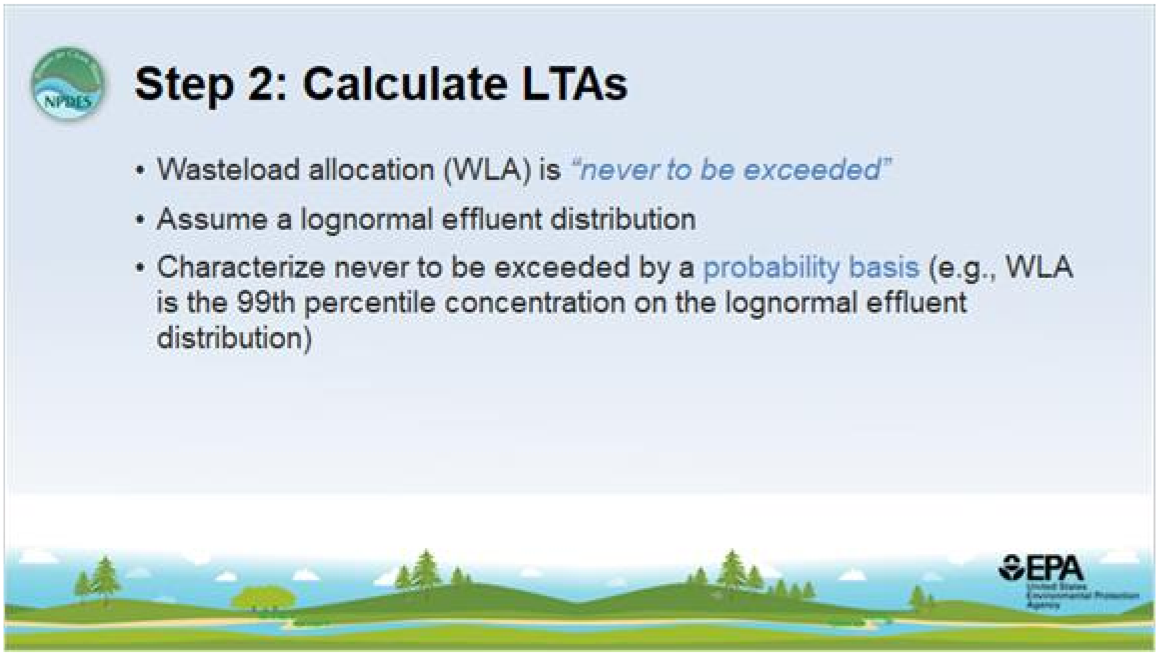


Notes:

That takes us to Step 2 in the process of calculating WQBELs.

Dave, why don't you show us how we calculate an LTA from each wasteload allocation?

1.17 Step 2: Calculate LTAs



Notes:

OK, Greg.

Recall that we calculated our wasteload allocations as the maximum amount of the pollutant that could be discharged without exceeding the applicable water quality criteria. That means that if the facility discharged above the wasteload allocations under these critical conditions, the water quality criteria would be exceeded.

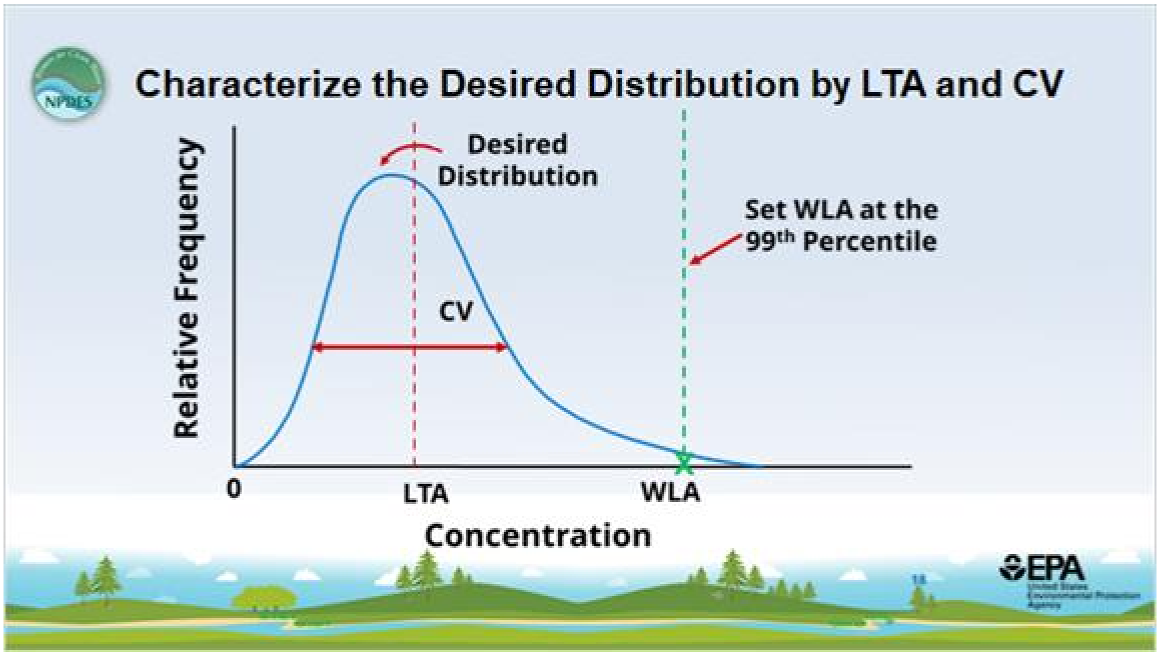
We certainly don't want that to occur, so in our analysis, we'll take the wasteload allocation that we've calculated and establish it as a "never to be exceeded" value. We can then take what we know about the variability of the pollutant concentration in the effluent and, from the wasteload allocation, calculate the long-term average (or LTA) performance that the facility would need to meet in order to "never" exceed the wasteload allocation.

To determine the LTAs, we'll once again assume that the effluent data follow a lognormal distribution, unless we have enough data to make some other statistical characterization.

In our statistical analysis, it's not really possible to set the WLA at a position that will never be exceeded, so we'll need to assume that the wasteload allocation is at an upper-bound value. For example, the TSD recommends that we establish the desired lognormal performance distribution by assuming that our calculated wasteload allocation is at the 99th percentile. Since our calculations already assume that the discharge is occurring during critical conditions, using the 99th percentile should be fully protective of the receiving water.

State permitting authorities that use this statistical approach can establish their desired percentile for the calculated wasteload allocation concentration through their regulations or implementation procedures, and typical values range from the 90th to the 99th percentile.

1.18 Characterize the Desired Distribution by LTA and CV



Notes:

If we look at this graphically, you can see that we're taking our calculated wasteload allocation, setting it as the 99th percentile value, and back calculating a "desired" distribution of effluent pollutant concentrations, with the LTA representing the long-term average performance that would be required.

