What To Submit to NCDENR with your POTW's HWA?

- Letter of Transmittal
- Organized Data Summaries-
  - L/STMP, SIU, Uncontrollable, and DMR
  - Data from all sampling sites in your approved L/STMP
- Removal Rate Calculations
- Mass Balance Spreadsheet
- HWA Spread Sheets
  - MAHL Criteria, MAIL, and Uncontrollable Calculations
- HASL (if necessary)
- Allocation Table
- Documentation of Design Influent values
- Copy of Land Application or Composting permit – through Attachment B.
- Copy of applicable pages of Sludge Annual Report
- Explanation of Choices, Assumptions, etc.

PARTIAL LISTING OF SOME INFO FROM COMP GUIDE: (Ch 2, 4, 5) updated February 2009

	NC Water Quality Standards For Freshwater Classes			Typical Detection Levels *See your LTMP/STMP for your own Division approved detection levels*								
	Class C Aquatic Life	Class WS Water Supply	Trout Waters			Literature Uncon--trollable Values	Literature AS / Nit Inhibition Values	Literature Anaerobic Digester Inhibition Values	Literature Median AS Removal Rates	40 CFR 503 Land App Cumulative Standard	40 CFR 503 Land App Ceiling Standard	40 CFR 503 Composte Ceiling Standard
Parameters	mg/l	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	%	lbs/acre	mg/kg	mg/kg
Arsenic	0.050	0.01		10	0.010	0.003	0.10 / 1.50	1.6	45 %	36	75	41
Cadmium	0.002		0.0004	2	0.002	0.003	1.00 / 5.20	20	67 %	34	85	39
Chloride	230 *AL	250		1,000	1	50						
Chromium, total	0.050			5	0.005	0.050	1.00 / 0.394	130	82 %			
Copper, total	0.007 *AL			2	0.002	0.061	1.00 / 0.48	40	86 %	1338	4300	1500
Cyanide	0.005			10	0.010	0.015	0.10 / 0.34	4	69 %			
Lead	0.025			10	0.010	0.049	1.0 / 0.50	340	61 %	267	840	300
Mercury	0.000012 mg/l 0.012 ug/l; 12 ng/l			0.2 ug/l using EPA 245.1 / 0.001 ug/l using EPA 1631	200 ng/l using EPA 245.1 / 1 ng/l using EPA 1631	0.0003	0.10 / n/a		60 %	15	57	17
Molybdenum				100	0.100				33 %		75	75
Nickel	0.088	0.025		10	0.010	0.021	1.00 / 0.25	10	42 %	374	420	420
Selenium	0.005			10	0.010				50 %	89	100	100
Silver	0.00006 *AL			5	0.005	0.005	0.25 / n/a	13	75 %			
Sulfates		250		1,000	1	30						
Zinc	0.05 *AL			10	0.010	0.175	1.0 / 1.0	400	79 %	2498	7500	2800
BOD				2,000	2	220			Site specific			
TSS				2,000	2	220			Site Specific			
Ammonia				100	0.1	25	480 / n/a	1500	Site specific			
Phosphorus, T				500	0.5	8			Site specific			
Nitrogen, Total				1,000	1	40			Site specific			
Oil & Grease				5,000	5	100			Site specific			

AL* = Action Level

AS=Activated Sludge; Nit.=Nitrification

The selection of a Removal Rate is one of many important steps preparing a Headworks Analysis (HWA). Choosing a correct removal rate will assure that the proper amounts of a metal or other parameter are distributed to either the sludge or to final discharge to the receiving water. Choosing an incorrect Removal Rate will have a different result depending on if that rate is too high or too low. For example:

- Choosing a removal rate that is too high can result in a POTW unknowingly over allocating for that parameter, overloading of the WWTP and ultimately causing violations of the NPDES permit or Water Quality standards.
- Choosing a removal rate that is too low can result in unanticipated amounts of metal entering the sludge and ultimately causing the sludge not to meet the requirements of their sludge disposal permit.
- Choosing a removal rate that is too low can also result in an underestimate of the allowable load to protect against NPDES or Water Quality Standards violations and cause SIUs to have to meet limits lower than are actually needed.

The following guidance presents a methodology for determining how best to determine an accurate removal rate, and some of the concerns and issues with these methods.

Section 1: Less than 50 % of a parameter sampling data is Below Detectable Limits (BDL)

Section 1.A. Site Specific Removal Rates

The preferred method for selecting the removal rates of a specific parameter is to calculate a specific removal rate based on historical data of the POTW performing the HWA. When a POTW has accurate and abundant data, the removal rate can be calculated with confidence that the result will represent the actual conditions at the WWTP. Due to the limitation of some analytical methods, it is likely that concentrations for some parameters will be reported not as an actual value but as below detectable limits (BDL) of the test. While having low levels of pollutants typically mean little chance of environmental harm, it makes determining the removal rate difficult. It is unknown if the actual concentration of the parameter is just one unit away from the detection limit, or is much closer to zero. Seemingly insignificant changes in how BDL data are used can significantly change the calculated removal rate, and thus greatly affect the results of the HWA.

It is recommended by the Division to calculate a removal rate for the parameter by substituting ½ of the detection limit for all data points reported as BDL.

Section 1.B. Use of Literature Removal Rates Even When Less than 50% Data is BDL

In rare cases, usually when necessary to resolve unexplained over allocation, use of a literature removal rate may be approved even when less than 50 % of the influent and effluent data is below detection. One example might be where the average influent is fairly close to the average effluent and both are very low. Approval will only be granted if the POTW is able to provide a compelling argument to do so, which would include demonstrated consistent compliance with the applicable environmental criteria and that existing SIU limits cannot be lowered without difficulty.

