

Guidance Manual for Using NEWLL12.xlsm To Develop Local Discharge Limitations

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UPDATED June, 2016
Publication number 10-XX-WQ

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NEWLL12.XLSM - User's Guide and Explanations

Updated June, 2016

Section I - General Use of the Excel Workbook "NEWLL12.XLSM"

DESCRIPTION: This workbook is a tool consisting of nine worksheets a visual basic subroutine modules and macros developed to run using a current edition of Microsoft's Excel™ program. This edition supersedes earlier versions of this spreadsheet.

USE: This workbook is to help municipalities develop "technically based" limits for various types of pollutants (conservative, non-conservative, toxic, reactive, and conventional). Such limits address the threats such pollutants pose to their sewers and sewage treatment facilities. Use of this spreadsheet informs and automates the process as much as possible. However, it cannot replace a good understanding of the theory and practice of developing, codifying, and applying local limits.

LICENSING: This spreadsheet belongs to the citizens of the State of Washington who paid for its development. Staff of the Department of Ecology (Ecology) and Municipalities in Washington State which operate Publicly Owned Treatment Works (POTWs) and consultants in their employ are the intended users, and may freely use this tool. For any other use, please contact the Ecology Publications office to ensure authorization. Ecology does not authorize any private licensing or copyrighting of this spreadsheet in whole or part. Any use that builds upon this work must properly credit the State and be free to use and distribute.

VALUE: Local limits that are "technically based" allow the pretreatment "Control Authority", (either Ecology or the delegated pretreatment program), to issue permits for discharges to the POTW that appropriately limit pollutants and are legally defensible. Such limits are necessary to protect the POTW, its processes, sludges, and receiving waters.

RELATIONSHIP TO OTHER GUIDANCE: Ecology designed this spreadsheet as a tool for automating the calculations (to the extent possible) in keeping with Ecology's policy on developing Local Limits. Please refer to that policy (and the references it cites) for background on how to determine pollutants of concern, do sampling, and employ local limits.

RELATIONSHIP TO PRIOR EDITIONS: This, the 11th edition, revises the discussion of how to use the workbook to develop limits for non-conservative pollutants (I.E. those that biodegrade or volatilize), pollutants for which the POTW was designed to treat (e.g. BOD, TSS, and Ammonia). This version drops "Inorganic Arsenic" from those metals that can be automatically selected. It completely replaced the spreadsheet on OSHA standards to reflect new state rules. It removed the Ecology spreadsheet for statistically determining a POTW's monthly limits based on WQ criteria. It added a spreadsheet of Henry's Law Constants for use in estimating appropriate limits to prevent explosions. It re-organized the charts in the "Toxic-Explosive Limits" workbook to include a summary table at the top. It includes a companion "example" spreadsheet completed for a (fictional) POTW "NEWLL11-Example" to illustrate some of the flexibility and utility of the workbook.

RELATIONSHIP TO THE OVERALL TASK OF ESTABLISHING LOCAL LIMITS: The spreadsheet is principally designed to calculate the maximum allowable limits for certain pollutants under specific presumptions, and to divide this loading among the "industrial" flows. It cannot replace good judgment or anticipate pollutants of concern. Ecology recommends POTWs also include limits for total Fats, Oils and Greases (FOG), petroleum based FOG, pH, TSS, and oxygen demanding pollutants (BOD and ammonia). When

receiving toxic and explosive pollutants, Ecology also recommends the POTW develop and codify limits for such pollutants. Ecology expects those using this spreadsheet will request Ecology approval of any new or modified local limits, and that delegated pretreatment programs will follow the procedures for program modifications in 40 CFR 403.18. After approval, the municipality must codify the limits in a local Ordinance to be enforceable.

DISCLAIMER: Neither the author nor the Department of Ecology make any claims as to the accuracy or the utility of this spreadsheet to a particular application. It is a complex tool which Ecology initially developed for internal use to simplify developing “technically based” local limits. While Ecology may require municipalities to develop local limits, we do not require any person to use this spreadsheet to accomplish that task. As a sophisticated tool that is periodically updated, it will doubtless have some bugs despite Ecology attempts to ensure its accuracy and utility. That said, Ecology cannot assume any responsibility for errors in the program or resulting from the use of misuse of this program. Ecology advises users of this spreadsheet to always double check the spreadsheet’s results with the formulas contained in EPA’s guidance manual on Local Limits. Users of this spreadsheet must have a good familiarity with the Excel® spreadsheet program

DETAILS ON CONTENTS: The ten spreadsheets in the “NEWLL12.xlsm” workbook all have distinctly different functions. The first four (below) are linked together and thus changes on one are reflected in the others. The other five are stand alone worksheets. This manual will show you how to enter data and interpret the results to get the most from this worksheet. Following sections will describe how to enter data into, or otherwise make full use of each of these spreadsheets.

These are the individual worksheets included in this workbook:

- “**Basic Data**” - Enter basic information about the plant, which pollutants to develop limits for, and how to do the calculations.
- “**Sample Data**” – Enter sample results from the influent, primary clarifier effluent, final effluent, biosolids, industrial, and ambient (receiving water) sampling data for pollutants of concern in the worksheet.
- “**Local Limits**” - Make pollutant specific adjustments to how local limits are calculated including adjusting the flows over which pollutant loadings are distributed,
- “**POTW Limits**” – Look up (in the lower section) and tabulate (in the upper section) limits which the POTW must meet for any pollutant not already listed and for which water quality criteria exists.
- “**Non-Conservative**” – Separate worksheet describing the adjustments to make to the spreadsheet when dealing with non-conservative toxic pollutants.
- “**Conventional Poll tool**” – Separate worksheet for graphically showing the POTW’s decisions on allocating their capacity for treating conventional pollutants, managing the POTW capacity as a resource, and limiting loadings to the POTW.
- “**Toxic-Explosive Limits**” – Separate worksheet to tabulate limits to protect against explosions and vapor toxicity. It contains the formulas, methodology, and tabulated data for deriving such limits. It includes and expands on EPA’s tables.
- “**HW_Thresholds**” – Provides a table of HW threshold values from WAC 173-303-090(8)(c).
- “**WA-OSHA-STDS**” – Unlinked table of exposure limits from WAC 296-841-20025 for use in the “Toxic-Explosive Limits” worksheet.

“**RREL Henry’s Law constants**” – An unlinked table of reference data (including Henry’s Law Constants and molar weights) gleaned from EPA Program “RREL Treatability Database” for use in the “Toxic-Explosive Limits” worksheet.

BEFORE YOU START: First: Ecology’s policy on developing local limits describes the general process for developing local limits. It describes how to do an initial screening, determine pollutants of concern, develop a sampling plan, document the basis for the limits proposed, propose limits to Ecology, and codify limits. This manual on using the spreadsheet does not cover these topics. Please refer to that policy and relevant texts such as “Developing Local Limits” (EPA, 2004) and Ecology’s “Guidance for Developing Quality Assurance Project Plans” to get appropriate data for developing local limits. This manual presumes that you have properly sampled for all pollutants of concern and are ready to enter the data you have in order to develop local limits.

Secondly: As a precautionary note, before entering any data, we advise saving an unaltered copy of the workbook and the workbook example in a safe location. While you will want to alter (customize) the spreadsheet to accommodate your particular situation, many cells include references to other cells in other spreadsheets. If the content of the cell is a link to another cell, changing the contents will delete the link. Breaking the links in the linked sheets may compromise the accuracy or functionality of the workbook.

General Methodology:

1. Review Local Limits policy, spreadsheet instructions, & coordinate your plans w/ Ecology
2. Enter the basic information on the “Basic Data” sheet in the yellow color cells (default colors can vary, see detailed spreadsheet instructions if in doubt.)
3. Enter Monitoring Data (influent, primary effluent, final effluent & sludge) in "Sample Data" rows 14-18 for sample 1, rows 24-28 for sample 2, etc for up to the last 20 samples.
4. Enter average ambient & industrial pollutant levels in "Sample Data" rows 9&10.
5. Refine how “Local Limits” calculates limits for each pollutant.
6. Refine the "Local Limits" worksheet to reflect pollutant specific decisions.
7. Enter Data in the "Conventional Poll Tool" tab for BOD, TSS, and Ammonia (see example).
8. Evaluate appropriate limits for toxic-explosive pollutants which may be discharged.
9. Compile limits & send this spreadsheet, the proposed ordinance, & a cover letter to Ecology.
10. Develop a plan for filling any data gaps and to periodically re-confirm limits are protective.

These ten steps are described in greater detail below:

STEP 1: REVIEW POLICY, INSTRUCTIONS, and COORDINATE THE PLAN: It will be up to you (the proponent and author of the rationale for the proposed limits) to defend the local limits derived whether you use this spreadsheet tool or not. Therefore, you should obtain a good working knowledge of EPA’s guidance, Ecology’s policy, and the theories behind this spreadsheet before starting the process of developing local limits.

STEP 2: ENTER BASIC DATA ABOUT THE POTW: The data required in this first spreadsheet is largely self-explanatory. In general, you should use values that reflect the reasonable worst case situation, not the absolute worst case. For example, for the hardness of the receiving waters, if the minimum hardness is 25, but the minimum for any 7-day period is 35, then 35 may be a more appropriate value to use. This is because there are a number of variables involved, and if one were to take the “worst case” for each, the resulting limits would be protective of a situation which is not likely to ever actually occur. For flow to the POTW, use a low flow summer month, but for sludge production an annual average is typically good enough. As far as the methodology for determining the local limits goes, understand that you can adjust the methodology for a particular pollutant in the “Local Limits” worksheet.

STEP 3: ENTER SAMPLING DATA: The second sheet for data entry is the “Sample Data” worksheet. This is used to enter data from sampling of the POTW’s influent, primary clarifier effluent, final effluent, biosolids, receiving waters, and industries. It also has a space for recording the detection limit (for the liquid samples). Enter wastewater sample results in units of ug/l, and biosolids sample results as mg/kg (report biosolids on a dry weight basis). Rows 3-8 of the spreadsheet shows the average and a statistical analysis of all non-blank data points. These values are used by the “Local Limits” worksheet. Placing a value or a “0” in the cell keys the program include the cell in averaging and statistical analysis. So do not enter a “0” where there is no data. Just leave the cell blank in such cases to avoid skewing the data. (See Q&A section for how to handle non-detects)

STEP 4: ENTER AMBIENT AND INDUSTRIAL CONCENTRATIONS: For ambient (receiving water) monitoring and industrial pollutant concentrations, this spreadsheet has two rows (9 and 10) for entering the average concentrations. Due to the limits in how complicated the spreadsheet can be, the user must average the available data in a separate worksheet (you may add worksheets to the NEWLL11.xlsm workbook by clicking on the “insert worksheet” tab on the far right of the other worksheet tabs). The ambient and industrial concentrations are important to a defensible analysis. The concentration of each pollutant in receiving waters (row 9) can greatly affect the amount of loading available to the POTW, and hence the local limits.

The concentrations (and hence loadings) already discharged from industries (row 10) is also an important factor in developing a local limit. Entering this value allows the spreadsheet to properly attribute headworks loadings to existing industry and “domestic” sources. Presuming that existing industries are discharging at the same concentration rates as domestic sources can result in lower local limits than necessary. So while it can be justified as a conservative presumption, it may be worth the time and effort to collect actual data from industries on all pollutants for which local limits are being proposed.

STEP 5: REFINE HOW “Local Limits” CALCULATES LIMITS FOR EACH POLLUTANT: After choosing the general method of calculating local limits in the “Basic Data” worksheet (rows 35-39), and entering sampling data in the “Sample Data” worksheet, the “Local Limits” worksheet should be giving you a proposed local limits (row 77) for each pollutant of concern. In some cases you will receive error messages. At this point review the data in the “Local Limits” worksheet, evaluate the reason for any error messages, and decide whether to adjust the presumptions to allow the spreadsheet to yield a proposed limit. The most common error message is generated when you have not allowed the macros and visual basic subroutines to run on your computer (many times these features are turned off as the default to enhance workstation security). The second most common errors are sample data transcription errors. The third most common error is making inappropriate data processing choices. For example, if there is no sampling data for a pollutant, and you have selected (in “Basic Data”) to use actual sampling as a default. In such cases, you will need to change that

choice for that particular pollutant (Under the column for that pollutant and in the “Local Limits” worksheet rows 50-54)

STEP 6: REFINE THE “Local Limits” WORKSHEET TO REFLECT POLLUTANT SPECIFIC DECISIONS:

The “default” methodology (passed on from rows 35-39 of the “Basic Data” worksheet to rows 50–54 of the “Local Limits” worksheet) may not be appropriate for all pollutant limits. There may be good reasons for handling pollutants differently. For example, the POTW may want to allocate loadings for a particular pollutant (for example mercury) over a smaller flow base. To do this, locate the column in the “Local Limits” spreadsheet that corresponds to that pollutant (column L for mercury), find the cell which contains the “default” information (row 15 for industrial flow), and change the cell (L15) to the desired value.