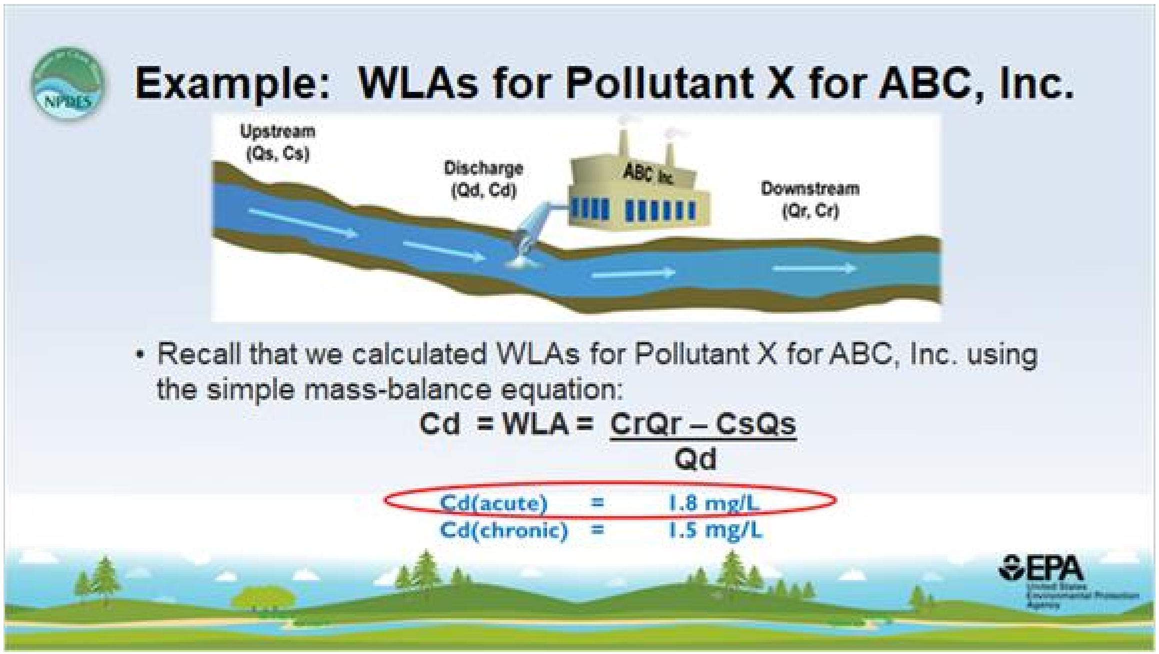
In effect, the LTA establishes a performance goal indicating how the facility would need to operate its treatment system to ensure that 99% the time its effluent concentration is below the wasteload allocation.

Because we know something about the statistics behind the lognormal distribution, we can calculate the relationship between the wasteload allocation (the 99th percentile value in our example) and the required LTA based on the coefficient of variation.

If we have a lot of effluent performance data to characterize the treatment system, we can calculate the CV as the standard deviation divided by the mean of the data set. However, if we have fewer than10 effluent samples available, the TSD suggests using 0.6 as a default CV.

OK, now that we've presented the theory, let's go back to our ABC Incorporated example and see how this works in practice.

1.19 Example: WLAs for Pollutant X for ABC, Inc.

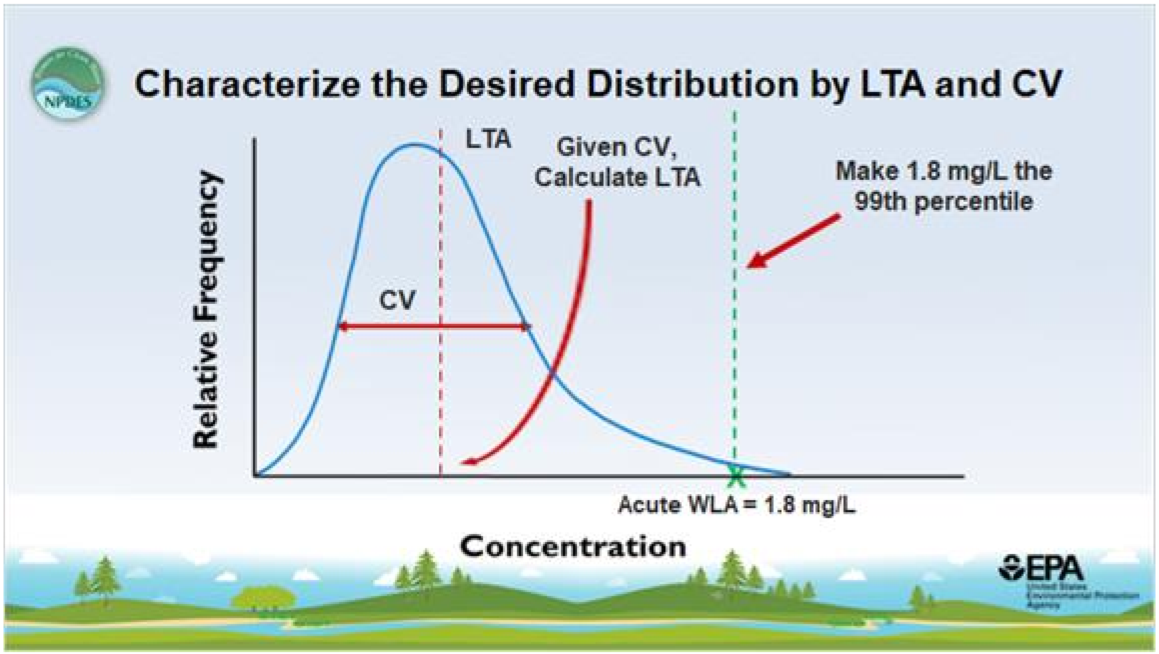


Notes:

Recall that we used our mass balance model to calculate two wasteload allocations derived from the acute and chronic criteria in the state's water quality standards.

Let's start with the acute WLA which we calculated as 1.8 mg/L.

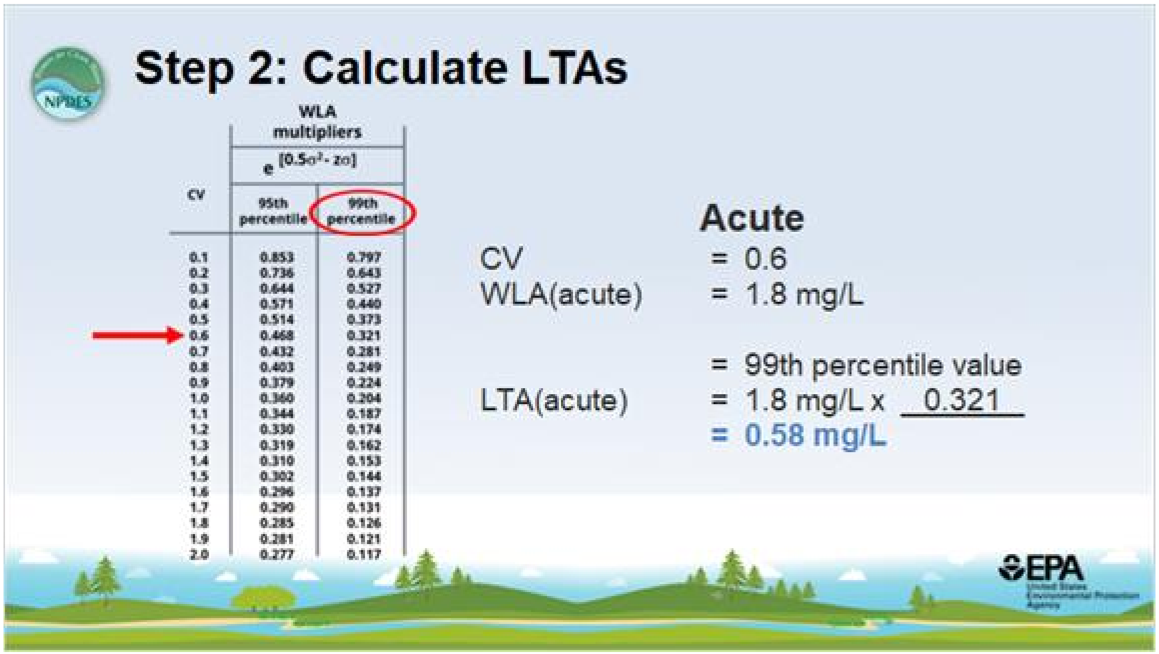
1.20 Characterize the Desired Distribution by LTA and CV



Notes:

We want that wasteload allocation of 1.8 mg/L to be at the 99th percentile on our lognormal distribution. Given our default CV of 0.6, we can use the lognormal distribution statistics to calculate the LTA of the desired distribution.