Another example is for conventional parameters where the WWTP is underloaded, it is the low influent concentration data, not the inability of the WWTP to remove the parameter, results in a calculated removal rate lower than anticipated. This "underloaded" situation can be addressed by use of the Design MAHL formula, or alternately by using the Design Removal Rate in the pass-through formula. In both cases, documentation of the Design information must be submitted with the HWA.

Section 2. More than 50 % of a parameter sampling data is BDL

Section 2.A. Use of Literature Removal Rates.

As discussed in Section E of the Comprehensive Guide and in the HWA Workshop materials, when a POTW has more than 50 % of its site-specific influent and effluent data reported as "below the detection level" (BDL), the POTW is to use the literature removal rate found in Appendix 5-D of the *Comprehensive Guidance for North Carolina Pretreatment Programs (Comprehensive Guide)*, which came from EPA's *Guidance Manual for the Development and Implementation of Local Limitations Under the Pretreatment Program* (December 1987) ("LLG"). Specifically, the removal rate listed in the "median" column is to be used. In other words, in absence of a site-specific removal rate, it would be assumed the POTW can be as efficient as the "median" or "middle" of the WWTPs covered by EPA's study. This required use of EPA's median literature removal rate is shown throughout the HWA training class materials wherever literature removal rates are listed in the slides and spreadsheets.

Situations where POTWs collect their site-specific data using the best available detection level and still have significant influent and effluent data reported as BDL are usually the result of comparatively low influent loads rather that an inability of the WWTP to remove the pollutant of concern. Use of the EPA median literature removal rate in this situation allows these POTWs to "get credit" for having at least as good a removal as the median of the general population of WWTPs as reported in the EPA's database.

See section 3 below for more discussion on Paired Data Removal Rates and the Decile Approach, including EPA's listing of 2nd and 8th Decile Literature Removal Rates

Section 2.B. Site Specific Removal Rates;

In some cases a POTW may still wish to seek DWQ approval to develop a site-specific removal rate even when a parameter has historical data below the minimum detection limit for more than 50% of the data. In cases where this results in a site-specific removal rate lower than the median EPA literature rate, the removal rate would likely be approved. Proposals for site-specific removal rates greater than EPA's median literature will be approved on a case-by-case basis. The options are:

Section 2.B.i. Include All Data including all BDL Values

In cases where all effluent data shows consistent compliance with an NPDES limit (from the permit itself or calculated during HWA development using WQS and 7Q10), a site-specific removal rate derived using all available data (BDL and above detection data) could be approved. The most common example of this is where most of the influent data is above detection but most of the effluent data is below detection.

If this option is pursued, it is recommended by the Division to calculate a removal rate for the parameter by substituting ½ of the detection limit for all data points reported as BDL.

Section 2.B.ii. Data Manipulation

In rare cases, a site-specific removal rate may be approved using only selected data when necessary to resolve unexplained over allocation. Approval of this method will only be granted if the POTW is able to provide a compelling argument to do so, which would include demonstrated consistent compliance with the applicable environmental criteria and that existing SIU limits cannot be lowered without difficulty.

Section 3. Paired Data Removal Rates

Section 3.A. Paired Data Removal Rates

Paired removal rates (called ADREs in EPA's LLGs) can only be calculated when the individual influent and effluent samples are collected taking into account the hydraulic detention time of the WWTP. Generally, the Division does not recommend POTWs attempt to collect hydraulically paired influent and effluent samples because of the difficulty in accurately determining the actual WWTP hydraulic detection time for any given pair of samples. Even if one uses the current WWTP flow at the time the influent sample collection is initiated, this flow will likely change significantly during some portion of the time before the last aliquot of the effluent sample is collected (e.g., 36 hours later for a 12 hour detention time WWTP). NC POTWs who have tried to collect "paired data" in the past show significant variability in removal rates, including many negative or "zero" removal rates. It is not logical to explain deletion of the negative removal and zero removal rates by saying "they can't possibly be true because my WWTP doesn't generate XXX pollutant" and still keep all the positive removal rates, implying "the positive rates must be true because they give me the result I expected." It could be just as likely that the positive removal rates, especially those on the high side of the spread of removal rates, are just as inaccurate as the negatives and zero.

For POTWs who wish to attempt to collect paired influent and effluent data, the method for determining the actual hydraulic detention time for any given pair of data must be discussed in the LTMP and must receive Division approval. The HWA submission must analyze the accuracy of this process. Negative and "zero" removal rate pairs cannot be automatically excluded. A removal rate using the average influent and average effluent must also be derived, and the Division reserves the right to require use of this removal rate in lieu of any higher "paired" removal rate derived.

Section 3.B. Decile Approach

As discussed in both the original 1987 LLG (Section 3.2.4.2) and the new EPA draft LLG (Section 5.1.1), analysis of POTW removal rate data using the decile approach is a tool to allow POTWs to more precisely understand the variability in their own WWTP removal rates in order to consider making more conservative (protective) choices. It gives the example of choosing the 2nd decile removal rate as the "worst case" or "more stringent case" or "more protective case" when performing the pass

through calculations as this lower removal rate assumes more pollutant will go to the effluent. The idea is that at least 20 % of the time the WWTP has this low a removal, and the POTW wants to be able to meet NPDES limits or water quality standards even then. It likewise discusses choosing the 8th decile when performing the sludge calculations as this assumes the "more stringent case" of higher than average removal rates which mean more pollutant is going to the sludge. [Note a POTW may only use the decile approach on its own site-specific data if it is collecting paired data and deriving paired removal rates. EPA's LLG tables list the 2nd decile and 8th decile literature removal rates to aide POTWs in exploring this type of use of deciles in their HWAs.]