Note that after doing this, the link to the original cell will be lost. So changing the “default” value for this parameter in the “Basic Data” worksheet will no longer alter that cell’s value. The link can be restored by either consulting the original “template” spreadsheet or often by dragging the link from a cell adjacent to the left or right of the altered cell in the “Local Limits” worksheet.

You may also find that if you divide the available headworks loadings for a pollutant over the entire industrial flow base, you get a limit (applicable to all industries) that is not economically feasible for the industries which discharge the pollutant. Where you have monitoring that confirms certain high flow users are not discharging a pollutant, and you have a control mechanism which would prohibit them from starting to do so, then you can remove their flows from the flow base over which to divide the available loadings for that pollutant.

STEP 7: ENTER DATA IN THE CONVENTIONAL POLLUTANT TAB FOR BOD5, TSS, AND AMMONIA: The “NEWLL12” spreadsheet has a tab (“Conventional Poll Tool”) with some graphs for displaying and tracking loadings from different sources as a proportion of the POTW’s total capacity. The “NEWLL12-solutions.xlsm” spreadsheet shows how a POTW might use these to assess where they are with respect to their allowable loadings and set loading allocations from which they can sell capacity to SIU’s. Portioning out load allocations is a local decision, and thus this worksheet is primarily for the benefit of the local POTW. The POTW can divide their available loadings among industrial and domestic needs in any manner that assures their protection against an organic and hydraulic overload. Ecology expects the POTW will decide how much of its presently recognized loading capacity to earmark for domestic and industrial contributions, let Ecology know what these decisions are, and carefully manage its loadings within these constraints (in concert with Ecology). The POTW should describe what compensation is required for allotting an industry a flow and loading capacity (connection or capacity fees), and how payment for actual discharges (monthly bills) are assessed.

STEP 8: EVALUATE LIMITS FOR TOXIC OR EXPLOSIVE POLLUTANTS:

POTWs must develop limits for toxic or explosive pollutants to protect the public and their workers when such pollutants are likely to be discharged to them. The point of concern in such cases is where the discharge enters the public sewer system. So, unlike metals, setting limits for such pollutants doesn’t involve estimating and dividing up a “maximum allowable headworks loading”. The example spreadsheet shows a table with limits for protection against toxic and explosive gases. This summary table lists pollutants of concern for a particular POTW based on their industries. It has column for the threshold limits gleaned from each of the two larger reference tables (one for vapor toxicity, and one for explosivity), and a column for the proposed local limit (the more stringent). Looking up the threshold limits in the tables is fairly straight forward (and so we’ve tried to make these tables as large as possible). However, the process of developing limits “from scratch” requires a knowledge of the

equations contained in the spreadsheet that goes beyond this overview. In such cases, please read the 1992 EPA guidance manual “Guidance to Protect POTW Workers from Toxic and Reactive Gases and Vapors” Chapters 2-6 (50 pages total). Each Ecology regional office has a pretreatment engineer in the Water Quality program that can Email a scanned version of this manual to you.

STEP 9: COMPILE LIMITS AND SEND THE ANALYSIS, SPREADSHEET, AND PROPOSED ORDINANCE TO ECOLOGY FOR APPROVAL: To be legally defensible and have continuing utility, to author must document the thought process which the municipality uses to arrive at the limits it believes necessary to protect the POTW. The municipality should propose the local limits (with this supporting documentation) to Ecology. Important documentation includes:

- a. The overall strategy, including the sampling plan and data used.
- b. Site specific information used such as sample results, ambient (receiving water) data, harmful effects that may be from industries, and how to allocate the POTW’s loading capacities.
- c. Presumptions made based on the information available,
- d. Decisions reached about which pollutants to limit, and how to manage the available headworks loading capacity for each.
- e. The local limits which arose from the analysis.
- f. How the limits will be codified, and
- g. The triggers are for revisiting the local limits (e.g. increased loading by X% & every Y years).

Municipalities that are delegated to run pretreatment program must ensure that any revisions to their present local limits meets the requirements for program modifications described in federal rules at 40 CFR part 403.18. Municipalities required to develop local limits by their NPDES permit must follow the requirements for submittal of reports under that permit (e.g. signature, certification, content).

STEP 10: DEVELOP A PLAN FOR FILLING ANY DATA GAPS AND PERIODICALLY CONFIRMING THAT THE LIMITS PROVIDE THE NECESSARY PROTECTIONS TO THE POTW: The ongoing maintenance of the local limits is an important, but often overlooked task. The POTW should make a note of the MAHL (Maximum Allowable Headworks Loading). This value is found on the “Local Limits” worksheet tab row 73. A good way to monitor changes is to track the mass of the pollutant in influent samples (concentration in the influent times flow on the date of sampling) and how this number changes each year. This value is found in row 65 of this worksheet. If the loading being received at the POTW (indicated by sampling over the current year) increase in subsequent years, and the proportion of the MAHL is significant, the POTW should investigate further. They may find that further controls are needed, or more sampling from trunk lines or industries for that pollutant is needed to find new or changed discharges.

COMMON QUESTIONS ANSWERED:

CAN I DEVELOP LOCAL LIMITS WITHOUT SAMPLING DATA?: The spreadsheet has a “default” mode that can be used where there is no sampling data, (in such case, just enter “N” in “Basic Data” rows 35, 38, and 39.) Such limits are better than nothing, but may meet the “technically based” standard, or fully protect the POTW. Therefore, such an approach should only be used as a stopgap measure or last resort. In this mode, the “Local Limits” worksheet calculates limits based upon assumed “typical” wastewater strengths and “typical” removal efficiencies. However, this doesn’t guarantee that the resultant local limits are

protective of any particular POTW. Because each POTW is different, Ecology advises ALWAYS using site specific sampling data and removal rates. The minimum recommended data set is eight (8) sample results (recommended regime is two consecutive days for four consecutive quarters).

HOW DO I HANDLE “NON-DETECT” DATA (in the “Sample Data” Worksheet): It often happens that metals are not detectable in the influent and/or effluent at a level that the laboratory is comfortable quantifying. How this situation is handled is critical to avoid skewing the data. The ideal situation is to avoid the situation altogether, which is why the most sensitive methods of sampling should always be used for initial sampling and less sensitive methods only used if initial sampling shows that a less sensitive method will do fine. For ambient monitoring, use of sensitive methods is doubly important because of the low concentrations anticipated. To obtain the best data and prevent false positive results, EPA has developed Method 1669 for sample collection at these low levels. This sample method also lists the appropriate companion “clean sample” analysis methods.

If you can’t avoid non-detects, here is how we suggest you handle them: When most of the data points (2/3 or more) produce quantifiable values in a data set, Ecology recommends considering the “non-detect” data points to be at the detection limit. Where a good share (1/3 to 2/3) of the data are “non-detect”, Ecology recommends presuming these values are ½ the detection limit. Where most of the data is non-detects (2/3 or more), it makes sense to try to find a more sensitive method. If you already were using the most sensitive method, Ecology recommends considering these to be “0” for purposes of developing local limits. Where both the influent and effluent values are “0” Ecology recommends throwing out the data point (not entering it in the spreadsheet at all). When over 2/3 of the influent and effluent data is “non-detect” and there is a biosolids standard, you may wish to consider only that data. The spreadsheet estimates a local limit using the allowable proportional increase in biosolids as a measure of appropriate local limits. The results of this method of calculating local limits is shown on row 70 of the “Local Limits” spreadsheet “Limit Using Proportional Biosolids Increase”.

In documenting the results of samples analyzed in order to develop local limits, describe how you decided to handle “non-detects”. Also, consider modifying the sample collection plan if, in initial sampling, neither influent or effluent concentrations are detected. In such cases conduct subsequent sampling using a more sensitive method if possible. Where you switch to a more rigorous sampling and analysis protocol, it often makes sense to discard the previously collected data. In such cases, simply document this rationale.

DO I NEED TO BE CONCERNED THAT THE LIMITS ARE TOTAL METALS WHILE THE CRITERIA ARE FOR DISSOLVED METALS?: The “Sample Data” and “Local Limits” worksheets presume effluent limits for all metals except hexavalent chromium are expressed as total metals limits. This is because typically the limits on the POTW will be expressed as total metals as well due to the inability to predict with confidence what changes to the ions will occur after discharge to the receiving environment. Typically hexavalent chromium limits are achievable when imposed as a total chromium limit. This is a conservative approach and saves doing both a hex-chrome and total chrome sample analysis.

The workbook can develop limits for metals or other pollutants for which a water quality standard applies to a specific form or ion. This is how standards for tri-butyl tin are implemented. Dissolved standards apply to Cadmium, Copper, Lead, Nickel, Silver, and Zinc, while Cyanide has a similar “weak and disassociable” standard, however rules for permitting presently require metals limits for these metals to be for the total metal. Therefore local limits reflect this permitting methodology in establishing local limits as “Total metal” limits.

The process of developing a local limit supportive of a “dissolved” standard requires only sampling for the dissolved form. Enter the dissolved metal concentrations from influent and effluent sampling (and ambient monitoring) in the “Sample Data” worksheet instead of total metals.

DO I NEED MONTHLY AS WELL AS DAILY LOCAL LIMITS?: This program calculates only daily limits. It uses the formulas in EPA’s Technical Support Document for Water Quality based limits to derive daily limits that are protective of the WQ standards that would apply to an NPDES permit. Because a POTW with a toxic pollutant limit would have a daily limit, protection of violation of this daily limit with daily pretreatment standards is appropriate. Since some samples must be taken as grab samples (pH, O&G, Cyanide, Phenols), the Ordinance should clarify whether all grab samples are subject to local limits. Some Approval Authorities (States and EPA regions) have been proponents of also deriving and codifying monthly limits in addition to daily limits. In such cases, the POTW would have to presume some frequency of monitoring to apply this to the Users.

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Section II - Equations Used to Determine Local Limits

GENERAL: Determining local limits by manual calculations is a multiple-step process. A spreadsheet, however, displays the results instantaneously based on the data entered. Therefore, it is important to enter all data before reviewing the answers yielded by this spreadsheet. Four of the spreadsheets are linked so data is transferred between them. These are “Basic Data”, “Sample Data”, “POTW Limits”, and “Local Limits”. The “Local Limits” worksheet receives key information used to derive local limits from the first three listed worksheets. Data comes from the “Basic Data” worksheet (rows 3, 5, 7, 9, 13-21, 50-54, and 78), the “POTW Limits” worksheet (rows 24-26), and the “Sample Data” worksheet (rows 33-34, 37-39, 42-43). The “Local Limits” spreadsheet shows few intermediate calculations. It derives a local limit based on compliance with several criteria (rows 54-60), displays the lowest limit to line 77, subtracts the desired reserve (from Basic Data cell C40), and displays the result in line 78.

The spreadsheet uses the “Uniform Allocation Method” to derive local limits by uniformly distributing the allowable headworks loadings among the industrial flow base shown in “Local Limits” row 15. This value comes from “Basic Data” line 26 “Industrial Flow” by default, but for metals for which there are fewer sources, the industrial flows contributing a particular pollutant may be reduced for a specific pollutant. This alternative method of establishing local limits is known as the “contributing flows” methodology. In describing the rationale for the limits, you will need to describe which methodology was used, and the basis for the flows used. The contributing flows method is defensible when the POTW has collected sample data from users which are not included in the flow base for a particular pollutant. The sample data needs to confirm that non-domestic dischargers other than those that comprise the flow base for this pollutant are NOT discharging the pollutant above domestic levels.

Another way to allocate available industrial loadings is on a mass basis. EPA promotes the use of mass based limits in their 2005 pretreatment streamlining rule, and the concept is gaining favor by aligning water conservation efforts with pretreatment oversight. This version (11) displays the loadings coming into and out of the POTW in rows 65-67, and the Maximum Allowable Industrial Loading (MAIL) on “Local Limits” row 74. This value would form the basis for a mass based allocation scheme. Applicable EPA manuals provide greater detail on how to develop mass based local limits. The POTW should properly document their methodology if pursuing this alternative. Understand, however, that mass based limits will require greater maintenance. Accordingly, Ecology will want to see, in proposals contemplating the use of mass-based limits, who will maintain these limits, how frequently they will be reviewed, and how the sufficiency of these limits will be evaluated.

Formulas 1-3: Maximum Allowable Headworks Loadings (MAHL) for compliance with Water Quality criteria, Activated Sludge Inhibition, and Anaerobic Digester Inhibition.