1.21 Step 2: Calculate LTAs



Notes:

The TSD provides tables that give us multipliers for calculating the LTA from the wasteload allocation based on the lognormal distribution.

This slide shows the table for calculating the LTA from the acute WLA. Notice that the multiplier is dependent on the CV and the percentile at which we fix the wasteload allocation.

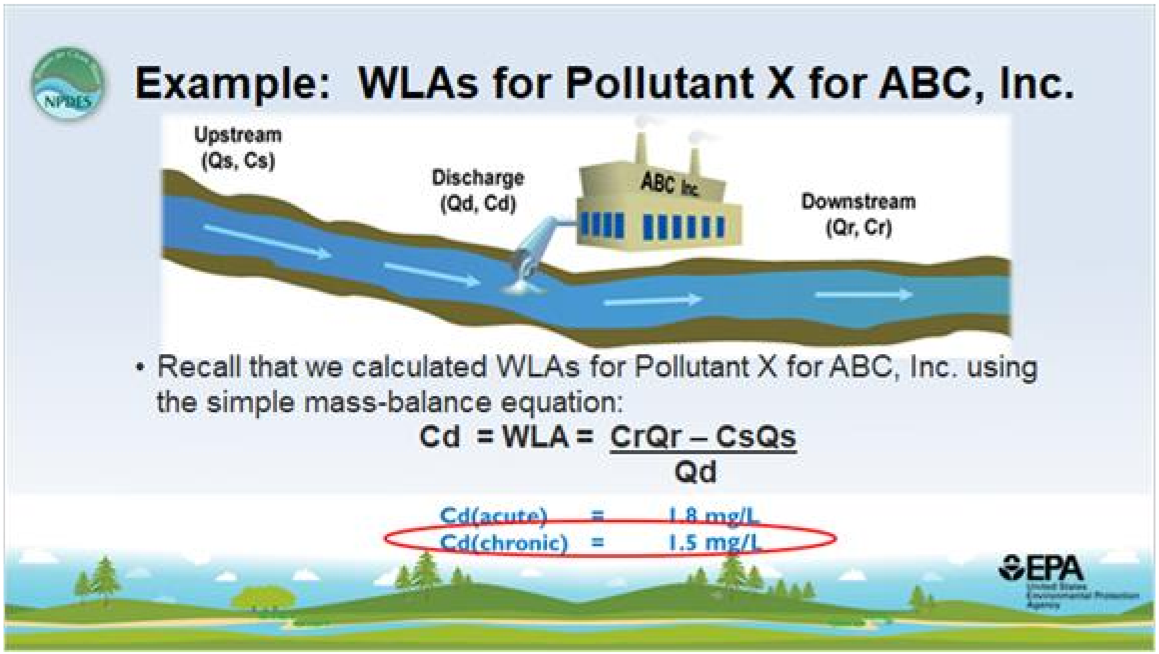
In our case, we decided to fix the wasteload allocation at the 99th percentile and assume a CV of 0.6. The corresponding lognormal distribution gives us an LTA that is 0.321 times the wasteload allocation.

We multiply the acute wasteload allocation (1.8 mg/L) by the multiplier of 0.321 to get an LTA of 0.58 mg/L.

What we've done here is derive a value, in this case 0.58 mg/L, that ABC's treatment system would need to achieve on average over the long term to ensure that the acute wasteload allocation (1.8 mg/L) would "never" be exceeded on any single day.

Note that although the acute wasteload allocation is a 1-hour average value, for purposes of calculating effluent limits we treat it like a 1-day average value, which is the shortest averaging period our procedures allow us to address.

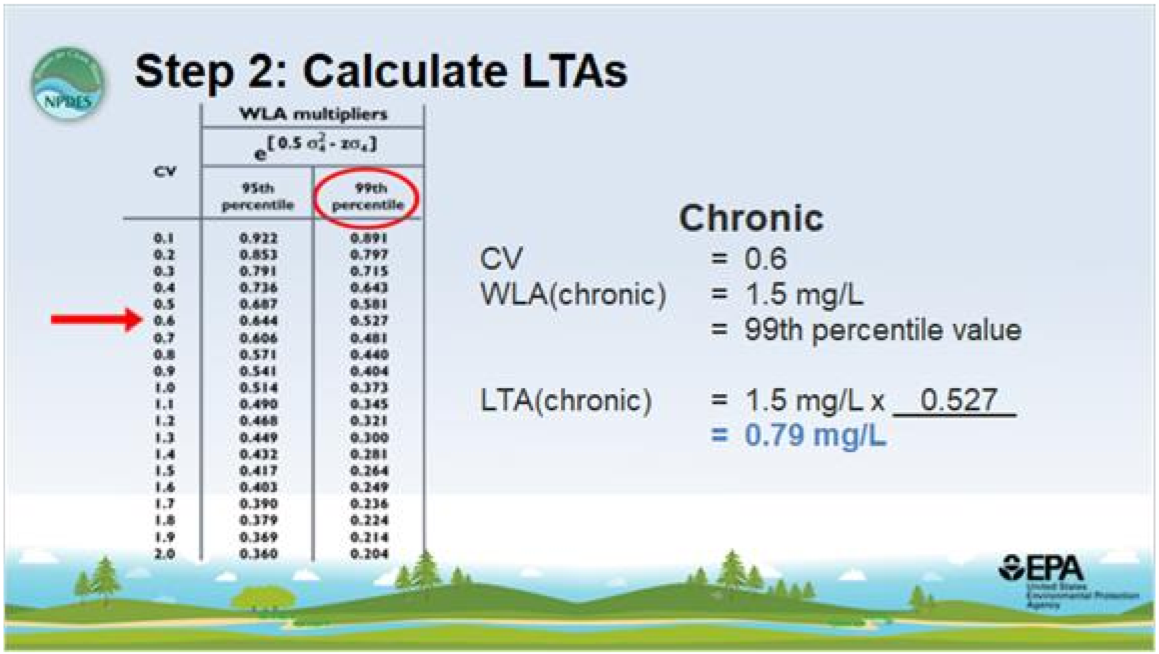
1.22 Example: WLAs for Pollutant X for ABC, Inc.



Notes:

Now let's work through the LTA calculation based on the chronic wasteload allocation, which was 1.5 mg/L.

1.23 Step 2: Calculate LTAs



Notes:

Again, we've established (based on the TSD recommendation) that the wasteload allocation is fixed at the 99th percentile and that the CV is 0.6.