Section 4. Source of EPA Literature Removal Rates: 1978 vs 1990

Some POTWs have pointed out that the Division uses the EPA's literature removal rate chart based on data from EPA's "40 POTW Study" with data collected in 1978. The 1991 EPA's National Pretreatment Program Report to Congress study, shown in the new Draft LLG (Page Q-6 of the Appendix), lists removal rates based on the "47 POTW Study" using data collected around 1990. These 1990 removal rates are actually lower than the original removal rates from the 1978 data. The Division continues to recognize the 1978 data as the preferred literature values. This decision is based on the assumption that the lower removal efficiencies seen in the 1990 study are a result of lower influent loads seen at facilities due to improved pretreatment programs implemented since 1978. Therefore, while the more recent literature data shows a decrease in the current removal efficiencies, it is assumed that most WWTPs still maintain the ability to perform at the higher removal efficiencies reported in the 1978 study if the WWTP were to receive an increased influent load. The Division would consider approval of the 1990 removal efficiencies or any other case specific literature removal efficiencies if a POTW presents a compelling argument to do so.

Units Conversion

- There are 1,000 milligrams (mg) in 1 gram (g)
  - milli = 1 *10-3
  - milligrams per liter (mg/l) are equal to parts per million (ppm)
- There are 1,000,000 micrograms (ug) in 1 gram
  - micro = 1 x 10-6
  - micrograms per liter (ug/l) are equal to parts per billion (ppb)
- There are a 1,000,000,000 nanograms in 1 gram
  - nano = 1 x 10-9
  - nanograms per liter (ng/l) are equal to parts per trillion

Units Conversion (cont)

- 1,000 ug in 1 mg
- 1,000,000,ng in 1 mg
- 1,000 ng in 1 ug

Or look at it backwards

- 0.001 mg in 1 ug
- 0.000001 mg in 1 ng
- 0.001 ug in 1 ng

Units Conversion (cont)

I'll never remember all that !

- **grams >> milligrams >> micrograms >> nanograms**
- **Move 3 decimal places between each**
- **Bigger >> smaller decimal moves right**
- **Smaller >> bigger decimal moves left**

Examples

Convert 32.1 ug/l (ppb) to mg/l (ppm)

32.1 ug/l → 3.21 one

0.321 two

0.0321 mg/l ← 0.0321 three

Examples

Convert 0.000056 mg/l (ppm) to ng/l (ppt)

0.000056 mg/l → 0.00056 one

0.0056 two

0.056 ug/l ← 0.056 three

That gets us to ug/l

Examples

Convert 0.000056 mg/l (ppm) to ng/l (ppt)

0.056 ug/l → 0.56 one

5.6 two

56 ng/l ← 56.0 three

Now we are at ug/l!

Tip

I always remember mercury:

0.0002 mg/l = 0.2 ug/l = 200 ng/l

A side note

"milli" comes from the Latin for thousand. So how come mg/l is called "part per million"? It has do to with the fact that the term "parts per million" is a weight to weight ratio. A liter of water weighs Approximately 1,000 grams or 1,000,000 mg. Thus one mg/l is equal to 1 ppm

Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E. Director
Division of Water Quality

February 19, 2007

Dear Pretreatment Professional:

Over the last year the DWQ staff met extensively with members of the Pretreatment Consortium concerning the issue of design headworks analysis for conventional parameters (BOD, TSS and ammonia). The issue arose when the Pretreatment, Emergency Response and Collection Systems Unit (PERCS) began to notice that high removal rates achieved by some well operated wastewater treatment plants (WWTP) led to unreasonably high available headworks loadings calculated using pass-through formula for conventional parameters when compared to plant design values While most agree that the calculated pass-through loadings were very high, they also asserted that the original design loadings were sometimes unreasonably restrictive and were often calculated decades ago.

The first solution for this problem proposed by the state was to have any WWTP with a calculated pass thru loading above design submit new calculations sealed by an NC Professional Engineer indicating the new appropriate capacity of the WWTP. Many municipalities balked at the cost of having an engineer recalculate design if the WWTP was not experiencing any compliance issues. Further analysis revealed that multiple safety factors were already built design calculations, which when combined with the conservative calculations in the headworks analysis led to a significant magnification. An example of these safety factors include the variability of industrial effluents and the statistically unlikely event that all industries would be discharging at their absolute maximum permit loading simultaneously Therefore, some allowances within strict limitations above calculated pass-through loading could be allowed without high risk of endangering the receiving waters of the plant.

The options for calculating conventional pollutant loading where calculated pass-through loadings exceeds design are proposed below:

1) Use Currently Available Design Criteria.

2) Apply Multiplier of 1.5 to Currently Available Design Criteria:
   a) WWTP must have full compliance for parameters requested to be multiplied for the previous 2 years.

   b) This option not available for WWTPs with Design calculations less than 8 years old as it is assumed that the currently available Design is still representative of current WWTP operations.

   c) This option will no longer be available if the WWTP is upgraded, expanded, or otherwise substantially changed enough to require a NPDES permit change such as rerating flow. The municipality must submit new NC PE stamped Design calculations indicating the new proposed capacity of the WWTP and obtain DWQ approval

   d) This option will no longer be available if a new industry, or change by an existing industry, will increase the SIU permitted load plus the uncontrollable load by more than 15% of the WWTP Design load all at one time. Before the applicable new/changed SIU discharge can begin, the municipality must submit new NC PE stamped Design calculations indicating the new true capacity of the WWTP and obtain DWQ approval.