In order to determine compliance with Water Quality Standards (and hence NPDES Permit limits), the spreadsheet uses several equations to determine the Maximum Allowable Headworks Loading (MAHL). The MAHL is the maximum loading of the pollutant which the POTW can accept and still maintain compliance with each of these criteria. EPA Guidance lists the following formula as appropriate for this purpose:

EPA Formula: $L_{IN} = (8.34) * [C_{CRIT} (Q_{STR} + Q_{POTW}) - (C_{STR} * Q_{STR})] / (1 - R_{POTW})$

Where:

L_{IN} = Allowable Influent Loading or Maximum Allowable Headworks Loading (MAHL)

C_{CRIT} = Water Quality Standard in mg/l (either acute or chronic standard)

Q_{STR} = Receiving stream (upstream) flow, in MGD

Q_{POTW} = Flow into the POTW, in MGD

C_{STR} = Receiving stream background level, mg/l

R_{POTW} = Removal efficiency across the POTW, as a decimal

HOWEVER, EPA's formula presumes the discharge is allowed to bring the entire receiving stream up to the point where it is at the criteria. Washington's water quality standards only allow using a fraction of the receiving stream for dilution. So, to use this equation in Washington, we must replace Q_{STR} with Q_{POTW} multiplied by the acute or chronic mixing zone ratios (AMZR, or CMZR). Often, however, it is the "Dilution Factor" which is listed. These numbers are related. The mixing zone ratio is the dilution factor minus 1. Therefore, the AMZR = Acute Dilution Factor - 1 ($DF_A - 1$) and CMZR = Chronic Dilution Factor - 1 ($DF_C - 1$). The equation can also be expressed in terms of loadings:

(Influent loading capacity) = conversion factor * [(maximum loading) - (background loading)]
(proportion passing through the POTW)

Expanding the equation: $L_{IN} = [(8.34) * C_{CRIT} (Q_{STR} + Q_{POTW}) - (8.34) * (C_{STR} * Q_{STR})] / (1 - R_{POTW})$

replacing $L_{IN} = [(8.34) * (C_{CRIT}) * (Q_{POTW} * (ADF - 1) + Q_{POTW}) - (8.34) * (C_{STR} * Q_{POTW}) * (ADF - 1)] / (1 - R_{POTW})$

reducing yields for acute(a) and chronic(c) standards:

$1. L_{INa,c} = (8.34 * Q_{POTW}) * (C_{CRIT} * DF_{A,C} - C_{STR} * (DF_A - 1)) / (1 - R_{POTW})$
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Where the POTW has been given an effluent limit for a pollutant, the process of deriving the limit will already have accounted for the dilution ratios and background concentrations. Therefore, using an effluent limit is numerically much easier. Previously, there was a separate column for entering any POTW effluent limits. That was the subject for a lot of confusion. Here is what to do if the POTW has an effluent limit: Look in the "Local Limit" spreadsheet. Find the column for the pollutant. Check rows 24-26 to see if any of these three values is blank. If so, enter the POTW limit in that blank space, and enter the value of 1.0 for mixing zone ratio for that parameter. For example, if the POTW has a copper limit of .02 mg/l, enter .02 in cell J26 and 1 in cell J19. The corresponding local limit will appear in rows 57-59 of the Local Limits worksheet (depending on whether the POTW limit was substituted for the acute, chronic, or WQ criterion respectively). Mathematically, when using a value of 1.0 for the dilution factor, the allowable headworks loading is:

$$2. L_{INt} = (8.34 * Q_{POTW}) * (TSDVAL) / (1 - R_{POTW})$$

The following cross references show the terms using the labels used in the LOCLIM.xls spreadsheet visual basic code (as used in section IV).

DFa = ACUTEDF (Acute Dilution Factor)

DFc = CHRONDF (Chronic Dilution Factor)

QPOTW = POTWFLOW (The Flow coming into the POTW)

C_{CRIT} = ACUTELIM or CHRONLIM (Acute or Chronic Criteria depending on the case)

C_{STR} = BGCON (or “0” if BGLOAD = “N”) (Background Concentration)

R_{POTW} = ACTREMRT (or BOOKREMRT if USEACTREM = “N”) (Removal rate of the pollutant between the influent and effluent of the POTW)

TSDVAL = The equivalent effluent limit considering the desired confidence level, statistical variability, and mixing zone ratios. This number comes from the NPDES permit for the POTW.

Activated Sludge and Anaerobic Sludge Digester Inhibition levels: The following equation established the maximum allowable headworks loading for ensuring that the biological processes used in activated sludge / anaerobic sludge digestion processes are not disrupted and is based upon the minimum reported threshold inhibition levels.

Protection against activated sludge inhibition is important for the vast majority of POTWs which use a suspended bacteria population for treatment (including Membrane Bio-Reactors). Secondary treatment plants such as trickling filter, biological contactors, and fixed film treatment systems may be more or less sensitive to specific pollutants. If you have such a plant, enter “O” for Other on Type of Plant, or disregard the resultant limits for protection of activated sludge processes.

Equation 3: This equation calculates the influent loading at the inhibition threshold. Since activated sludge processes aren’t exposed to solids removed in the primary clarifier, the primary removal rate establishes the proportion of the influent loading that is seen in the secondary processes. If the POTW does not have primary clarifiers, a primary removal rate of 0% should be used in this equation. If you enter, in “Sample Data”, the same values in sample #1 for influent and primary clarifier effluent, this will show a 0% primary removal rate and it will pass this value to the Local Limits worksheet.

$$3. L_{IN(as, ad)} = \frac{8.34 * (C_{INH(as, ad)} * Q_{POTW})}{1 - R_{PRIM}}$$

Where: $L_{INas,ad}$ = The maximum headworks loading which still protects against interference with activated sludge or anaerobic digester processes.
 $C_{INH(ad)}$ = ADINHLIM; the influent concentrations corresponding to possible anaerobic sludge digestion inhibition.
 $C_{INH(as)}$ = ASINHLIM; the influent concentration corresponding to possible activated sludge process inhibition.
 R_{PRIM} = ACTPRIM or BKPRIM if USEPRIREM = "N". This is the percentage of the pollutant that is removed across the primary clarifier (primary removal rate).

Equation 4: This equation converts the respective maximum allowable headworks loadings to equivalent Local Limits. It subtracts the domestic loading and then divides it by the industrial flows:

$4. LL_{(a, c, h, ad, or as)} = (L_{IN(a,c,t, ad, or as)} - 8.34*(C_{DOM})*(Q_{POTW} - Q_{IND})) / (Q_{IND} * 8.34)$
--

Where: C_{DOM} = Domestic concentration of the pollutant. Value assigned by the spreadsheet is:

C_{DOM} = AVEINFCON if USESAMDOM = "Y" and EXISTSOURCE = "N";
 C_{DOM} = EQDOMCON if USESAMDOM = "Y" and EXISTSOURCE = "Y"; and
 C_{DOM} = BOOKDOMCON when USESAMDOM = "N".

Q_{IND} = INDFLOW

$LL_{(a, c, t, ad, or as)}$ = The local limit (in mg/l) obtained by dividing the available headworks capacity (in lbs) by pounds of industrial flow for either (a)cute, (c)hronic, or (h)uman health based limits. This limit is calculated in this manner for Acute, Chronic, and TSD limits.

Equation 5: The equations for deriving the maximum allowable headworks loadings and Local Limits based upon protecting beneficial biosolids uses were derived using the two methods described in this section (below). These formulas, (5-8), make the most of available biosolids data which is ideal for developing limits for the protection of biosolids uses. As an added bonus, it allows the calculation of limits for non-conservative pollutants. The default way to calculate compliance with sludge limits is to presume that pollutants that are not exiting in the effluent are in the sludge. Using actual sludge concentrations is a more defensible approach and allows this spreadsheet to work for non-conservative pollutants as well. For reference, for protection of sludge quality, the EPA Local Limits manual uses the following formulas:

For Conservative pollutants:

For Non-Conservative pollutants*:

$5a. L_{HW} = \frac{(8.34)*(C_{SLCRIT})*(PS/100)*(Q_{SLDG})}{R_{POTW}}$	$L_{HW} = L_{INF} * \frac{C_{SLCRIT}}{C_{SLDG}}$
---	--

Where: L_{HW} = Allowable influent loading, lbs/d
 C_{SLCRIT} = Sludge disposal criterion, mg/kg dry sludge
PS = Percent solids of sludge to disposal
 Q_{SLDG} = Sludge flow to disposal, MGD
 R_{POTW} = Removal efficiency across the POTW as a decimal
 L_{INF} = POTW influent pollutant loading, lbs/d
 C_{SLDG} = Pollutant level in sludge to disposal, mg/kg dry sludge

Sludges tend to “cook down” during digestion, and it’s the final concentration after digestion that is limited. Because of this, the wasting rate (Q_{SLDG}) is not the best representation of the mass of “final” sludge sent to disposal. To improve accuracy, we can substitute the dry sludge production rate in tons per day times a conversion factor (.002) for the sludge wasting rate. (Note, “.002” = 2,000 lb/ton divided by 1,000,000 ppm). This makes the same formula:

$$5b. L_{IN} = \frac{(C_{SLCRIT}) * (.002) * (Q_{DRYSLDG})}{R_{POTW}}$$

Where:

C_{SLCRIT} = SLCONLIM, This is the concentration limit which the sludge must meet in parts per million. This value changes depending on whether the user chooses to meet “Unrestricted” or “Ceiling Level” sludge metals concentrations. It uses the concentration limits found in 40 CFR part 503 and 173-308-160 WAC tables 1 & 3.

$Q_{DRYSLDG}$ = SLPRODRT, This is the rate at which sludge is produced in U.S. tons per day on a dry weight basis. This data needs to correspond to the average POTW flow entered for the results to be meaningful. In the absence of any site specific data, the program will suggest, just to the right of “basicdata” cells 31C&32C, a value that corresponds to 300 mg/l of sludge production times the influent flow rate (MGD) times 8.34 lb/gallon divided by 2000(lb/ton). This yields an answer in tons/day that is typical for many POTWs. If the value used is less than half or more than double the value suggested, please check it closely.

R_{POTW} = ACTREMRT (or BOOKREMRT if USEACTREM = “N”) This is the average overall removal rate of pollutants through the entire POTW. This value is either the average as shown from sampling, or is taken from EPA estimates of average removal rates depending on how limits are selected to be computed.

Equation 6 – Estimate of the Current Headworks Loading Implied by Biosolids Data

$$6. L_{CHW} = \frac{(C_{SL}) * (.002) * (Q_{DRYSLDG})}{R_{POTW}}$$

L_{CHW} = Current Headworks Loading as indicated by sampling (row 66 of “Local Limits”)

C_{SL} = SLCON; This is the average level of the pollutant in the sludge. When using sample data to compute local limits, this value will be the average sludge concentration. Otherwise, this value is 500 times the product of the book domestic concentrations, the book removal rate, and the total POTW flow divided by the dry sludge production rate. By this method, when multiplied out, the terms cancel out and the current headworks loading becomes equal to the book domestic concentration times the POTW flow (as in the previous equations).

Equation 7 – Crediting the Present Loadings of Existing Sources (“Credit Present Loading of Existing Sources (Y/N)” = Y) This equation reduces the influent concentration by an amount consistent with the industrial flows and concentration. The domestic concentration (row 25 of

Local Limits) is reduced when “Y” is entered in row 51. Otherwise it’s simply the average influent level (row 38) or .

$$7) C_{EQDOM} = \frac{(Q_{POTW} * C_{INF}) - (Q_{IND} * C_{IND})}{Q_{POTW} - Q_{IND}}$$

C_{EQDOM} = EQDOMCON: The equivalent domestic concentration after removing industrial flows and loadings from the headworks flow and loadings.

C_{INF} = AVEINFCON: The influent concentration at the POTW as determined by sampling.

C_{IND} = INDCON; The average concentration of industrial wastewater (“Sample Data” row 10).

When blank, the current industrial load will be presumed 0. This can lead to lower local limits that necessary. In systems with several users, use the flow weighted average concentration.