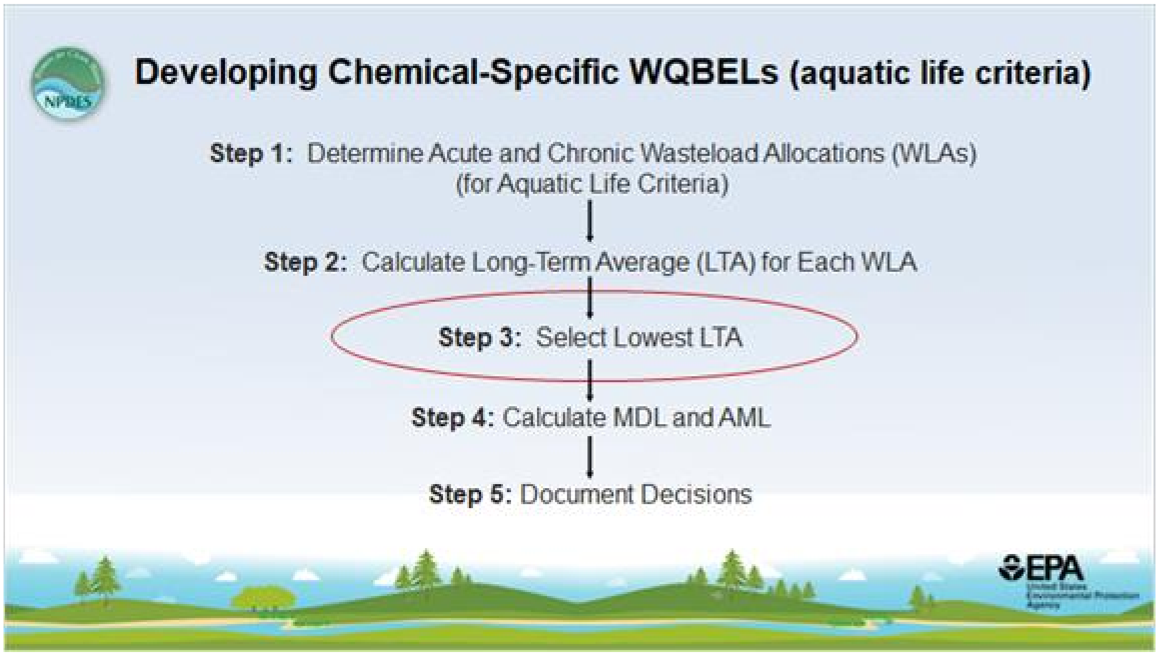
Notice that the equation and the multipliers are slightly different for calculating an LTA from the chronic wasteload allocation because, when we start with the chronic wasteload allocation, we're starting with a 4-day average value, whereas the acute wasteload allocation was a single (one-day) value.

In this case, our multiplier is 0.527.

Multiplying the chronic wasteload allocation (1.5 mg/L) by the multiplier of 0.527 gives us an LTA of 0.79 mg/L.

In this case, we've derived a value (0.79 mg/L) that ABC's treatment system would need to achieve on average over the long term to ensure that the chronic wasteload allocation (1.5 mg/L) would "never" be exceeded on a 4-day average basis.

1.24 Developing Chemical-Specific WQBELs (aquatic life criteria)

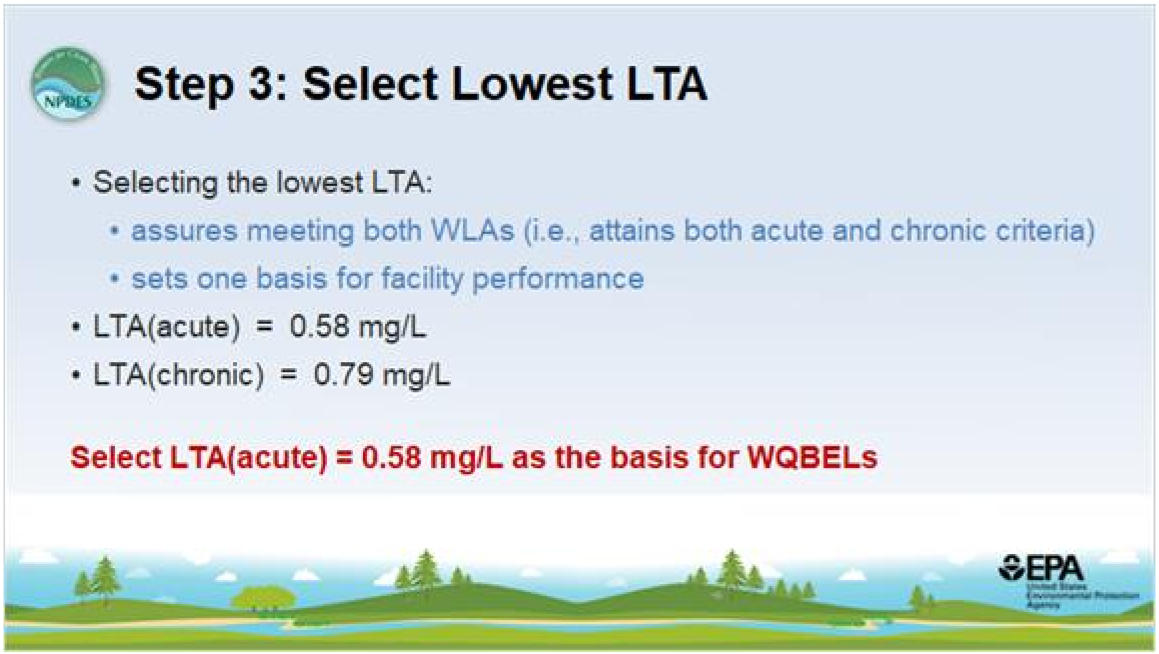


Notes:

Moving on from here, Step 3 is pretty easy.

We just have to select the lowest of the calculated long-term averages.

1.25 Step 3: Select Lowest LTA



Notes:

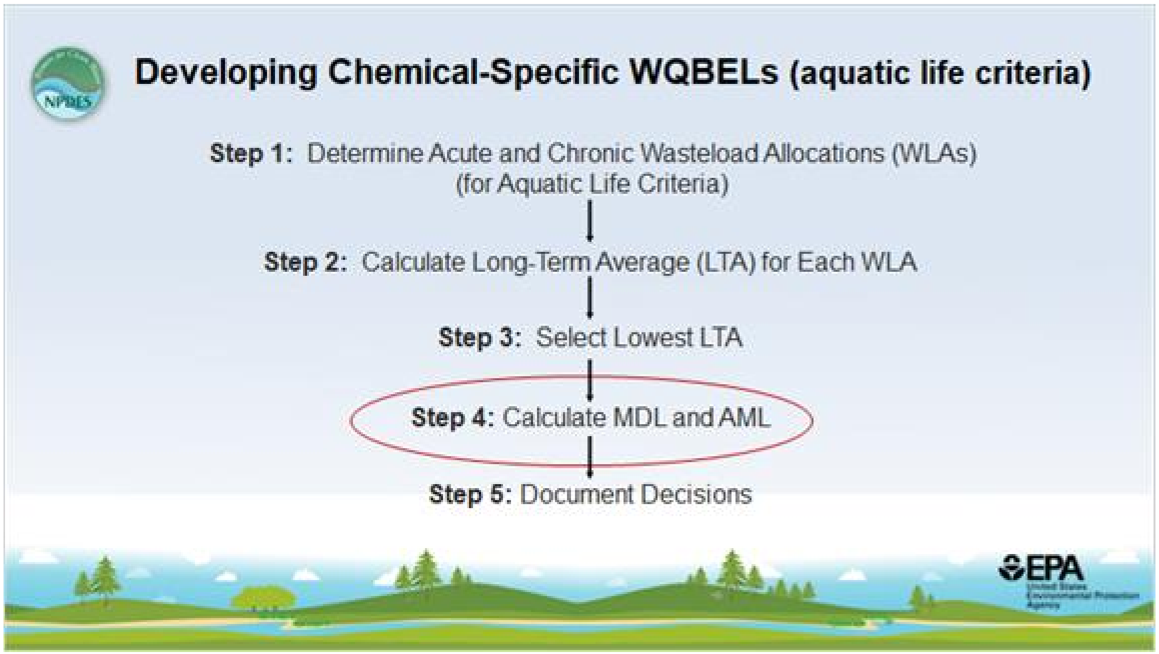
Now that we have two LTAs, one based on the acute wasteload allocation and one based on the chronic wasteload allocation, we can compare them directly.