North Carolina Division of Water Quality 1617 Mail Service Center Raleigh, NC 27699-1617 Phone (919) 733-7015
Customer Service
Internet: h2o.enr.state.nc.us 512 N. Salisbury St. Raleigh, NC 27604 FAX (919) 733-2496 1-877-623-6748

3) Allowable Load based on Maximum Average Monthly Influent Load:
   a) The WWTP must have 100 % limit compliance for the applicable parameter during the month from which data will be used. Additionally, the WWTP must have substantial compliance for the applicable parameter for the last two years.
   b) WWTP data older than 5 years may not be used.
   c) Consideration should be given for seasonality (lower removal rates in winter) or other factors.

4) Re-rating of WWTP by NC Professional Engineer:
   a) The municipality obtains approval of new NC PE stamped Design calculations indicating the new calculated capacity of the WWTP.

5) Site Specific Special Circumstances:
   a) DWQ will entertain proposals for WWTPs with special circumstances. Possibilities include WWTPs that were designed for parameter levels that are well below typical domestic levels for the applicable parameter.

POTWs wishing to use options 2-5 must submit a detailed proposal along with their HWA for PERCS's consideration. These POTWs must obtain PERCS approval before using any new proposed MAHL.

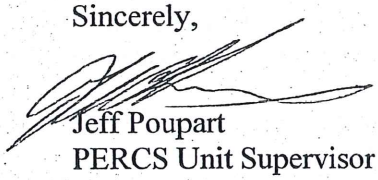
PERCS does not currently plan to require the use of Design allowable loads as maximum for Phosphorus and Total Nitrogen. However, if special circumstances require consideration of Design allowable loads for these parameters, PERCS will generally use the above procedures as the basis for our review.

PERCS believe that the best alternative is to have an engineer recalculate design capacity. The above options should provide useful alternatives

All NC POTWs must evaluate the Design Load for any applicable parameters and compare to the Pass-through Load, in both mg/l and lbs/day. The HWA.AT spreadsheet located on PERCS Headworks Analysis web-page has been modified to provide for this comparison. For POTWs with a Pass-through MAHL less than Design, you should use Pass-through as your MAHL. If your WWTP is underloaded, you may be able to obtain approval to use Design as your MAHL. Contact PERCS to discuss.

Thank you for your continued support of the Pretreatment Program. If you have any questions or comments, please contact me at (919) 733-5083 ext. 527, at ext. 527 [email: jeff.poupart@ncmail.net].

Sincerely,



Jeff Poupart
PERCS Unit Supervisor

Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen S. Sullins, Director
Division of Water Quality

December 27, 2007

Subject: End of 2007 Pretreatment Mailing

Dear Pretreatment Professionals:

As we draw to the close of another great pretreatment year, I wanted to update you on a couple of items in addition to the invitations to the upcoming year's workshops and your Program Summaries.

1) Design HWA Workgroup: Correspondence sent out to Pretreatment Professionals on 2/19/07 regarding the outcome of the HWA workgroup presented 5 options for calculating conventional pollutant loadings when calculated pass-through loadings exceeded design. PERCS would like to take this opportunity to clarify some of the caveats attached to option #2, **Apply Multiplier of 1.5 to Currently Available Design Criteria.**

   a) **WWTP must have full compliance for parameters requested to be multiplied for the previous 2 years.** The Division and the PERCS Unit realize that there are circumstances beyond the reasonable control of the POTW. Excessive rainfall events or accidents can lead to permit violations. When applying to use the 1.5 Multiplier option, provide an explanation for any permit limit violations for the parameter you are requesting to apply this option to. The PERCS Unit will review the data for patterns of noncompliance that may be a sign of poor plant operation or performance that would indicate that the treatment plant really cannot accept more than the design load.

   b) **This option not available for WWTPs with Design calculations less than 8 years old as it is assumed that the currently available Design is still representative of current WWTP operations.** In terms of design, typically, it takes about 3 years from the design stage of a WWTP until actual operation begins. The permit cycle is 5 years, hence 8 years was selected as the age of a WWTP design before the 1.5 Multiplier option can be used. If a POTW feels their design calculations are inaccurate despite being less than 8 years old, provide justification as to why it is inaccurate. For instance, a plant designed for biological nutrient removal may include chemical feed because the historical influent BOD is too low to support the process. Another example might be that increasing the influent BOD may decrease the need for the chemical addition. Other factors such as if a facility can show that the influent of the treatment plant has changed significantly since the time the design loadings were determined and it can demonstrate that the facility is meeting and exceeding permitted limits that the facility was originally designed to meet may also be taken into consideration.

Please keep in mind that DWQ and the PERCS Unit are always willing to entertain proposals for WWTPs with special circumstances. Possibilities include WWTPs that were designed for parameter levels that are well below typical domestic levels for the applicable parameter.

The 2/19/07 letter also stated that the options were also to be used for ammonia. PERCS meant this to be of benefit to the POTWs, however many felt that other options should be explored before limiting the ammonia to just the 5 options presented. Therefore, Phase 2 of the Design HWA workgroup to address ammonia and other nutrients will reconvene on January 17, 2008. Until a final set of options are developed, POTWs may use the pass-through calculations for nutrients. You are strongly cautioned not to allocate above the design MAHL for ammonia or other nutrients of concern at your WWTP.

2) IUP Workshop: The first meeting of the Industrial User Permitting Writing guidance workgroup will be in January or early February (the date, time, and location will be posted on our web-site in early January). If you would like to join us, or have suggestions on guidance to be developed, contact Dana Folley or just come to the meeting.