Equation 8 – Estimating Local Limits (the below equation shows the formula based on protection of sludge quality) (“Local Limits” row 60). Local limits for protection against WQ criteria or inhibition are not shown, but use the same general methodology:

$$8) LL_{SL} = \frac{L_{IN} - (L_{CHW} - L_{IND})}{Q_{IND} * 8.34}$$

LL_{SL} = local limits for sludge protection

L_{IN} = Maximum Allowable Headworks Loading (see equations 5a and 5b)

L_{CHW} = current headworks loading (see equation 6)

L_{IND} = industrial loading (= $C_{IND} * Q_{IND}$)

Q_{IND} = industrial flow base

Section III – Visual Basic Formulas Used to Determine Local Limits

VISUAL BASIC FORMULAS: This section shows the visual basic codes for seven functions (one on each page) that translate the above formulas into the format used by Excel®'s Visual Basic Translator. The functions each return the Local Limit that equates to protection of the POTW for one of the seven criteria. These formulas involve more than simply translating the above formulas because they allow the user several computational options. These include the option to use data from sampling, compensate for the fact that there are existing users that are discharging already, use removal rates from sampling, etc. The use of conditional branching dictates a number of simple intermediate code steps (which could be done in the Excel spreadsheet) or a more comprehensive visual basic statement. This spreadsheet uses the latter option for the more complex code.

To view or edit these formulas open the Excel Workbook and then click on the “Tools” menu and pull the mouse arrow down to “Macro” and then from the six options select “Visual Basic Editor”. The Visual basic editor window will then open up. If you don't have within this a smaller window that says “Project - Newll6.xlw”, then within the Visual basic editor screen click on the “View” menu and then select “Project Explorer”. Click “Newll6.xls” to open the project, and double click on “Function” to open up the function module where the code resides. You may now edit the functions and when you exit if you save the worksheet, your work will be saved.

Function Acute(POTWFLOW, DOMFLOW, INDFLOW, ACUTEDF, ACUTELIM, ESTINDUSCON, BGCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, INCLBGCON, USEACTREM)

If ACUTELIM = "NA" Then
Acute = "NA"
GoTo 90
End If

If USESAMDOM = "Y" Or USESAMDOM = "y" Then
GoTo 20
Else
GoTo 30
End If

20 If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
DOMCON = EQDOMCON
GoTo 40
Else
DOMCON = AVEINFCON
GoTo 40
End If

30 DOMCON = BOOKDOMCON

40 If INCLBGCON = "Y" Or INCLBGCON = "y" Then
BGLOAD = (ACUTEDF - 1) * BGCON
Else
BGLOAD = 0
End If

50 If USEACTREM = "Y" Or USEACTREM = "y" Then
REMRATE = ACTREMRT
Else
REMRATE = BOOKREMRT
End If

60 $MAXACUTELOAD = (8.34 * POTWFLOW * (ACUTEDF * ACUTELIM - BGLOAD)) / (1 - REMRATE)$

70 $CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)$

80 If MAXACUTELOAD <= 0 Then
Acute = 0
Else
Acute = (MAXACUTELOAD - CURRENTLOAD) / (INDFLOW * 8.34)
End If

90
End Function

Function Chronic(POTWFLOW, DOMFLOW, INDFLOW, CHRONDF, CHRONLIM, ESTINDUSCON, BGCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, INCLBGCON, USEACTREM)

```
If CHRONLIM = "NA" Then
  Chronic = "NA"
  GoTo 90
End If
```

```
If USESAMDOM = "Y" Or USESAMDOM = "y" Then
  GoTo 20
Else
  GoTo 30
End If
```

```
20  If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
    DOMCON = EQDOMCON
    GoTo 40
  Else
    DOMCON = AVEINFCON
    GoTo 40
  End If
```

```
30  DOMCON = BOOKDOMCON
```

```
40  If INCLBGCON = "Y" Or INCLBGCON = "y" Then
    BGLOAD = (CHRONDF - 1) * BGCON
  Else
    BGLOAD = 0
  End If
```

```
50  If USEACTREM = "Y" Or USEACTREM = "y" Then
    REMRATE = ACTREMRT
  Else
    REMRATE = BOOKREMRT
  End If
```

```
60  MAXCHRONLOAD = (8.34 * POTWFLOW * (CHRONDF * CHRONLIM - BGLOAD)) / (1 - REMRATE)
```

```
70  CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)
```

```
80  If MAXCHRONLOAD <= 0 Then
    Chronic = 0
  Else
    Chronic = (MAXCHRONLOAD - CURRENTLOAD) / (INDFLOW * 8.34)
  End If
```

```
90
End Function
```

Function TSDlim(POTWFLOW, DOMFLOW, INDFLOW, CHRONDF, TSDVAL, ESTINDUSCON, BGCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, INCLBGCON, USEACTREM)

```
If TSDVAL = "NA" Then
  TSDlim = "NA"
  GoTo 90
End If
```

```
If USESAMDOM = "Y" Or USESAMDOM = "y" Then
  GoTo 20
Else
  GoTo 30
End If
```

```
20  If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
    DOMCON = EQDOMCON
    GoTo 40
  Else
    DOMCON = AVEINFCON
    GoTo 40
  End If
```

```
30  DOMCON = BOOKDOMCON
```

```
40  If INCLBGCON = "Y" Or INCLBGCON = "y" Then
    BGLOAD = 0
  Else
    BGLOAD = 8.34 * (CHRONDF - 1) * BGCON * POTWFLOW
  End If
```

```
50  If USEACTREM = "Y" Or USEACTREM = "y" Then
    REMRATE = ACTREMRT
  Else
    REMRATE = BOOKREMRT
  End If
```

```
60  MAXTSDLOAD = (8.34 * ((TSDVAL * POTWFLOW) + BGLOAD)) / (1 - REMRATE)
```

```
70  CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)
```

```
80  If MAXTSDLOAD <= 0 Then
    TSDlim = 0
  Else
    TSDlim = (MAXTSDLOAD - CURRENTLOAD) / (INDFLOW * 8.34)
  End If
```

```
90
End Function
```

Function Sludge(TYPELIM, POTWFLOW, INDFLOW, SLPRODRT, CLASACON, CEILCON, ESTINDCON, EQDOMCON, BOOKDOMCON, AVESLCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, INCLBGCON, USEACTREM)

10 If CEILCON = "NA" Then
 Sludge = "NA"
 GoTo 110
End If

15 If USESAMDOM = "Y" Or USESAMDOM = "y" Then
 DOMCON = EQDOMCON
 SLCON = AVESLCON
 HWCON = AVEINFCON
 Else
 DOMCON = BOOKDOMCON
 SLCON = (8.34 * 1000000 * BOOKDOMCON * BOOKREMRT * POTWFLOW) / (SLPRODRT * 2000)
 HWCON = BOOKDOMCON
 End If

20 If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
 INDCON = ESTINDCON
 Else
 INDCON = 0
 End If

30 If TYPELIM = "A" Or TYPELIM = "a" Then
 SLCONLIM = CLASACON
 Else
 SLCONLIM = CEILCON
 End If

40 INFLOAD = 8.34 * POTWFLOW * HWCON

50 MAXSLLOAD = (SLCONLIM * SLPRODRT * 0.002)

60 CURRSLLOAD = SLCON * SLPRODRT * 0.002

70 DOMLOAD = 8.34 * POTWFLOW * DOMCON

80 If USEACTREM = "Y" Or USEACTREM = "y" Then
 REMRATE = CURRSLLOAD / INFLOAD
 Else
 REMRATE = BOOKREMRT
 End If

90 If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
 INDSLLOAD = CURRSLLOAD * ((INDFLOW * INDCON) / ((INDFLOW * INDCON) + (POTWFLOW * DOMCON)))
 Else
 INDSLLOAD = 0
 End If

100 If MAXSLLOAD <= 0 Then
 Sludge = 0
 Else
 Slhwload = (MAXSLLOAD - (CURRSLLOAD - INDSLLOAD)) / REMRATE
 Sludge = Slhwload / (INDFLOW * 8.34)
 End If

110 End Function

Function ASInhib(POTWTYPE, POTWFLOW, INDFLOW, ASINHLIM, ESTINDCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTPRIREM, BKPRIREM, USESAMDOM, EXISTSOURCE, USEPRIREM)

```
2  If ASINHLIM = "NA" Then
    ASInhib = "NA"
    GoTo 100
End If

5  If POTWTYPE = "A" Or POTWTYPE = "a" Then
    GoTo 10
Else
    ASInhib = "NA"
    GoTo 100
End If

10 If USESAMDOM = "N" Or USESAMDOM = "n" Then
    GoTo 30
End If

20 If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
    DOMCON = EQDOMCON
Else
    DOMCON = AVEINFCON
End If
GoTo 40

30  DOMCON = BOOKDOMCON

40  If USEPRIREM = "Y" Or USEPRIREM = "y" Then
    REMRATE = ACTPRIREM
Else
    REMRATE = BKPRIREM
End If

MAXASLOAD = (8.34 * ASINHLIM * POTWFLOW) / (1 - REMRATE)

CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)

90  If MAXASLOAD <= 0 Then
    ASInhib = 0
Else
    ASInhib = (MAXASLOAD - CURRENTLOAD) / (INDFLOW * 8.34)
End If

100 End Function
```

Function Digstor(DIGTYPE, POTWFLOW, INDFLOW, DIGFLOW, ADINHLIM, ESTINDUSCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, USEACTREM)

```
2  If ADINHLIM = "NA" Then
    Digestor = "NA"
    GoTo 100
End If

5  If DIGTYPE = "Y" Then
    GoTo 10
Else
    Digestor = "NA"
    GoTo 100
End If

10 If USESAMDOM = "N" Or USESAMDOM = "n" Then
    DOMCON = BOOKDOMCON
    GoTo 40
End If

20  If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
    DOMCON = EQDOMCON
    GoTo 40
    Else
    DOMCON = AVEINFCON
    GoTo 40
    End If

40  If USEACTREM = "Y" Or USEACTREM = "y" Then
    REMRATE = ACTREMRT
    Else
    REMRATE = BOOKREMRT
    End If

60  MAXDIGLOAD = (8.34 * ADINHLIM * DIGFLOW) / REMRATE

70  CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)

90  If MAXDIGLOAD <= 0 Then
    Digestor = 0
    Else
    Digestor = (MAXDIGLOAD - CURRENTLOAD) / (INDFLOW * 8.34)
    End If

100 End Function
```

Function HHealth(POTWFLOW, DOMFLOW, INDFLOW, HHlthDF, HHlthLIM, ESTINDUSCON, BGCON, EQDOMCON, BOOKDOMCON, AVEINFCON, ACTREMRT, BOOKREMRT, USESAMDOM, EXISTSOURCE, INCLBGCON, USEACTREM)

```
If HHlthLIM = "NA" Then
  HHealth = "NA"
  GoTo 90
End If
```

```
If USESAMDOM = "Y" Or USESAMDOM = "y" Then
  GoTo 20
Else
  GoTo 30
End If
```

```
20 If EXISTSOURCE = "Y" Or EXISTSOURCE = "y" Then
  DOMCON = EQDOMCON
  GoTo 40
Else
  DOMCON = AVEINFCON
  GoTo 40
End If
```

```
30 DOMCON = BOOKDOMCON
```

```
40 If INCLBGCON = "Y" Or INCLBGCON = "y" Then
  BGLOAD = (HHlthDF - 1) * BGCON
Else
  BGLOAD = 0
End If
```

```
50 If USEACTREM = "Y" Or USEACTREM = "y" Then
  REMRATE = ACTREMRT
Else
  REMRATE = BOOKREMRT
End If
```

```
60 MAXHHLOAD = (8.34 * POTWFLOW * (HHlthDF * HHlthLIM - BGLOAD)) / (1 - REMRATE)
```

```
70 CURRENTLOAD = 8.34 * DOMCON * (POTWFLOW - INDFLOW)
```

```
80 If MAXHHLOAD <= 0 Then
  HHealth = 0
Else
  HHealth = (MAXHHLOAD - CURRENTLOAD) / (INDFLOW * 8.34)
End If
```

```
90 End Function
```

Section IV - Detailed Explanation of the Spreadsheet:

“Basic data” tab

Rows 14-17 which list the name of the facility, contact, data entry person, and reviewer are self explanatory.

Rows 19-22 (below) as described below are translated to “Local limits” rows 2-5

Name of Facility: _____		(self explanatory)
Point of Contact: _____		
Person Entering Data: _____		
Reviewer: _____		
GENERAL INFORMATION:		
Receiving Water Hardness (if fresh)	19	<----- Number must be between 25 and 400
(M)arine, (F)resh, or (B)oth Discharges	20	<----- Enter only letters "M", "F", or "B"
Sludge: Class A (A) or (C)eiling level	21	<----- Enter only letters "A" or "C"
Plant: (A)ctivated sludge or (O)ther	22	<----- Enter only letters "A" or "O"

Cell C19:

- ENTER: The hardness of the receiving water immediately upstream of the discharge.
- IMPORTANCE: Several freshwater metals standards vary based on the receiving water hardness.
- HOW DETERMINED: Hardness varies with flow volume and season. If known, enter the hardness at the critical flow condition (90th percentile value of data set for the critical season). Receiving water hardness is typically higher at the critical low flow condition, and pollutants limits are lower at lower hardness values.
- HOW USED: This data is passed to a spreadsheet which computes the actual water quality limits for the receiving water, which are returned to lines 19 and 20.