The lowest of these two LTAs will establish a performance expectation for the treatment system to ensure that the effluent quality protects both the acute and chronic aquatic life criteria. Effectively, this LTA could be used as the basis of design for treatment at the facility.

In our example, the lower of the two values is the acute LTA of 0.58 mg/L.

Using the TSD approach, this single long-term average of 0.58 mg/L will now be the basis for calculating both the maximum daily and the average monthly effluent limits.

1.26 Developing Chemical-Specific WQBELs (aquatic life criteria)

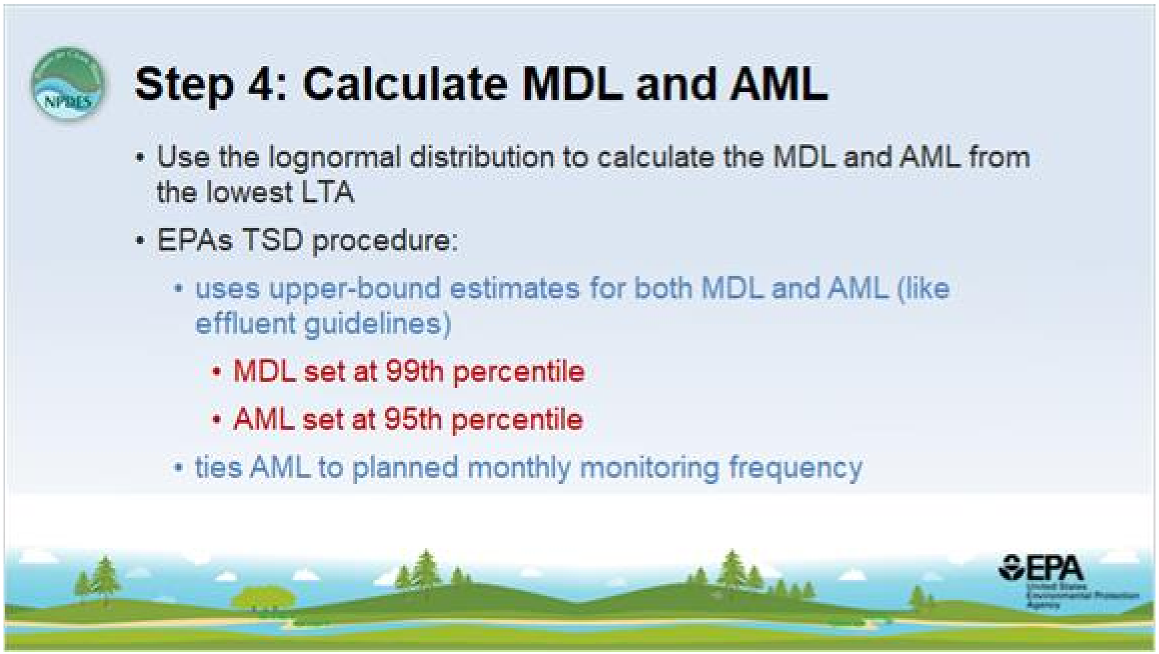


Notes:

So that brings us to Step 4

Greg, can you tell us how to use the selected LTA to calculate our water quality-based effluent limitations?

1.27 Step 4: Calculate MDL and AML



Notes:

I sure can, Dave.

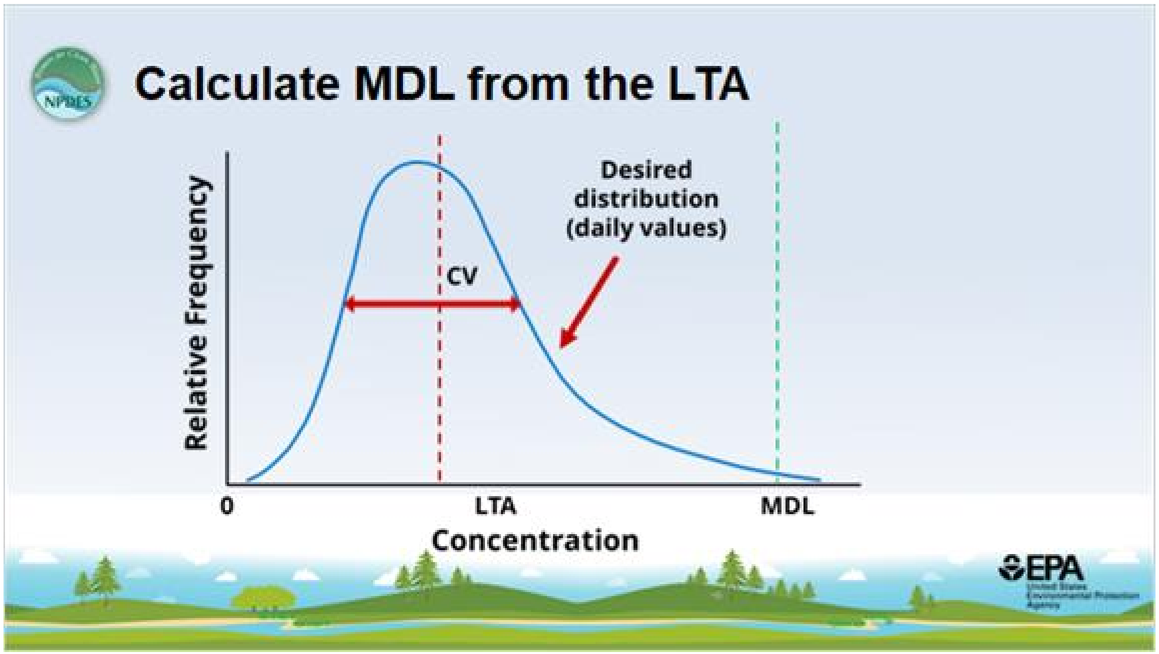
The TSD uses the same statistical approach to calculate water quality-based effluent limitations from the LTA as EPA's Office of Science and Technology uses when developing the technology-based standards in the effluent guidelines program.

Using this statistical approach, the TSD method calculates both the maximum daily limit (or MDL) and average monthly limit (or AML) at upper-bound values on the lognormal effluent concentration distribution curve we just established by picking the lowest LTA.

The TSD recommends setting the MDL at the 99th percentile of daily values and the AML at the 95th percentile of monthly average values. These recommended percentiles are consistent with those used in EPA's methodology for establishing performance standards in the effluent guidelines.

One thing to note regarding the value we calculate for the AML, is that it also depends on how frequently we plan to have the facility monitor for the pollutant of concern in order to show compliance. The more frequently the facility is required to monitor during a month, the closer the average of the samples taken over the month should move toward the LTA; thus, the lower the calculated average monthly limit.