3) Rulemaking: A draft of the NC General Pretreatment Regulations – 15A NCAC 02H .0900 – is with the Regional Office inspectors for comment. We hope to finalize the DWQ internal draft by the end of February 2008. The next step will be a series of meetings with a small group of POTWs to get detailed input. If you would like to participate, or have suggestions on what to change, contact Dana Folley or the Consortium.

4) Streamlining: Most POTWs have received their SUO review letters, and the rest will by the end of January 2008. Don't forget to submit the final adopted SUO to the PERCS Unit, including documentation of adoption and effective date. All POTWs are reminded that you must **incorporate the Required changes in the new Model IUP at your next IUP renewal**. Visit www.ncwaterquality.org, then click on *Wastewater* and then *Pretreatment*. Scroll down to the Streamlining Update area for more directions.

5) Also, please see the following **important** attachments:
   a) Invitation for January 2008 Comp Judge, Significant Non-Compliance (SNC), and Pretreatment Annual Report (PAR) Workshops.
   b) Program Info Sheets and Historical SNC Sheets for your POTW. Please **review, mark any corrections, and include them with your 2007 PAR due 3/1/08** (if you have a consultant working on your PAR, remember to send them copies.)
   c) Invitation for six 2008 Headworks Analysis Workshops.

As always, please contact us with any questions or comments.

Sincerely,

Deborah Gore

Deborah Gore, Acting PERCS Unit Supervisor

Cc with enclosures:
RO Pretreatment Contacts
PERCS Pretreatment Staff

Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen S. Sullins, Director
Division of Water Quality

December 22, 2008

Subject: End of 2008 Pretreatment Mailing

Dear Pretreatment Professionals:

As we draw to the close of another great pretreatment year, I wanted to provide you an update on some issues, inform you on this year's upcoming workshops and distribute the Pretreatment Program Info Database sheets.

1) NC Pretreatment Professionals Honor Roll: In case you missed the Annual Pretreatment Conference held in August 2008, this year's addition to the Honor Roll is Trudy McVicker from the City of Raeford.

2) Acting Supervisor: Jeff Poupart has accepted the position of Point Source Branch Manager. Until the position is filled on a permanent basis, Deborah Gore is the Acting Supervisor for PERCS.

3) Design HWA Workgroup, Phase 2: This phase of the workgroup was to study ammonia and phosphorus. The workgroup reconvened in January 2008. The Consortium solicited data from POTWs. The data was evaluated to determine if there were other viable options for calculating the allowable pollutant loading when the calculated pass-through calculations exceed design. The conclusion of the group was that the five options arrived at for BOD and TSS are also the best options for Ammonia and Phosphorus. Please see Division correspondence of 2/19/07 and 12/27/07 for further information on these options.

4) IUP Workshop: The Industrial User Permitting Writing guidance workgroup has met three times and conference called once. The first IUP Writing workshop is tentatively planned for spring 2009.

5) Rulemaking: The internal DWQ draft will be completed by March 2009. The next step will be a series of meetings with a small group of POTWs to get detailed input. If you would like to participate, or have suggestions on what to change, contact Dana Folley or the Consortium.

6) Streamlining: If you have not submitted your final adopted SUO, please do so as soon as possible.

7) Staff Assignments: Staff assignments remain the same:
Dana Folley, 919-807-6311 [Dana.Folley@ncmail.net]:
Catawba, Chowan, Lumber, Roanoke and New
Monti Hassan, 919-807-6314 [Monti.Hassan@ncmail.net]:
Hiwassee, Little Tennessee, Neuse and Yadkin
Sarah Morrison, 919-807-6310 [Sarah.Morrison@ncmail.net]:
Broad, Cape Fear, French Broad and Tar-Pam
We continue to meet our goals for project review of 30 days for IUPs and 90 days for ERP, HWA, IWS, LTMP and SUO.

8) Workshops: Due to the current budget constraints we are only planning one Pretreatment Annual Report (PAR) workshop this year for February 3, 2009 (see attached invitation). If there appears to be an overwhelming need for additional PAR workshops, we will add to the schedule.

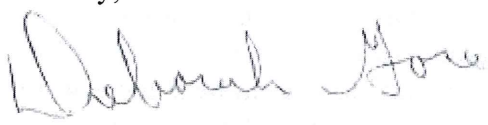
   Three Headworks Analysis (HWA) workshops are planned for January 28, February 24 and May 12, 2009 (see attached invitation).

9) Pretreatment Program Info Database Sheets: Please review your attached program info sheet and historical SNC sheets and make necessary updates to any of the information presented. Send the sheets back with your PAR, due March 1, 2009. If all the information was correct, please indicate that in your PAR. Especially note the due dates. This may be the only reminder you get.
   Note the historical SNC sheets now only have current active SIUs.

10) Email Addresses: In the future, PERCS would like to be able to use email to send out mass mailings. To make this an effective and cost saving tool, we ask that you keep PERCS updated on your current email address. See the new field on the program information sheet.

As always, please contact your pretreatment staff member (as listed above) or me at 919-807-6307 [email:Deborah.Gore@ncmail.net] with any questions or comments.