Cell C20:

- ENTER: The receiving water type based on salinity.
- IMPORTANCE: Water quality limits for metals differ for fresh water and salt water.
- HOW DETERMINED: Enter “F” for receiving water salinity at or below 1 part per thousand 95% of the time. Enter “M” when receiving water salinity is at or above 10 parts per thousand 95% of the time. Enter “B” if the receiving water salinity falls between these two standards.
- HOW USED: This information is passed to a spreadsheet which along with the information in box 1 returns the appropriate water quality standard. For “B” discharges, the lower limit is returned.

Cell C21:

- ENTER: Whether potential sludge use and/or disposal might requires the sludge to meet class A biosolids metals concentrations (unrestricted use a.k.a Exceptional Quality or EQ) or ceiling level concentrations (for loading based applications). Refer to 40 CFR part 503 and WAC 173-308-160 for more information.
- IMPORTANCE: Local limits must be protective of the intended beneficial uses of biosolids. Since the standards vary depending on the intended biosolids use, this box allows the use to be input.
- HOW DETERMINED: Based upon the POTW’s biosolids management plan, or other related biosolids use plan or permit issued pursuant to 40 CFR part 503.
- HOW USED: The data input here selects whether line 24 (class A standards) or line 25 (ceiling concentration standards) is used in developing local limits protective of biosolids uses.

Cell C22:

- ENTER: Whether the plant is activated sludge “A” or something else “O”.
- IMPORTANCE: This is used to determine whether local limits must also protect against activated sludge inhibition.
- HOW DETERMINED: If you are unsure, contact the POTW or review the facility engineering report.
- HOW USED: In Part VII an “Activated Sludge Inhibition” local limits value is returned if box 4 is “A”.

“Basicdata” Rows 12-20 (below) are translated to “Loclimit.xls” rows 9-17, but may be edited for particular pollutants

Total Plant Flow (in MGD)	C24	<----- For flows typically the most critical situation (one that yields the lowest local limits) is the lowest flow month, but run several scenarios if there is any doubt. Adopt the lowest limits.
Domestic Flow (in MGD)	C25	
Industrial Flow (in MGD)	C26	
Infiltration/Inflow (by subtraction)		<----- The program calculates this value
Acute Dilution Factor	C28	<----- From NPDES Permit Fact Sheet
Chronic Dilution Factor	C29	<----- From NPDES Permit Fact Sheet
Dilution Factor for Human Health Based WQ	C30	<----- Enter Chronic DF if not otherwise determined
Digester Flow (in MGD)	C31	<----- recommend: 0.015 MGD @ 2% solids
Dry Sludge Production Rate (US Tons/day)	C32	<----- recommend: 1.251 T/D

Cell C24:

- ENTER: The average dry weather monthly POTW flow
- IMPORTANCE: Local limits are based upon the available headworks loadings for non-domestic dischargers. When POTW flows at critical conditions are entered, the local limits will protect the POTW from pass through when these conditions occur.
- HOW DETERMINED: Flow volume varies seasonally. If known, enter the average POTW flow during low flow months. When doing a “what if” analysis for determining limits when POTW flow reaches design flow, ensure that Industrial flows are appropriately increased as well.
- HOW USED: This flow volume is used to determine the maximum headworks loadings that can enter the POTW based upon protection of water quality, interference, and sludge protection.

Cell C25:

- ENTER: The domestic flows which correspond to the POTW flow entered in box 1.
- IMPORTANCE: Accurately partitioning POTW flows into Domestic, Industrial, and I&I is important since each has a different level of pollutants. I&I flows are assumed to not have pollutant loadings. If this is known or suspected to be the case, include I&I flows as domestic flows.
- HOW DETERMINED: The lowest flow period at the POTW during the last year, (assuming negligible I&I) minus industrial sources should closely approximate the current domestic loading.
- HOW USED: The headworks loading from domestic sources is based on this number times the domestic pollutant concentration (known or assumed), and a conversion factor (pounds per gallon) to produce a loading in pounds. The available headworks loading is reduced by this amount to yield the headworks loading available for non-domestic sources.

Cell C26:

- ENTER: The total of all known or Permitted non-domestic flow rates.
- IMPORTANCE: This establishes the flow over which to divide the available headworks loading for each pollutant. Local limits are protective for this volume of industrial discharge of each pollutant.
- HOW DETERMINED: Discharge permits typically include discharge flow and specific pollutant limits. Use each industry’s maximum permitted flow rate even if industries typically discharge at less than this level unless provisions limiting the discharge during critical periods for the POTW. This number may be entered separately for each pollutant (for limits based on contributory flow). For example: if only one industry discharges Cadmium, this box in the Cadmium column may contain only this discharger’s flow volume. The resulting local limit would be protective of the POTW only when this was the only source of Cadmium, and if/when another User began discharging Cadmium, the limit would no longer be protective of the POTW.
- HOW USED: This variable is used by the functions which compute local limits as the volume of flow over which available headworks loading is divided.

Cell C28:

- ENTER: Acute Dilution Factor
- IMPORTANCE: In determining water quality based limits, this factor determines the amount of dilution afforded at the point where the effluent must meet acute water quality standards.
- HOW DETERMINED: The NPDES Permit for the POTW will specify this number. In new construction, or increased flow over previous permits, the Department will develop this number.
- HOW USED: This number is combined the acute water quality limit on the first line of part III and the background concentration to derive the maximum allowable pollutant concentration in the effluent which the POTW must meet.

Cell C29:

- ENTER: Chronic Dilution Factor
- IMPORTANCE: This factor determines the amount of dilution afforded to the effluent at the point where it must meet chronic water quality standards.
- HOW DETERMINED: This number, like the acute dilution factor, is determined by the NPDES permit writer using computer modeling. It is technically the inverse of the percent of the effluent in the stream flow at the edge of the mixing zone during critical (7Q10) conditions.
- HOW USED: The use of this number is analogous to how the acute dilution factor (above) is used.

Cell C30:

- ENTER: Chronic Dilution Factor
- IMPORTANCE: This factor determines the amount of dilution afforded to the effluent at the point where it must meet quality standards for protection of human health for carcinogen or non-carcinogen effects. When handling both carcinogens and non-carcinogens, address a particular pollutant by editing row 15 of the "Loclimit.xls" worksheet.
- HOW DETERMINED: This number is determined by the NPDES permit writer using computer modeling and is the inverse of the percent of the effluent in the stream flow at the edge of the mixing zone during conditions applicable to human health based WQ stds (30Q5) conditions. If unknown, it is acceptable to use the Chronic Dilution Factor.
- HOW USED: The use of this number is analogous to how the acute and chronic dilution factors (above) are used.

Cell C31:

- ENTER: Digester flow in MGD during the flow conditions used in boxes 1-3.
- IMPORTANCE: Pollutants partition in the primary clarifier and only a portion pass into the activated sludge process train. This number is used to account for this partitioning.
- HOW DETERMINED: The POTW records, or design dry weather digester flow estimates from the facility's engineering report. If you don't have a clue about what this is, the cell to the right has a suggested value @ 2% solids
- HOW USED: This number is passed to the local limits calculations in part VI.

Cell C32:

- ENTER: Sludge volume produced in dry US tons per day.
- IMPORTANCE: This number is critical in determining what volume of pollutants is captured by the biosolids. Since metals which enter the POTW in the influent must either leave by way of the biosolids or the effluent, a mass balance between the influent and biosolids can indicate the effluent concentrations. The sludge concentrations can also be used to determine both influent and effluent concentrations by assuming a removal rate (the typical percentage of the metal which partitions into the sludge at a similar POTW). This should be done only when the most sensitive sampling and analysis methods cannot detect the pollutant in the influent.
- HOW DETERMINED: This is determined by POTW's records, and normalized for a single day. If you don't have a clue what this is, the cell to the right has a suggested value @ 300 mg/L removed solids per day (shown here @ 1mgd).
- HOW USED: The spreadsheet uses this number in Part VII and Part VIII to evaluate how well the data correlates to influent and effluent sample results and typical removal rates.

Default Method for Calculating Limits*		
Sampling Data Available (inf, eff, sludge) (Y/N)	C35	<--- "Y" if sampling data available, otherwise defaults presumed
Credit present loading of existing sources (Y/N)	C36	<-- reduce influent to domestic using "loclimit.xls" row 28
Adjust for receiving water pollution (Y/N)	C37	<-- requires receiving water data in "loclimit.xls" row 29
Use Observed Overall Removal Rate (Y/N)	C38	<-- Always say "Y" if good data available from the POTW
Use Observed Primary Removal Rate (Y/N)	C39	<-- If primary effluent sample data is obtained say "Y"
Fraction of Industrial Loading Capacity in reserve	C40	<-- Enter .1 for 10% of MAIL, etc.
Fraction of Headworks Loading held in reserve	C41	<-- Enter .1 for 10%, of MAHL, etc.

*** Customize as needed for specific pollutants at "LOCLIMIT.XLS" Rows 45-49**

GENERAL: The responses entered in boxes 1-5 in this part are like switches that allows the user to choose between methods of calculating local limits depending on how the switch is set. Each switch is set for all pollutants in the "Basicdata" worksheet, but may be altered for a specific pollutant by changing the response in the "Loclimit.xls" worksheet under that pollutants column (each pollutant has its own column in the "Loclimit.xls" worksheet).

C35: ("Basic Data" row 35, transferred to "Local Limits" row 50)

- ENTER: Whether the domestic wastewater strengths from sampling (entered in the SAMPLING.xls spreadsheet should be used for calculating local limits.
- IMPORTANCE: When actual sampling data is used, the resultant local limits are considered to be technically based. When "default" concentrations are used, the limits are less defensible.
- HOW DETERMINED: Analyze the available data, and if it appears reliable, enter "Y"
- HOW USED: When this switch is "N", the local limits are based upon the assumption that the average influent values correspond to average domestic concentrations found in EPA's 1987 & 1991 local limits development manuals. When the switch is "Y", the local limits formulas use the pollutant concentrations in the "SAMPLING.xls" spreadsheet.

C36: ("Basic Data" row 36, transferred to "Local Limits" row 51)

- ENTER: Whether you want the program to compensate for existing industries already discharging pollutants.
- IMPORTANCE: Existing sources discharging significant amounts of pollutants should be accounted for, however they cannot be presumed to all be discharging at their permit limits.
- HOW DETERMINED: The "Equivalent Domestic concentration" is the influent concentration less the industrial contribution [i.e. (influent load – industrial flow times the average industrial pollutant concentration)/POTW flow]. Industrial pollutant concentrations must be determined rigorously (by monitoring reports from industries, or a comprehensive sample program by the POTW). Entering permit or existing local limits in line 30 is inappropriate.
- HOW USED: When this switch is "N", line 32 is the average influent level (line 35) unless this is zero in which case it is the default domestic concentration (line 33). When the switch is "Y", the average influent level is reduced by an amount related to the industrial loading entered in line 30. However, the program will not perform the calculations if this reduces the domestic concentration to a negative number. The following example demonstrates how this is done:

EXAMPLE: Assume you entered "Y" in both the first two boxes (lines 45 and 46) in order to use sampling data and you want to compensate for existing industrial sources. For this example, the following information is given to illustrate how this compensation is done:

- Average POTW dry weather design flow = 1.0 MGD (line 9)
- Estimated total non-domestic flows = .05 MGD (line 11)

- Assumed industrial concentration = 1.0 mg/l (line 28)
- Average influent sample strength = .1 mg/l (line 33)

Given this, the domestic concentration used to determine local limits would not be the average influent strength of 0.1 mg/l, but an adjusted level of 0.053 mg/l. This is equivalent to saying that when 5% of flows enter the plant at 1.0 mg/l, the strength of the other 95% entering the plant (the non-industrial component) must be 0.053 mg/l to produce an influent strength of 0.1 mg/l. A mass balance equation is used for this calculation.

C37: (“Basic Data” row 37 transferred to “Local Limits” row 52))

- ENTER: ‘Y’ or ‘N’ for whether the program should reduce allowable loading based on receiving water concentrations (background levels) entered on row 9 of the Sampling.xls spreadsheet (and shown in “Loclimit.xls” line 31).
- IMPORTANCE: Water quality regulations require limits to be protective of the receiving water, and therefore if background pollutant levels are known they must be entered and this box marked “Y”. When background levels are unknown, limits can be developed which will be protective up to a certain background level by entering a maximum suspected background concentration in part IV. This line can also be used to do a “what if” analysis to see how local limits change with varying receiving water pollutant levels as entered in Part IV.
- HOW DETERMINED: Use best professional judgment and all available sources of receiving water data.
- HOW USED: When “Y”, the allowable headworks loading on lines 52 and 53 is reduced by a factor related to the background concentrations entered on line 29. Unlike previous versions of NEWLL, in Version 8 the TSD limit (“Localimit” line 60) will also compensate for background concentrations if this value is ‘Y’ (but not a ‘y’).