1.28 Calculate MDL from the LTA



Notes:

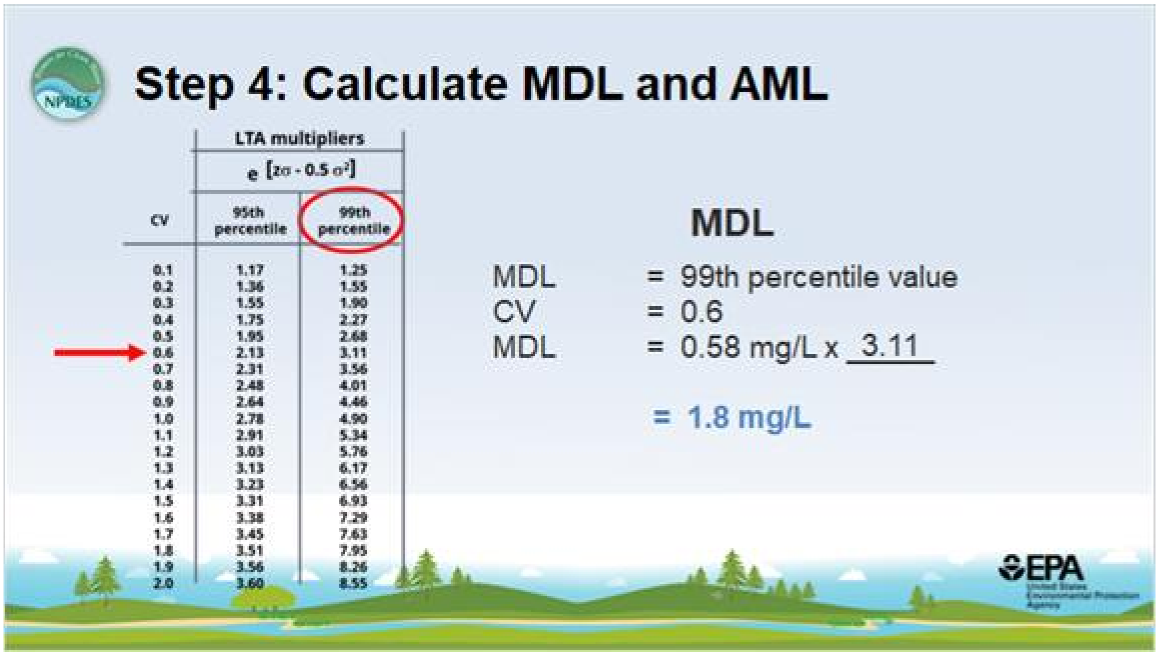
This slide depicts the relationship between the LTA and MDL.

Recall that we previously identified the controlling LTA, and determined that if the facility performed at this level on average, then both the acute and chronic WLA's would be achieved.

By placing the MDL at an upper-bound value on the desired lognormal distribution curve, we're requiring that any randomly collected daily sample be at or below this MDL value. As long as the facility is operating its treatment system so that it performs at or better than the performance described by this "desired" curve, the statistics indicate that the facility should be able to meet this MDL.

Let's take a look at our ABC Incorporated example and see how this works.

1.29 Step 4: Calculate MDL and AML



CV	LTA multipliers $e^{[z\sigma - 0.5\sigma^2]}$ 95th percentile	99th percentile
0.1	1.17	1.25
0.2	1.36	1.55
0.3	1.55	1.90
0.4	1.75	2.27
0.5	1.95	2.68
0.6	2.13	3.11
0.7	2.31	3.56
0.8	2.48	4.01
0.9	2.64	4.46
1.0	2.78	4.90
1.1	2.91	5.34
1.2	3.03	5.76
1.3	3.13	6.17
1.4	3.23	6.56
1.5	3.31	6.93
1.6	3.38	7.29
1.7	3.45	7.63
1.8	3.51	7.95
1.9	3.56	8.26
2.0	3.60	8.55

Notes:

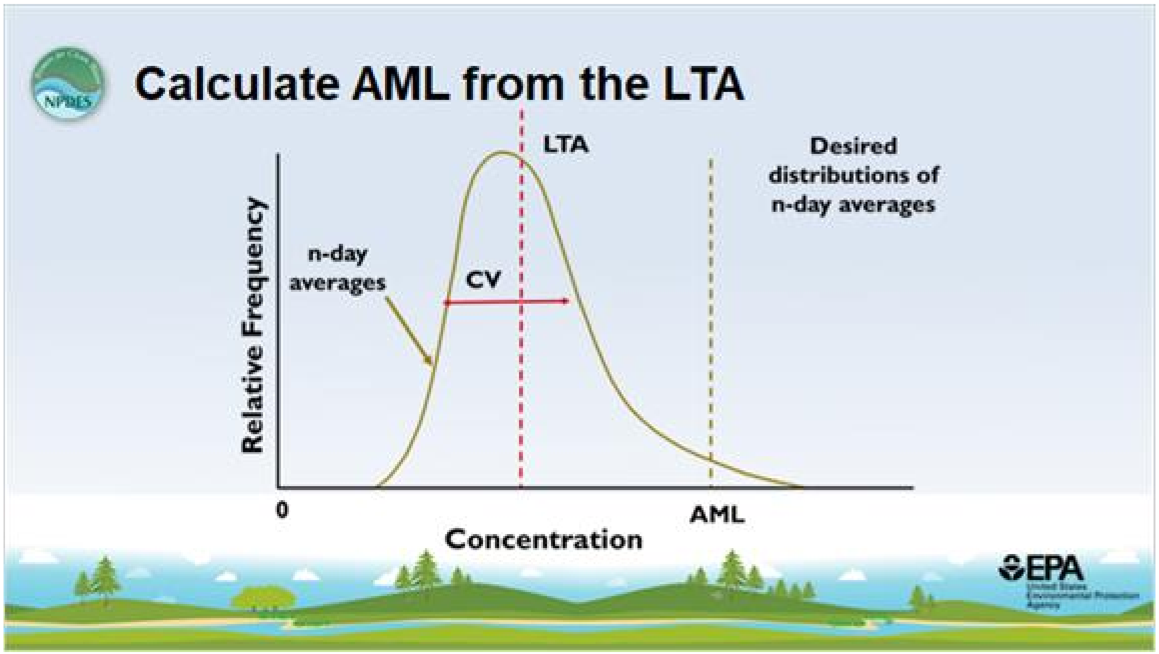
To facilitate our effluent limitation calculations, the TSD provides a table based on a lognormal distribution of daily effluent values that gives multipliers for calculating a maximum daily limit from the LTA. We have to know or assume the CV and choose the desired percentile for the MDL.

As we said before, the TSD recommends setting the MDL at the 99th percentile, but different permitting authorities may use a different percentile. Check your permitting procedures to see what they say about calculating this limit.

Using the table from the TSD, we're going to set the MDL at the 99th percentile and, assuming a CV of 0.6, our multiplier is 3.11.

For our ABC Incorporated example, we multiply the selected LTA (0.58 mg/L) by 3.11 and get a maximum daily limit of 1.8 mg/L.

1.30 Calculate AML from the LTA



Notes:

This slide depicts the relationship between the LTA and AML.