Sincerely,



Deborah Gore, Acting PERCS Unit Supervisor

Dg/dec_08mass_mailing
Enclosures:
- PAR Workshop Invitation
- HWA Workshops Invitation
- Program Info sheet(s)
- Historical SNC sheet(s), if applicable

Cc with enclosures:
- PERCS Pretreatment Staff
- All RO Pretreatment Contacts

Michael F. Easley, Governor
William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources
Alan W. Klimek, P.E. Director
Coleen H. Sullins, Deputy Director
Division of Water Quality

Explanation of 2004 HASL Worksheet Modifications and Effects on HWA

Two new HASL Worksheet templates have been made available on the Pretreatment Unit's Webpage. The first one is a new HASL worksheet for POTWs that land apply sludge that replaces the previous HASL. It includes fours changes described below that are aimed at better protecting the quality of sludge generated at POTWs with a Pretreatment Program. The second new HASL is an adaptation of the new land application HASL for POTWs that must meet the stricter limits for composting sludge.

1. Elimination of the Annual Sludge Loading Rate Limits Criteria: These criteria do not apply to municipal land application and so they have been removed from the worksheet.
2. Addition of a box to include the POTWs Sludge Permit number: With this information the applicable sludge information can be more easily referenced.
3. Use of the Maximum Sludge Concentrations: In the section of the worksheet that compares the POTW's current sludge concentration data to the applicable sludge-ceiling limit, the maximum sludge concentration is now entered instead of the average sludge concentration. Since the sludge ceiling concentration limit cannot be surpassed at any time for a batch of sludge to be land applied, the maximum concentration observed is a more appropriate value to review. If a POTW feels that a specific batch is unrepresentative due to a one-time event, a discussion explaining why these values should not be used must be included in the HWA submission, and the next highest values should be entered into the worksheet.
4. Addition of a column that calculates MAHL based on the sludge ceiling concentration: In the past versions of the HASL worksheet, a new sludge MAHL was only calculated by the HASL if the historic sludge concentrations entered exceeded the ceiling concentration limit. As long as the HASL worksheet showed that the current sludge does not cause violations, the Control Authority could remove the sludge allowable load from the main HWA spreadsheet and use the next most restrictive criteria (pass through or inhibition). This does not necessarily protect the quality of the sludge. The worksheet has been modified so a sludge MAHL to protect the quality of sludge is calculated in the HASL for each parameter. This value must replace the values calculated in the main HWA spreadsheet for any parameter that shows over allocation based on the HWA sludge criteria calculations. An example showing the reasoning behind this modification and the calculations used is shown on the following pages.

It is important to point out that the HASL worksheet was developed for use as a tool to address the situations only when there was a problem with the sludge allowable loads calculated in the main HWA spreadsheet. Some Control Authorities had MAHLs from the main HWA spreadsheet based on sludge that showed over allocation, but the current sludge data showed that there was not a problem. The original HASL worksheet was developed in 1994 so that if this situation occurred, the POTW could show that the sludge disposal system was operating within the permit limits, and that the calculated MAHL in the HWA could be adjusted to use the next

most restrictive criteria. The new HASL worksheets remain a tool for addressing this problem, and can only be used when the HWA calculations for the sludge criteria in the main HWA spreadsheet show unexplained over allocation and are unrepresentative of the actual conditions at the POTW.

Sludge Loading Criteria Example

While performing a HWA, a POTW finds that they have over allocation for Nickel and Arsenic that does not seem to make sense. The MAHL, based on sludge criteria, exceeds the current influent load, implying there should be sludge violations, yet no sludge violations have been shown.

HWA results before HASL is performed.

Pollutant	Stream Standard Loading (lbs/day)	AS/Nit/TF Inhibition Loading (lbs/day)	Cumulative Sludge Loading (lbs/day)	Sludge Ceiling Loading (lbs/day)	**MAHL (Lbs/day)**
Arsenic	60.47	7.76	4.00	**1.25**	**1.25**
Nickel	100.92	19.41	44.55	**7.52**	**7.52**

The original HASL worksheet could be filled in to check if there are any problems with the current sludge. IF the HASL worksheet shows that the current sludge is in good shape, the MAHL for sludge quality calculated by the main HWA spreadsheet is dropped from the HWA and the next most stringent MAHL (pass through or inhibition) is used. For our example, the results of a successfully completed HASL worksheet would result in the following:

HWA results after HASL is performed.

Pollutant	Stream Standard Loading (lbs/day)	AS/Nit/TF Inhibition Loading (lbs/day)	Cumulative Sludge Loading (lbs/day)	Sludge Ceiling Loading (lbs/day)	**MAHL (Lbs/day)**
Arsenic	60.47	**7.76**	Removed	Removed	**7.76**
Nickel	100.92	**19.41**	Removed	Removed	**19.41**

However, this leaves the potential for problems. The HASL worksheet shows that there have not been any problems in the present, but simply removing the allowable loads based on sludge criteria and only using the next most restrictive criteria (pass through or inhibition) does not guarantee that the next most stringent MAHL will protect the quality of the sludge in the future.

There is a solution. Since we already assume that removal efficiencies remain constant as influent concentrations or flows change and we also have calculated the % of the sludge ceiling concentration limit found in the sludge, why not use these values to calculate a MAHL that will

still protect the quality of the sludge? The results of this calculation are shown in the following table.

MAHL Calculation based on HASL

Pollutant	Sludge Ceiling (lbs/day)	Percentage of Ceiling Concentration Limit (From HASL worksheet)	Actual Influent (lbs/day)	**MAHL (Lbs/day)**
Arsenic	**1.25**	6.9 %	0.47	**6.81**
Nickel	**7.52**	12.1 %	1.71	**14.13**

Where:

$$\text{MAHL} = \left(\frac{\text{Influent Loading}}{\text{\% of Ceiling Concentration}} \right)$$

This is very similar to the "non-conservative" Anaerobic Digester Inhibition Allowable Load Calculation that is already used for Ammonia. The assumption is that since it is known that the current sludge is not causing a problem and it is known how much more concentrated the sludge can get before a problem is likely to occur, than we can scale up the influent proportionally to estimate an MAHL. Again, this assumes that the removal rates stay constant with changes in influent concentrations.