C38: (“Basicdata” row 38 transferred to “Local Limits” row 53))

- ENTER: Whether the overall removal rate from sampling is to be used (Y) or the default removal rate is to be used (N) for determining local limits.
- IMPORTANCE: The overall removal rate has a direct bearing on all local limits except activated sludge inhibition.
- HOW DETERMINED: If the actual removal rate from sampling is not within the 2d and 8th decile removal rates, and the plant is an activated sludge secondary treatment plant, it is recommended that the default removal rate be used (enter “N”). For tertiary plants, higher removal rates (at or above the 8th decile removal rate) are not uncommon, and for trickling filter or lagoon systems, the removal rates will be near or below the 2d decile removal rates in many cases. In these circumstances, if the data is reliable (the coefficient of variation or standard deviation divided by the mean is 0.6 or less for 10 samples) it is recommended to use the actual removal rates (enter “Y”).
- HOW USED: When this is “Y”, the formulas use the average removal rates for each sample for which a removal rate could be determined (shown on line 38). Otherwise, the average removal rate for a secondary treatment plant for the pollutant in question (from line 41) is used. If the value shown on line 38 is not a number BETWEEN 0 and 1 (it can’t be 0 or 1) or line 38 shows an error (#error or #value), you must enter a “N” here in line 48. Since the spreadsheet interprets blanks without the (‘) placemaker as 0’s it is a good idea to double check removal rates by manually averaging the removal rates in the “SAMPLING.xls” spreadsheet when removal rates are questionable.

C39: (“Basic Data” row 39 transferred to “Local Limits” row 54))

- ENTER: Whether the overall removal rate from sampling is to be used (Y) or the default removal rate is to be used (N) for determining local limits.
- IMPORTANCE: The overall removal rate has a direct bearing on activated sludge inhibition.
- HOW DETERMINED: Since primary clarifier data is seldom collected, and properly collecting it, (before return streams enter the primary clarifier effluent) is even rarer, this will typically be marked “N”. When activated sludge inhibition has been noted, ensure to properly collect this data so this option can be used.
- HOW USED: When this is “Y”, the Activated Sludge Inhibition formula uses the primary removal rates determined by sampling in part V box 1 rather than box 3 (line 37 in lieu of line 39 of the spreadsheet).

C40: (“Basic Data” row 40 transferred to “Local Limits” row 78))

- ENTER: The proportion of additional flow to be able to serve as a fraction of the current industrial flow.

- **IMPORTANCE:** The establishment of a reserve is prudent to allow new industrial users to discharge without having to first do a recalculation of local limits. This is only needed if the proportion of industrial to POTW flow increases.
- **HOW DETERMINED:** The choice of this value is discretionary, but to allow 10-25% more industrial flows is typical.
- **HOW USED:** Calculated as the lowest limit (“Loclimit.xls” lines 54-60) times $1/(1+x)$ where ‘x’ is the fraction held in reserve. For example if $X=.2$ and the lowest limit was 1.0 mg/L, the new limit (shown in row 76) would be .83 mg/L.

**Which Conservative Pollutants to Limit? (Bold = Required by EPA)
Check (or Un-Check) for Each Pollutant**

Develop Local Limit? (check=YES)

44	Antimony	<input checked="" type="checkbox"/>
45	Arsenic (T)	<input checked="" type="checkbox"/>
46	Arsenic (penta or +5)	<input checked="" type="checkbox"/>
47	Beryllium	<input checked="" type="checkbox"/>
48	Cadmium	<input checked="" type="checkbox"/>
49	Chromium(+6)	<input checked="" type="checkbox"/>
50	Chromium (T)	<input checked="" type="checkbox"/>
51	Copper	<input checked="" type="checkbox"/>
52	Cyanide	<input checked="" type="checkbox"/>
53	Lead	<input checked="" type="checkbox"/>
54	Mercury	<input checked="" type="checkbox"/>
55	Molybdenum	<input checked="" type="checkbox"/>
56	Nickel	<input checked="" type="checkbox"/>
57	Selenium	<input checked="" type="checkbox"/>
58	Silver	<input checked="" type="checkbox"/>
59	Thallium	<input checked="" type="checkbox"/>
60	TributylTin	<input checked="" type="checkbox"/>
61	Zinc	<input checked="" type="checkbox"/>
62	Add 1 (insert name of first additional Pollutant)	<input checked="" type="checkbox"/>
63	Add 2 (insert name of second additional Pollutant)	<input checked="" type="checkbox"/>
64	Add 3 (insert name of third additional Pollutant)	<input checked="" type="checkbox"/>
65	Add 4 (insert name of fourth additional Pollutant)	<input checked="" type="checkbox"/>

Cells C44 – C65: (“Basic Data” Cells C40 to C65 control which columns appear in the worksheets “Local Limits” (Columns B to W) and “Sample Data” (Columns C to X)

- ENTER: Check the boxes of the pollutants for which you wish to develop local limits.
- IMPORTANCE: Local Limits should be developed for all “Pollutants of Concern”. National Pollutants of concern include those twelve pollutants in bold.
- HOW DETERMINED: .
- HOW USED: The Program uses a macro to either hide or show the columns in the “Sample Data” and “Local Limits” worksheets which correspond to the pollutants selected. Click on the check mark box to select or unselect (uncheck) the pollutant. The selected pollutants will appear in the sampling and local limits spreadsheets and hide the pollutants which are not selected. .

B62 – B65: (“Basic Data” row 40 transferred to “Local Limits” row 78)

- ENTER: Enter the names of the pollutants for which you wish to develop local limits.
- IMPORTANCE: Through the data collection process, the POTW may find it needs to develop local limits for additional pollutants. In such case, this spreadsheet can also be used to help develop these limits, however, the appropriate criteria (corresponding to the pollutants) must be entered by hand (the spreadsheet can’t look up the pollutant and find the applicable criteria for it).
- HOW DETERMINED: The POTW should do an Industrial User Survey and an initial “screening” for potential “pollutants of concern”. If this identifies additional pollutants for which water quality, biosolids, or inhibition criteria exist, then these pollutants should be identified on these four lines. More lines can be added (albeit not easily).
- HOW USED: The Program will show the names in these four boxes in the last four columns in the sampling and local limits spreadsheets (so long as the check boxes to the right of each name are checked).

INSTRUCTIONS FOR “Sample Data” Spreadsheet (tab) in the NEWLL12.xlsm Workbook

NOTE: The “sample data” worksheet summarizes sampling data in rows 3-8, Persons using the spreadsheet are to enter data in rows 9,10 -18

AVE AMBIENT CONC.		Row 9
AVE INDUSTRIAL CONC.		Row 10
SUMMARY(ABOVE) SAMPLE 1	Click the "+" button to the left of row numbers to review or input data. Enter only dates and sampling results (white boxes in default pallate)	
Date:	LOCATION:	Row 13 (Pollutant Name)
A14;A24;A34;etc.	Influent	Row 14
	Effluent	Row 15
	Prim. Clar.	Row 16
	Sludge	Row 17
	Detection_Limit	Row 18

Row 9: (“Sampling.xls” row 9 populates “Loclimit.xls” row 31)

- ENTER: The 90th percentile highest ambient concentration reflective of the best information (this spreadsheet does not do statistical analysis on ambient data, and therefore it must be done on a separate worksheet and the results entered here.)
- IMPORTANCE: The ambient concentration determines the assimilative loading capacity in the receiving environment.
- HOW DETERMINED: Based on actual sampling using clean sample methods (ideally) or best information available.
- HOW USED: Used internal to the calculations of the user-defined functions “Acute”, “Chronic”, “HHealth”, and “TSDlim” which appear on “Loclimit.xls” lines 54-56 and 60. This reduces the effluent load which then translates to a correspondingly reduced headworks loadings and a reduction in local limits.

Row 10: (“Sampling.xls” row 10 populates “Loclimit.xls” row 30)

- ENTER: The average actual industrial concentration reflective of the best information (this spreadsheet does not do statistical analysis on industrial effluent data, and therefore it must be done on a separate worksheet and the results entered here.
- IMPORTANCE: The average industrial data allows (by subtraction) calculation of effective domestic concentrations.
- HOW DETERMINED: Based on actual sampling using clean sample methods (ideally) or best information available.
- HOW USED: Used to determine the “Adjusted Domestic Concentration”, which is “Loclimit.xls” line 32. This value is used in the calculations of the user-defined functions “Acute”, “Chronic”, “HHealth”, and “TSDlim” which appear on “Loclimit.xls” lines 54-56 and 60. Entering a non-zero value here reduces the domestic load which then translates to a correspondingly increased headworks loadings and an increase to local limits.

A14;A24;etc: (“Sampling.xls” cell 14A and in the same box for subsequent samples or every ten rows)

- ENTER: The date of the particular sampling.
- IMPORTANCE: For tracking values back to a specific sampling event
- HOW DETERMINED: Based on review of the sampling results.
- HOW USED: For data analysis purposes only (not used in the spreadsheet).

Row 13: (“Sampling.xls” row 13 columns S-W)

- ENTER: The name of additional pollutants of concern for which sampling was performed.
- IMPORTANCE: For adding additional pollutants to the worksheet sampling data is necessary
- HOW DETERMINED: Review of potential Pollutants of Concern for which additional sampling is conducted.
- HOW USED: The names of these additional analytes are added to the “Loclimit.xls” and other spreadsheets.

Row 14-18: (“Sampling.xls” row 14 columns C-W)

- ENTER: The sample data for influent, effluent, primary clarifier, biosolids, and the detection limit for the effluent samples for the particular analyte identified in row 13. Enter values in ug/L except for sludge data which is in mg/kg on a dry weight basis. Highlight influent values which have a different detection value, but the result returned was ND.
- IMPORTANCE: For tracking values back to a specific sampling event and potentially catching errors.
- HOW DETERMINED: Based on review of the sampling results.
- HOW USED: For data analysis purposes only (not used in the spreadsheet).

“Local Limits” worksheet – Output portion

Part I: GENERAL INFORMATION

Receiving Water Hardness (if fresh)	Row 3
(M)arine, (F)resh, or (B)oth Discharges	Row 5
Sludge: Class A (A) or (C)eiling level	Row 7
Plant: (A)ctivated sludge or (O)ther	Row 9

Rows 3, 5, 7, and 9.

Rows 3, 5, 7, and 9: (From “Basic Data” rows 19-22)

- ENTER: Do not enter values here. These are pulled from the “Basic Data” spreadsheet.
- IMPORTANCE: The hardness and type of receiving water, sludge criteria and inhibition values to use are determined by these values.
- HOW DETERMINED: See the instruction on “Basic Data” rows 19-22.
- HOW USED: These values are used to determine the appropriate local limits for protection of WQ, Biosolids, and prevention of Inhibition of activated sludge processes.

Part II: PLANT DATA - OPEN AND CHANGE "BASICDATA.XLS" VALUES IF FLOWS CONTRIBUTING FOR A PARTICULAR POLLUTANT VARY

Total Plant Flow (in MGD)	Row 13
Domestic Flow (in MGD)	Row 14
Industrial Flow (in MGD)	Row 15
Infiltration/Inflow (by subtraction)	Row 16
Acute Dilution Factor	Row 17
Chronic Dilution Factor	Row 18
Dilution Factor for HH Limits	Row 19
Digester Flow (in MGD)	Row 20
Dry Sludge Production Rate (US Tons/day)	Row 21

- ENTER: These values are pulled from the “Basic Data” spreadsheet by default, but may be adjusted for a particular pollutant by entering a value here (thus replacing the formula and breaking the link to the “Basic Data” spreadsheet. The relative amounts of flow for the POTW and Industry respectively determine the amount of loadings available and the industrial flows over which loadings are to be divided. The dilution ratios, digester flows, and dry sludge production rates are not to be adjusted for one pollutant to the next under any scenarios contemplated in developing this tool.
- IMPORTANCE: These pieces of data are important to determining local limits. When using the “contributing flows” method, the “Industrial flow” value will need to be reduced by the amount of flows from industries that do not contain levels of the pollutant above domestic levels. Domestic flow can be increased by the same amount such that the total flow remains constant. When using “Tiered Limits” the Industrial Flows will need to be divided into tiers, and the total amount of industrial flow increased by a multiplier reflective of how much higher certain tiers are over the base tier.
- HOW DETERMINED: See the instruction on “Basic Data” rows 24-32.
- HOW USED: These values are used to determine the maximum allowable headworks loading, how much of that to allocate to industries, and the amount of industrial flow over which to divide the maximum available industrial loading.