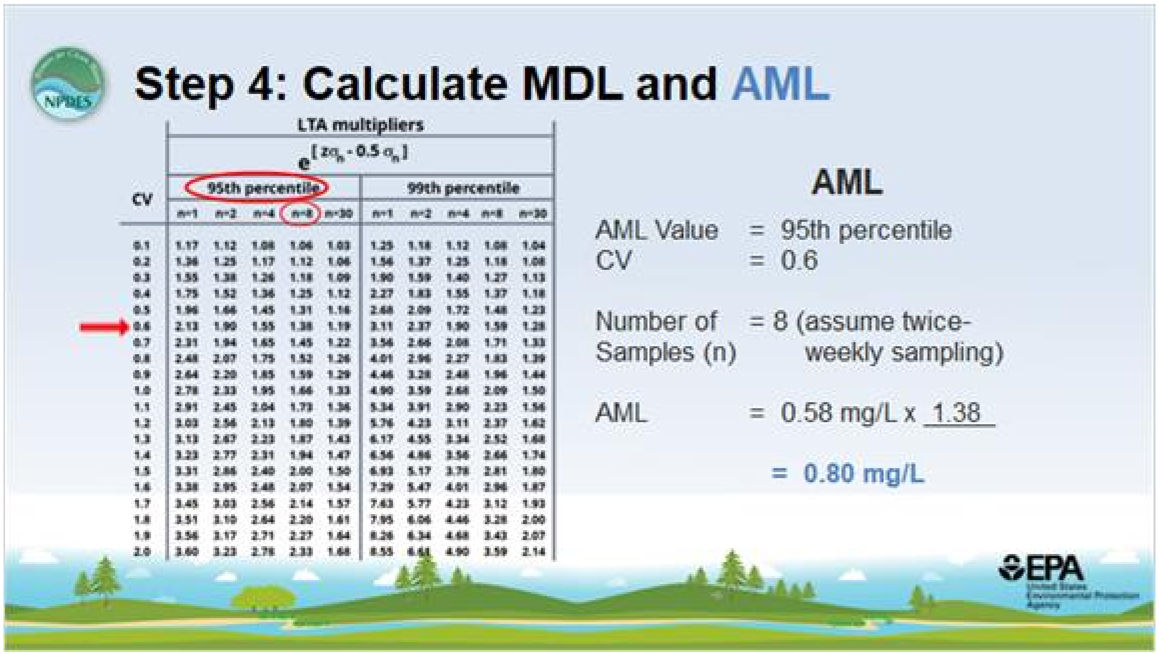
Again, we're basing the average monthly limit on the single LTA that we determined would ensure achievement of both the acute and chronic WLA; however, the distribution, in this case, represents the distribution of monthly average values rather than daily values.

Here the TSD recommends placing the AML at the 95th percentile of the desired lognormal distribution of monthly average values, and the AML will require that any random monthly average be at or below this value.

Just as with the MDL, as long as the facility is operating its treatment system so that it performs at or better than the performance described by the "desired" curve, the statistics indicate that the facility should be able to meet this AML.

Let's take a look once again at our ABC Incorporated example and calculate our AML.

1.31 Step 4: Calculate MDL and AML



Notes:

The TSD provides a table for calculating the AML that is similar to the table for calculating the MDL, but with an important difference.

To determine the appropriate multiplier, we need to know or assume the CV and choose the desired percentile value for the AML, just as with the MDL.

In addition, however, we need to know how many samples per month we will require the permittee to collect to determine its monthly average for that month. As I said earlier, the more samples there are in the average for a month, the closer the average of those samples should be to the LTA. Therefore, as the number of required samples goes up, the multiplier and the AML go down,

Of course, these limit calculations assume that when the permittee collects samples, any single sample could be on the high end of the distribution and the average will move down as more samples are collected.

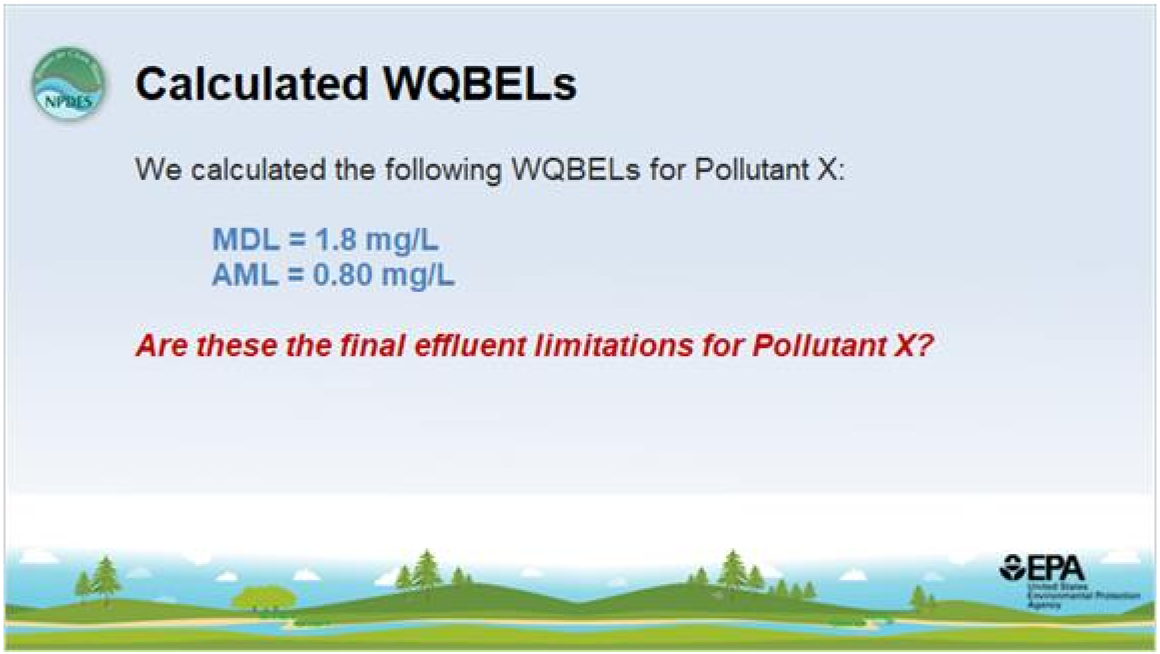
The TSD recommends selecting the 95th percentile for the AML, an approach that parallels the process for developing effluent guidelines. So, using the table from the TSD, we set the AML at the 95th percentile.

In our example, we'll base our AML calculation on a monitoring frequency of eight samples per month. In other words, the AML will define the limit for an average of eight samples per month.

Assuming a CV of 0.6, our multiplier is 1.38

We multiply the selected LTA (0.58 mg/L) by 1.38 and get an average monthly limit of 0.80 mg/L.

1.32 Calculated WQBELs



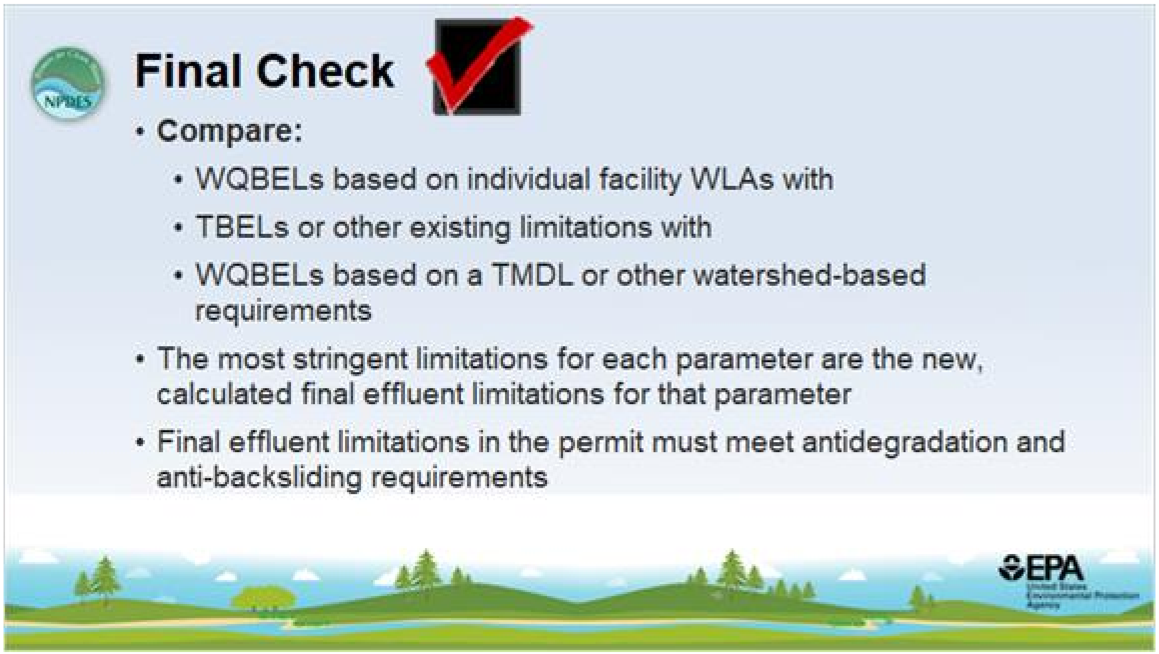
Notes:

Are these the limits that we put in the NPDES permit?