This results in a HWA Table as follows:

HWA Results Using the HASL Worksheet Sludge Ceiling Criteria

Pollutant	Stream Standard Loading (lbs/day)	AS/Nit/TF Inhibition Loading (lbs/day)	Cumulative Sludge Loading (lbs/day)	HASL Sludge Ceiling Loading (lbs/day)	**MAHL (Lbs/day)**
Arsenic	60.47	7.76	Removed	**6.81**	**6.81**
Nickel	100.92	19.41	Removed	**14.13**	**14.13**

Using this example it can be seen that the new 2004 HASL worksheet continues to allow for the Control Authority to adjust the MAHL calculated in the main HWA spreadsheet when that value causes over allocation and is based on the sludge criteria. But, the new 2004 HASL calculates a new MAHL based on the sludge criteria to be used in the HWA, instead of simply allowing for the sludge criteria to be removed. Properly using the HASL Worksheet along with the HWA will better protect the POTW from Sludge Permit limits violations.

Calculations for the Land Application of Residuals

$$\frac{\text{mg/l}}{\text{equivalent}} = \text{milliEq}$$

$$\frac{\text{mg/l}}{\text{\% solids (as a decimal)}} = \text{mg/kg} \qquad \text{mg/kg} * \text{\% solids (as a decimal)} = \text{mg/l}$$

$$\text{mg/kg} * \left[\frac{\frac{2000\ \text{Lbs}}{\text{ton}}}{1\ \text{kg}/1{,}000{,}000\ \text{mg}}\right] = \text{mg/kg} * .002 = \frac{\text{Lbs}}{\text{Dry Tons}}$$

Helpful Conversions:

- **1 Acre = 43,560 ft^2**
- **1 Kg = 1,000,000 mg**
- **1 Ton = 2,000 Lbs**
- **1 Gallon of Water = 8.34 Lbs**
- **1 Mile = 5,280 ft.**

$$\frac{(\text{gallons})(\text{\%solids})(8.34\ \text{Lbs/gal})}{2000\ \text{Lbs/ton}} = \text{Dry tons}$$

$$\frac{(\text{Dry tons})(2000\ \text{Lbs/ton})}{(\text{\% solids (as a decimal)})(8.34\ \text{Lbs/gal})} = \text{gallons}$$

Surface Water

- Point-Source
  - NPDES Wastewater
  - Pretreatment
    - Categorical User Information
    - Comprehensive Guide
    - Headworks Analysis
    - Industrial Waste Survey Information
    - Mercury Guidance
    - Other Downloads
    - Other Industrial Information
    - Other Pretreatment Links
    - Pretreatment Annual Report Guidance
    - Permit Writing Guidance
    - Staff Contacts
    - Training
  - Collection Systems
- Wetlands and Stormwater

Pretreatment Program

Headworks Analysis

The Headworks Analysis (HWA) calculates the flow and pollutant treatment capacity of a wastewater treatment plant (WWTP). It incorporate the WWTP Design criteria as well as environmental criteria to protect the receiving stream (NC Water Quality Standards or NPDES limits), the WWTP biomass (Inhibition criteria), and the sludge disposal site (40 CFR 503 land application or incineration standards).

The Allocation Table compares the flow and pollutant loads permitted to the WWTP's significant industrial users (SIUs) to the allowable WWTP influent loads from the HWA to ensure the WWTP will not be overloaded.

HWA Training

- HWA Workshop powerpoint presentation (Feb 09) Part 1 (http://portal.ncdenr.org/c/document_library/get_file?uuid=9ca7faa2-ca27-41d5-a29f-11db4e453f34&groupId=38364) and Part 2 (http://portal.ncdenr.org/c/document_library/get_file?uuid=05cc3163-0a62-4cf2-9df3-bd6242b859e4&groupId=38364). This slide presentation includes detailed discussions on calculations, definitions, references, decision making and explanations.
- What items to submit with your POTW's HWA? (http://portal.ncdenr.org/c/document_library/get_file?uuid=52cf927b-a9c2-45d4-af04-d587ff770462&groupId=38364)(Feb. 09)

Some supporting HWA workshop materials are available only in hard copy format. Please contact your PERCS Pretreatment Staff Person (http://portal.ncdenr.org/web/wq/swp/ps/pret/contacts) for this information and real examples of HWAs.

PLEASE NOTE: Allow your Internet Browser to download the powerpoint files, then use the browser to save the file to your computer, i.e., File, Save As.

Spreadsheets for the HWA

- Headworks Analysis Spreadsheet with linked Allocation Table and HASL Worksheet (Updated February 2008) (http://portal.ncdenr.org/c/document_library/get_file?uuid=fc276f8d-7366-4935-89dc-bed726f40785&groupId=38364)
- Separate Allocation Table (not linked to the HWA Spreadsheet) (http://portal.ncdenr.org/c/document_library/get_file?uuid=577d69f3-aad1-4ff6-b470-25fa48aa3344&groupId=38364)
- Generic Data Summary Spreadsheet (http://portal.ncdenr.org/c/document_library/get_file?uuid=28eea956-3e61-46a4-b8a7-b3f8e6765aae&groupId=38364)
- Removal Rate Spreadsheet (http://portal.ncdenr.org/c/document_library/get_file?uuid=ebbdfb3f-b7a3-478d-86f3-d1f76990e4f9&groupId=38364)
- Uncontrollable Mass Balance Spreadsheet (http://portal.ncdenr.org/c/document_library/get_file?uuid=c1d18252-aaea-4839-99ce-7da6a27e3141&groupId=38364)