Part III: CONCENTRATIONS LIMITING THE POTW DUE TO PASS THROUGH OR INTERFERENCE

WQ Acute criteria, aquatic life (mg/L)	Row 24
WQ Chronic criteria, aquatic life (mg/L)	Row 25
WQ Chronic criteria, human health (mg/L)	Row 26
Activated Sludge Inhibition Level	Row 27
Anaerobic Digester Inhibition Level	Row 28
Class A Sludge standards (40 CFR 503)	Row 29
Sludge ceiling concentration for beneficial use	Row 30

Rows 24-26

- **ENTER:** Go to “POTWLIM.xls” (rather than here in “Loclim.xls” spreadsheet) and enter any revised standard for pollutants for which limits are being developed. For added pollutants (such as columns U, V, W, and X) enter the applicable criteria or formulas from which the criteria are derived in either location.
- **IMPORTANCE:** These criteria in rows 24-26 are maximum POTW effluent concentrations at the edge of the acute, chronic, and HH mixing zones. These numbers come from the “POTWLIM.xls” spreadsheet. Criteria in rows 27-30 are used to evaluate how much industrial loading can be accepted without interfering with the POTW or impairing beneficial biosolids uses.
- **HOW USED:** These numbers are used in conjunction with the dilution factors in Part II to determine the maximum effluent concentrations permissible. The resulting values can be verified by review of the POTW’s NPDES permit fact sheet, or used by the POTW in developing plans which anticipate appropriately “technically based” permit limits.

Rows 27 & 28

- **ENTER:** Updated data on Activated Sludge or Anaerobic Digester Inhibition Levels if available, or for Columns U and beyond the best information available on inhibition. Rows 27-30 are prepopulated for the thirteen pollutants in columns C-T based on literature values provided in EPA publications, but will need to be manually entered in any additional columns used.
- **IMPORTANCE:** Activated sludge and aerobic digester inhibition levels are required in order to determine the maximum loadings allowable by dischargers without causing problems with the activated sludge processes and sludge digestion processes. These numbers are taken from 1987 EPA manual: Guidance Manual for the Development of Local Discharge Limitations Under the Pretreatment Program.
- **HOW USED:** The program uses these values to establish a local limit necessary to protect the POTW from inhibition. This is then compared to the local limits for protection in other regards (Water Quality, Biosolids Quality) and the lowest value used to establish the MAHL and MAIL.

Rows 29 & 30

- **ENTER:** Any more current information on biosolids standards per 40 CFR part 503 or more stringent state standards.
- **IMPORTANCE:** Sludge concentration levels according to 40 CFR part 503 for class A sludge Row 29 and for maximum beneficial uses Row 30 are listed in order to develop limits which protect the beneficial sludge uses.
- **HOW USED:** As selected in part I, limits are developed which ensure that the intended beneficial sludge uses are protected. These limits are compared in later sections of the spreadsheet.

“Local Limits” worksheet description of inputs (continued)

Part IV: POLLUTANT CONCENTRATION – SUMMARY - rows 33-39

Estimated Average Industrial Conc.	Row 33
Ambient Concentration (receiving water)	Row 34
Adjusted Domestic concentration	Row 35
Typical Domestic Concentrations	Row 36
Average Sludge Level (mg/Kg - Dry)	Row 37
Average Influent Level (mg/l)	Row 38
Average Effluent Level (mg/l)	Row 39

Row 33: From “Sample Data” Row 10

- **IMPORTANCE:** Influent sampling data represents a combination of industrial and domestic wastewater. In order to determine the equivalent domestic concentration, an industrial concentration must be assumed.
- **HOW DETERMINED:** This information comes from the “sampling.xls” worksheet line 10.
- **HOW USED:** When sampling data is used, this value is used to adjust the measured influent concentrations to determine an equivalent domestic concentration.

Row 34: From “Sample Data” Row 9

- **IMPORTANCE:** The presence of background concentrations of pollutants reduces the available loading for the POTW. It is important to enter the information on background concentrations of pollutants if available so that the local limits are protective of the quality of the receiving water.
- **HOW DETERMINED:** This information comes from the “sampling.xls” worksheet line 9.
- **HOW USED:** The local limits formulas decrease the available loading by a factor which is based upon the background levels of pollutants in the receiving waters.

Row 35: Calculated domestic concentration when loading from Existing IU’s are removed

- **IMPORTANCE:** Influent samples are a combination of industrial and domestic wastewater. In order to determine the equivalent domestic concentration, this box adjusts the sample value to compensate for the assumed industrial loading. If no industrial concentration is assumed, the local limits returned by this program are in fact the ADDITIONAL concentrations which industries can discharge.
- **HOW DETERMINED:** The formula on this line converts the influent sample into an equivalent mass loading, then subtracts the mass loading from industries, and then re-converts the remaining mass loading into an equivalent domestic loading which is adjusted to account for the presence of known industrial contribution

Row 36: (Typical domestic concentration)

- **IMPORTANCE:** This default concentration is used to determine limits when sampling data is unavailable.
- **HOW DETERMINED:** Default value is from the EPA manual on the development of local limits. This source is dated, and thus it is highly recommended that users of this spreadsheet update this data or do not enter “N” to the question of whether sampling data is available (Basic Data sheet row 35).
- **HOW USED:** When sampling data is available to determine influent pollutant concentrations, the value in box 3 is used, otherwise this spreadsheet assumes this “default” level of the pollutant is present in the domestic wastewater. When initially estimating the industrial wastewater strength, a good first guess to choose an industrial concentration which makes the value in box 3 approximately equal this value, and then double check that the resulting limit is lower than the estimated industrial concentration chosen.

Rows 37, 38, and 39: From “Sample Data” Rows 8, 3 & 4 (respectively)

- **IMPORTANCE:** This gives the average value of samples taken for sludge, influent, and effluent.
- **HOW DETERMINED:** This is the average of sample data entered in the SAMPLING.xls spreadsheet.
- **HOW USED:** The local limits are based upon these values when in Part VI, “How to Calculate Limits” the first box, “Get Domestic Levels from Sampling”, (“Loclimit.xls” line 47) is marked Y for the pollutant. This trigger is set in “Basicdata” line 23 unless it is changed for the particular pollutant.

Part V: REMOVAL RATES

Average Primary Removal Rate	Row 42
Average Overall Removal Rate	Row 43
Reference Primary Removal Rate	Row 44
Reference 2d Decile Plant Removal	Row 45
Reference Ave Plant Removal	Row 46
Reference 8th Decile Removal	Row 47

Row 42: (Primary Removal Rate From “Sample Data” Row 5)

- **IMPORTANCE:** The primary removal rate is critical in determining how the pollutants partition within the POTW. A higher primary removal rate will yield higher limits based upon protection of activated sludge process. Note that the primary clarifier effluent must be sampled before return flows enter into it. Otherwise, the primary clarifier effluent concentration can be estimated by doing a mass balance between the influent and the primary sludge, (given a known primary sludge flow rate and pollutant concentration).
- **HOW DETERMINED:** This number is the average primary removal for the data points for which primary removal could be calculated in the SAMPLING.xls spreadsheet. It is not based on average influent and average primary clarifier strengths, but only the averages of the data points for which meaningful primary removal can be computed.
- **HOW USED:** It is used to compute local limits which will protect against activated sludge inhibition.

Row 43: (Overall Removal Rate From “Sample Data” Row 6)

- **IMPORTANCE:** The overall removal rate is critical in determining how the pollutants ultimately partition between the sludge and effluent. A higher overall removal rate will yield higher limits based upon protection of water quality, while a lower removal rate will yield higher limits based on compliance with biosolids usage and anaerobic sludge digester inhibition. Whether higher or lower removal rates yield larger local limits depends on whether water quality, sludge usage, or inhibition effects are limiting.
- **HOW DETERMINED:** The overall removal rate is the average of the removal rates for which meaningful removal rates can be determined. The program screens each data point, and only those points which produce meaningful overall removal rates are used to determine this average overall removal rate.
- **HOW USED:** When sampling data exists, the user can choose to use this removal rate.

Rows 44, 45, 46, and 47:

- **ENTER:** (Optionally) Removal rates for primary and secondary treatment gleaned from reputable studies or sources. The default values, which arose from a study included in EPA’s manual on local limits, may (should) be modified based on new information. POTWs other than secondary activated sludge plants should review the EPA manual as the default removal rates are for activated sludge plants.
- **IMPORTANCE:** These removal rates are extremely important when sampling data is unavailable. Even when sampling data is available, it is prudent to check to ensure that the average overall removal rate falls between the 2d and 8th decile removal rates listed (box 4 & 6). Removal rates outside this range for secondary activated sludge treatment plants merits further investigation. Also, if a POTW modification is designed to improve the removal rate of suspended solids, as a rule of thumb the percent increase in metals removal rates will generally be similar. Therefore this spreadsheet can be used to predict the effects of proposed changes to the POTW on local limits.
- **HOW DETERMINED:** These “default” removal rates are from the EPA local limits manual, reflecting reported removal efficiencies of POTWs with secondary activated sludge processes surveyed. EPA uses the decile approach for determining “consistent removal” for adjusting local limits based on the concept of granting “removal credits”. When not requesting removal credits the approach is optional.
- **HOW USED:** These boxes are used based upon the options selected in part VI. The information on box 3 is used for activated sludge inhibition calculations when the box “Primary removal rate from sampling” is marked “N”. The average removal rate (box 5) is used for computing all other limits when the box “Overall removal rate from sampling” is marked “N”. The actual formulas used are discussed in section II of this manual.

Part VI: HOW TO CALCULATE LIMITS:

Sampling Data Available (inf, eff, sludge) (Y/N)	Row 50
Credit present loading of existing sources (Y/N)	Row 51
Adjust for receiving water pollution	Row 52
Use Observed Overall Removal Rate (Y/N)	Row 53
Use Observed Primary Removal Rate (Y/N)	Row 54

Rows 50-54 are from “Basic Data” Rows 35-39

- **ENTER:** Enter a value different than used for other pollutants (as entered in “Basic Data”) for any pollutant for which different decisions apply. For example, if you only have data for existing sources for three pollutants, you may wish to say “N” in “Basic Data” row 36 which asks for whether you want Credit present loading of existing sources, but change the “N” to a “Y” for the three pollutants for which you have data here in Row 51 (presuming you entered the data for these pollutants in “Sample Data”).
- **IMPORTANCE:** This allows pollutant by pollutant decisions to be made to accommodate that the data set may be more complete for certain pollutants than for others.
- **HOW DETERMINED:** The default values are from “Basic Data” rows 35-39.
- **HOW USED:** The Visual Basic programs use these values to determine how to calculate limits.

Part VII: LOCAL LIMITS FOR COMPLIANCE WITH:

Acute WQ Standards (in mg/l)	Row 57
Chronic WQ Standards (in mg/l)	Row 58
TSD Limits (in mg/l)	Row 59
Sludge Application Limits (in mg/l)	Row 60
Activated Sludge Inhibition (in mg/l)	Row 61
Anaerobic Digester Inhibition (in mg/l)	Row 62

- **GENERAL:** These six cells contain the results of the calculations done based upon the formulas in section II of this report. Each line reflects the maximum local limit based upon compliance with a particular standard. In general, the water quality based limits (cells 1, 2, and 3) and the sludge application based limit (cell 4) must be complied with, and there is little margin for discretion. The local limits based on protection of the POTW against inhibition are, however, more subjective, and the limits resulting from applying “standard” inhibition levels may be found to be inappropriately conservative. In order to evaluate whether an exception to the inhibition levels returned in cells 5 and 6 is appropriate, a more thorough knowledge of inhibition processes and the characteristics of the particular pollutant is required. This manual will not provide this level of detail, however, the other references cited here and treatability databases can be cited.
- **HOW DETERMINED:** See the formulas in section III of this report for a more in depth analysis of the formulas used in calculating these local limits. Note, however, that the available pollutant loadings are divided evenly over the entire industrial flow entered in Part II. This may be overly conservative when some dischargers have shown by sampling that they do not discharge a particular pollutant.