Maybe, or maybe not.

Dave is going to tell us about a final check that we need to do before deciding whether these are, in fact, the final limits.

1.33 Final Check



Notes:

Thanks, Greg.

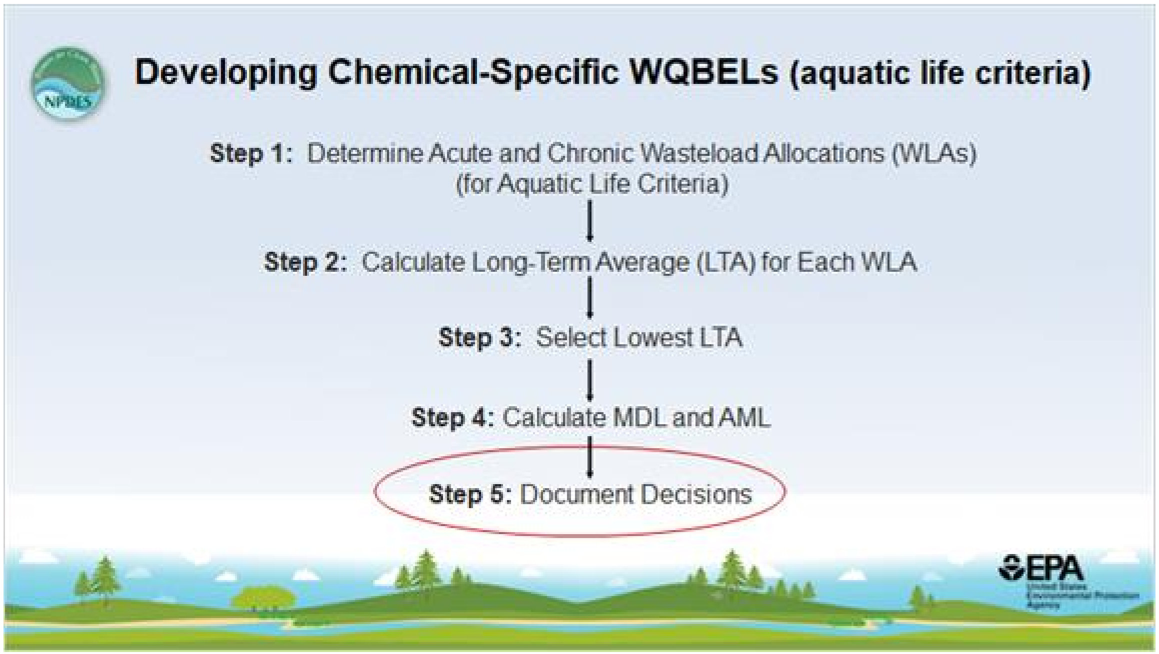
First, we need to compare our water quality-based effluent limitations to any technology-based effluent limitations that we've already calculated.

Second, we need to check to see if our facility-specific water quality-based effluent limitations might be more or less stringent than limits that may have been developed based on a total maximum daily load or a watershed assessment, perhaps developed to protect a downstream water body.

Ultimately, the most stringent limitations derived for each parameter using any of these approaches are the final calculated effluent limitations for that parameter.

And last, but certainly not least, the final effluent limitations in the permit must also meet antidegradation and anti-backsliding requirements, which are topics of discussion for another day.

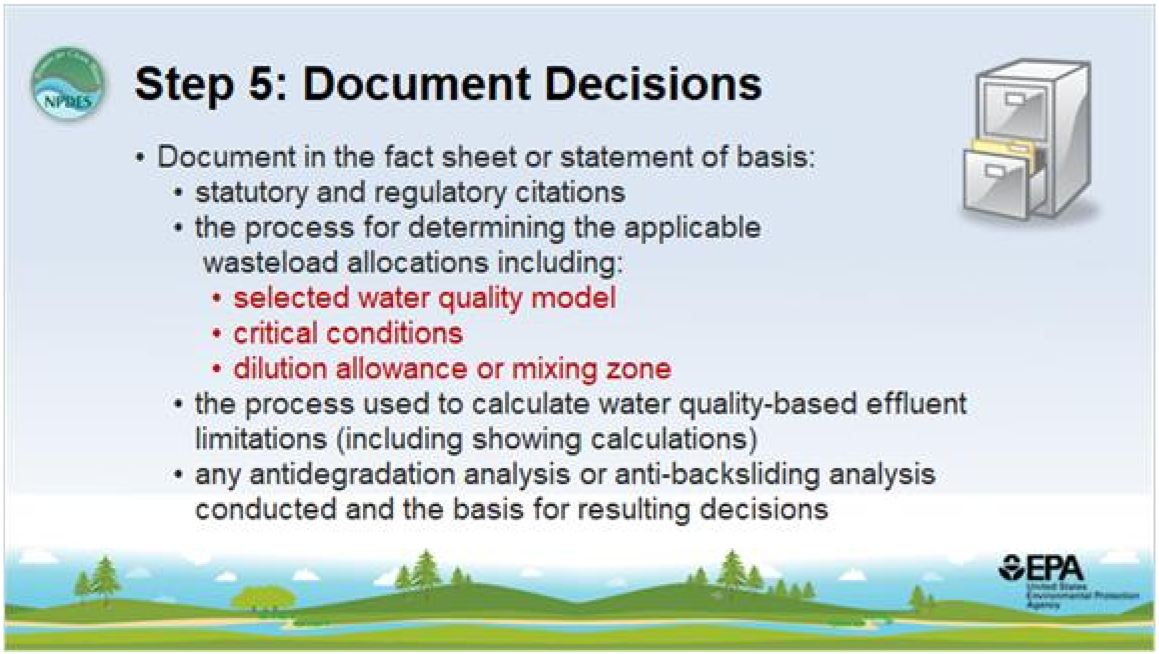
1.34 Developing Chemical-Specific WQBELs (aquatic life criteria)



Notes:

For now, we will move on to the last step in the process which is, as always, documenting our decisions.

1.35 Step 5: Document Decisions



Notes:

Just as with the other steps in the process, we need to include statutory and regulatory citations and an explanation of the process we used to calculate effluent limitations in the fact sheet or statement of basis.

Of particular note, 40 CFR 124.56(a) requires that the fact sheet contain "…any calculations or other necessary explanation of the derivation of specific effluent limitations…required by 40 CFR 122.44 and reasons why they are applicable or an explanation of how the alternate effluent limitations were developed."

EPA's review of NPDES permits, conducted over the past several years as part of a national Permit Quality Review, has found that this required information is frequently incomplete or absent from NPDES permit fact sheets. Much too often, fact sheets omit the calculations or simply note that the limit has been carried forward from the previous permit. While this might seem like a reasonable time saver for the permit writer, the fact sheet for the previous permit might also lack this information, and the permittee and other stakeholders would have no basis to assess whether the proposed limit is still appropriate and protective.

In addition, if we conduct an antidegradation or anti-backsliding analysis, we also need to document that process.