Guidance Documents for HWA

- February 2007 Design HWA Memo (http://portal.ncdenr.org/c/document_library/get_file?uuid=0dc24873-eac8-4e45-9113-5e6b05551268&groupId=38364)
- Dec 07 Mailing with updates on design (http://portal.ncdenr.org/c/document_library/get_file?uuid=dc9ec71f-7ffe-4b06-aa94-3a832dca8bf8&groupId=38364)
- Dec 08 Mailing with more updates on design (http://portal.ncdenr.org/c/document_library/get_file?uuid=81ed82de-bc40-4f96-a331-47867689c0be&groupId=38364)
- Feb 2009 HWA Numbers (http://portal.ncdenr.org/c/document_library/get_file?uuid=8f006e10-3b32-4f86-927e-cbf307f3e931&groupId=38364)

- Removal Rate Determination Guidance (http://portal.ncdenr.org/c/document_library/get_file?uuid=dfcc6863-fa4c-4e26-acd8-94803f1dfaf7&groupId=38364) (2004)
- Headworks Addendum for Sludge loading (Hasl) (2004 modifications) (http://portal.ncdenr.org/c/document_library/get_file?uuid=b5e8fdfb-c5ee-43ac-9395-96777ad356c3&groupId=38364)
- Some Sludge conversion formulas (http://portal.ncdenr.org/c/document_library/get_file?uuid=bbe5f0f8-6c79-4c67-808a-2d1911e66095&groupId=38364)

Organics HWA and Related Guidance Documents

- Organics Headworks Analysis Spreadsheet (http://portal.ncdenr.org/c/document_library/get_file?uuid=79360225-4c2c-4b1b-8971-ee5bd04750d4&groupId=38364)
- Organics Headworks Analysis Guidance (http://portal.ncdenr.org/c/document_library/get_file?uuid=8b46743b-c107-4dda-a5a0-2f78adbf1934&groupId=38364)

Pharmaceutical HWA and Related Guidance Documents

- Pharmaceutical Organics Headworks Analysis Spreadsheet (http://portal.ncdenr.org/c/document_library/get_file?uuid=561d0843-7cac-43ea-8422-c5ee82343e5f&groupId=38364)
- Pharmaceutical OHWA Guidance (http://portal.ncdenr.org/c/document_library/get_file?uuid=0a8f7f99-4091-4203-891d-5d1cd901655b&groupId=38364)

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Archdale Building: 512 N. Salisbury St.
Toll Free: (877) 623-6748

Typical Problems with HWA:

1) Does not include data summaries.
    a. See HWA presentation for what is required, but essentially need data summary of all LTMP data including influent, effluent, aeration basin and sludge, DMR data used, uncontrollable data and/or uncontrollable mass balance.

2) Does not include narrative to explain various HWA choices.
    a. Source of all values used in HWA must be explained, either from the data summaries attached to the HWA or from the narrative.
    b. Any values not derived from attached data summaries must be explained.
    c. All differences in values used in HWA over those derived from the data summaries must be explained.
    d. Sludge disposal method must be identified, with all applicable sludge limits (for land application, class A distribution, or monofill) must be identified (include copy of permit) and used either in the HWA spreadsheet or in the HASL or both.

3) Derives POTW flow from only those days when LTMP data was collected.
    a. HWA must use POTW flow based on the average of all daily values from all DMR data for applicable period. If other value is used, HWA must show the daily average, explain why it is not used, and show how the number was derived and why it is better.
    b. Examples typically include using only week day flows, adding or deleting flow based on new or dropped SIUs.

4) HWA uses POTW NPDES permitted flow instead of actual WWTP flow.

5) For parameters that the POTW has an extensive data set from the DMRs, for example BOD, TSS, NH3, some metals, derive removal rate from only LTMP data collected.
    a. HWA must use all available data from LTMP and DMRs. If this is not done, HWA must discuss this and explain why.
        i. One example might be elimination of high data points from a hurricane.
        ii. Another example might be that NPDES required once per week data for nickel has a detection level of 50 ug/L whereas the LTMP data meets the LTMP required detection level of 10 ug/L. This would be most applicable where the NPDES data is all below detection. However, if some is below and some is above, the POTW should prepare a data summary of all data and consult with DWQ about what data to use and what to not use and why.

6) No documentation of how derived removal rates from included influent and effluent data.
    a. Must list average influent and effluent values used with derived removal rate next to it or otherwise clearly indicated.

7) Use of wrong NPDES limits.

8) HWA uses action levels when passing toxicity.

9) No discussion of NPDES violations and how HWA does or does not address them.

10) Using data from different time periods without adequate explanation of why this is done. For example, using influent and effluent from 5 years, but SIU data and POTW flows from only the last year.

11) HWA doesn't use nitrification inhibition criteria when needed.

12) Use of wrong sludge standards.
    a. The HWA and HASL spreadsheets provided by DWQ use the land application sludge standards. Facilities with other standards such as distribution and marketing or sludge monofill must change the standards to the ones in your sludge permit.

13) Incorrect carrying of data values from one spreadsheet to another. For example, using a different non-SIU flow in the HWA than the one derived from the uncontrollable mass balance. If the POTW has done this intentionally, the HWA submission must explain the reasoning.

14) Incorrect use of below detection data. Also incorrect choices for removal rates as related to the percentage of below detection data.