General Inhibition References: Also note that DOE Publication #95-404 (as revised 12/2004) discusses some sources of information on treatability, and alternative methods for measuring the inhibitory effects of industrial discharges. <http://www.ecy.wa.gov/pubs/95404.pdf>

Part VIII: SAMPLE QUALITY: COMPARISON OF LOADINGS AND REMOVAL RATES IMPLIED BY SAMPLE DATA

Influent Pollutant Loading (per sampling)	Row 65
Pollutants in biosolids (per sampling)	Row 66
Pollutants in effluent (per sampling)	Row 67
% Influent load accounted for: (eff/inf)	Row 68
Current HW Load Implied by Sludge Data:	Row 69

Row 65: (Mass of pollutants in the influent per day)

- **IMPORTANCE:** This illustrates the total mass of the particular metal which enters the plant based on the average influent concentration. (This returns a number only when sampling data is available).
- **HOW DETERMINED:** The average influent sample strength (mg/l) is multiplied by the average total POTW flow (MGD) and by a conversion factor (8.34 lb/gal) to yield pounds per day.
- **HOW USED:** This information is used in doing mass balance calculations.

Row 66: (Mass of pollutants in the biosolids per day)

- **IMPORTANCE:** This shows the mass of the particular metal which is ultimately partitioned into the sludge.
- **HOW DETERMINED:** The concentration of the metal in the sludge (mg/Kg) is multiplied by the dry sludge production rate (tons/day), and a conversion factor (2,000 lb/ton / 1,000,000 mg/Kg or 0.002) to yield lbs/day.
- **HOW USED:** For doing mass balance calculations

Row 67: (Mass of pollutants in the effluent per day)

- **IMPORTANCE:** This shows the mass of the particular metal which is exiting the POTW based on the sampling results entered in the SAMPLING.xls spreadsheet.
- **HOW DETERMINED:** As with box 1, the average influent sample strength, POTW flow, and a conversion factor (8.34) are multiplied together.
- **HOW USED:** For checking (along with box 1 and 2) whether the mass of the pollutant entering the plant equals the mass of the pollutant exiting the POTW.

Row 68: (Percent of the influent loading accounted for (effluent wastestreams / influent wastestreams))

- **IMPORTANCE:** Demonstrates the correlation between the mass of the pollutant in the effluents (boxes 2 & 3) and the mass of the pollutant in the influent (box 1).
- **HOW DETERMINED:** Box 2 & 3 are added and divided by box 1.
- **HOW USED:** When this value is near 100% \pm 25% the data correlates well and the limits developed by the spreadsheet can be used with confidence. When the value is outside this range, the wastewater data should be analyzed, and box 5 and 6 consulted.

Row 69: (Proportion of MAHL which the biosolids concentrations infer the POTW is receiving)

- **IMPORTANCE:** The limit implied by proportionately increasing the influent loading by the same proportion that the biosolids may be increased is an alternative method of calculating a local limit.
- **HOW DETERMINED:** The average influent concentration is multiplied by the ratio of the POTW flow to Industrial flow. This is then multiplied by the ratio of the Class A sludge concentration limit minus the average sludge concentration and this is divided by the Class A sludge concentration limit.
- **HOW USED:** This removal rate from this line can be used by entering it in "Reference Ave Plant Removal" (box 4 of part V), and by entering "N" where it asks "Overall Removal Rate from sampling" (box 4 in Part VI). As an alternative, an effluent can be assumed which matches the removal rate

PART IX: MASS BASED ANALYSIS	
Limiting MAHL (AHL + LL*SIUflow)	Row 72
Max. Allowable Industrial Loading	Row 73

Row 72: (Limiting Maximum Allowable Headworks Loading)

- **IMPORTANCE:** Demonstrates the mass of the pollutant available to both controllable and uncontrollable sources.
- **HOW DETERMINED:** The limiting local limit is multiplied by the industrial flow and the domestic flow and loadings are multiplied and these two products (industrial and domestic loadings) are added.
- **HOW USED:** This shows how much total Headworks loading is available for this pollutant.

Row 73: (Maximum Allowable Industrial Loading)

- **IMPORTANCE:** Demonstrates the mass of the pollutant available to controllable sources only.
- **HOW DETERMINED:** The limiting local limit is multiplied by the industrial flow.
- **HOW USED:** This, when compared to box 1(MAHL) shows how much of the MAHL is being allocated to industrial users.

Part X: LOCAL LIMIT RECAP:	Antimony
Lowest Limit	Row 76
With X.% of MAIL reserved for future IUs	Row 77
With X.% of MAHL reserved for growth	Row 78
With both reservations (MAIL and MAHL)	Row 79
WA Dangerous Waste Threshold:	Row 80
Existing Limits - for comparison	Row 81

Row 76: (The lowest local limit value listed in Part VII.)

- **IMPORTANCE:** This value is normally the local limit that must be imposed.
- **HOW DETERMINED:** The local limits developed in part VII are compared, and the lowest selected.
- **HOW USED:** This value is passed to box 2 where a reserve is applied.

Rows 77, 78, and 79:

- **ENTER:** (In “Basic Data” cell C40 (for MAIL set-aside), and/or cell C41 (for MAHL set-aside) enter, as a fraction, the default reserve proportion. This is transferred to “Local Limits” cells A77 and A78. If you want a different reserve proportion for a particular pollutant, you will need to enter your own formula in that column for calculating it). Reserves typically are set to allow a proportional increase in non-domestic flow (relative to domestic flow) which would equate to a MAIL set-aside, or as a general factor of safety (MAHL set-aside).
- **IMPORTANCE:** Local limits are developed based on the assumptions that a particular percentage of flows are coming from of non-domestic sources. If actual non-domestic flows increase more than domestic flows, the local limits may no longer be protective of the POTW. Therefore it is prudent to include a safety factor. Otherwise non-domestic flows would have to be limited to the volume assumed in Part II box 3 multiplied by the percent increase in domestic flow, or local limits would have to be revised whenever additional non-domestic flows were increased. Neither of these options is usually desirable.

- **HOW DETERMINED:** If industrial dischargers discharge, for example, 100,000 GPD, and they have plans to increase this to 150,000 GPD in the next three years, the number to enter here would be $(150,000 - 100,000) / 100,000$ or .5 (which will be displayed as 50%). Note that the number entered in “Basic Data” cell C40 is automatically transformed into a percentage and the text is added in “Local Limits” cell A78 to format the fraction.

Row 80:

- **IMPORTANCE:** Local Limits cannot exceed WA State HW Thresholds listed in this row.
- **HOW DETERMINED:** These values are derived from WAC 173-303-090(8)(c).
- **HOW USED:** You must manually review whether the lowest limit is higher than this value.

Row 81:

- **IMPORTANCE:** As a record of the local limits which the POTW currently has. This may be a useful if you are running several scenarios and want to see which yields the more stringent limits than presently. Most find it most useful to vary only one parameter at a time to see how it affects the outcome (traditional sensitivity analysis). Rows below this (82 on) can be used to record the results of different scenarios (you will have to devise a way to keep track of what changed for each different run).
- **HOW DETERMINED:** Based on local codified Ordinance.
- **HOW USED:** No calculations use this value, it is only for comparison purposes.

Section V - Description of Rows in “Local Limits” worksheet

Following are brief descriptions of each lines in the LOCLIM.XLS spreadsheet. Each line with as asterisk (*) must have accurate data entered in it in order to produce local limits. I have included the names for each of the lines used in the visual basic subroutines on the “Function” sheet.

LINE NAME DESCRIPTION:

PART I: GENERAL INFORMATION

3*		Hardness of the receiving water
5*		Discharge water type, either (M)arine, (F)resh, or (B)oth
7*	TYPELIM	Sludge protection standard - Class (A) or (C)eiling levels
9*	PLANTTYPE	Whether plant is (A)ctivated sludge or (O)ther

PART II: PLANT DATA:

13*	POTWFLOW	Total average design plant flow in Millions of Gallons per Day
14*	DOMFLOW	Domestic flow anticipated in the total design flow above.
15*	INDFLOW	Estimated Industrial (non-domestic) flows (may be different for each metal)
16		Estimated average Inflow and Infiltration (obtained by subtraction of rows 9,10,&11)
17*	ACUTEDF	Acute Dilution Factor - Inverse of the effluent conc. at edge of acute mixing zone.
18*	CHRONDF	Chronic Dilution Factor - Inverse of the effluent conc. at edge of chronic mixing zone.
19		Dilution factor to be used for Human Health Limits (unless known, use Chronic DF)
20*	DIGFLOW	Digester flow in Millions of Gallons per Day (MGD)
21*	SLPRODRT	Dry Sludge Production, in dry U.S. (short) tons per day.

PART III: CONCENTRATIONS LIMITING THE POTW DUE TO PASS THROUGH OR INTERFERENCE

24	ACUTELIM	Acute Water Quality Criteria (from the POTWLIM.xls spreadsheet)
25	CHRONLIM	Chronic Water Quality Criteria (from POTWLIM.xls as above.)
26		WQ Criteria for protection of Human Health
27	ASINHLIM	Activated Sludge Inhibition Limit - For secondary Activated Sludge processes only.
28	ADINHLIM	Anaerobic Digestion Inhibition Limit - For all anaerobic sludge digestion processes.
29	CLASACON	Class “A” Sludge application limit
30	CEILCON	Ceiling concentration for beneficial sludge uses.

PART IV: POLLUTANT CONCENTRATION SUMMARY

33*	INDCON	Estimated industrial concentration
34*	BGCON	Background concentration
35	EQDOMCON	Adjusted domestic conc. [= (aveinf*potwflow - bgcon*indflow)/(potwflow-indflow)]
36	BOOKDOMCON	Typical domestic concentrations found in EPA manual on local limits development
37	AVESLCON	Average sludge concentration from line 8 of SAMPLING.XLS spreadsheet
38	AVEINFCON	Average POTW influent concentration from line 3 of SAMPLING.XLS
39	AVEEFFCON	Average POTW effluent concentration from line 4 of SAMPLING.XLS

PART V: REMOVAL RATES

42	ACTPRIM	Primary removal rate determined by wastewater samples SAMPLING.XLS line 5
43	ACTREMRT	Overall removal rate determined by wastewater samples - SAMPLING.XLS line 6
44	BKPRIREM	Average primary removal rate from EPA manual on local limits development
45		Second decile activated sludge removal rate from EPA local limits manual
46	BOOKREMRT	Average overall removal rate for secondary activated sludge plants (from EPA).
47		Eighth decile activated sludge removal rate from EPA local limits manual

PART VI: HOW TO CALCULATE LIMITS

50	USESAMDOM	Get domestic concentrations form sampling data (Y/N - must use caps!)
51	EXISTSOURCE	Compensate for existing sources already discharging pollutants (Y/N)
52	INCLBGCON	Adjust to be protective at the background concentrations entered on line 29 (Y/N)
53	USEACTREM	Use the removal rates determined by sampling (shown on line 38) in formulas (Y/N)
54	USEPRIREM	Use the primary removal rates determined by sampling (line 37 vs line 39) (Y/N)

LOCAL LIMITS CORRESPONDING TO THE ABOVE CRITERIA

57		Limit required to comply with WQ Standards for Aquatic Life at the Acute Mixing Zone.
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- 58 Limit required to comply with WQ Standards for Aquatic Life at the Chronic Mixing Zone.
 59 Limit required to comply with WQ Standards for Human Health at the HH Mixing Zone.
 60 Limit for complying with the sludge concentration standard selected in line 4.
 61 Limit for prevention of Activated Sludge process inhibition. (“NA” if line 5 = “T”)
 62 Limit required for preventing Anaerobic Sludge Digester inhibition.

PART VIII: SAMPLE QUALITY: COMPARISON OF LOADINGS & REMOVAL RATES IMPLIED BY SAMPLING DATA

- 65 INMASS Mass of Pollutants in the Influent. Formula:
 $(AVEINFCN * POTWFLOW * 8.34)$
 66. SLMASS Mass of Pollutants in the Sludge. Formula:
 $(AVESLCON * SLPRODRT * .002)$
 67 EFFMASS Mass of Pollutants in the Effluent. Formula:
 $(AVEEFFCON * POTWFLOW * 8.34)$
 68 Ratio of average combined effluent and sludge loadings to average influent loadings:

$$\frac{((SLPRODRT * AVESLCON * .002) + ((POTWFLOW * AVEEFFCON) * (8.34)))}{(POTWFLOW * (AVEINFCN) * (8.34))}$$

 69 The Percentage of the MAHL that it would appear the POTW is receiving if only biosolids data is used. To discount sampling data, the book removal rate is used if it is <>0 Formula:
 $(SLMASS / BOOKREMRT / MINMAHL)$

PART IX: MASS BASED ANALYSIS

- 72 MINMAHL Limiting Maximum Allowable Headworks Loading MAHL – for both Industries & Domestic
 73 Maximum Allowable Industrial Loading = (MAHL – Uncontrollable sources)

PART X – LOCAL LIMITS RECAP

- 76 Most stringent local limit indicated in lines 52-57
 77 Limit after subtraction of the safety factor to allow an additional percentage of IU flow
 78 Limit after subtraction of a general safety factor to allow for decreased MAHL’s
 79 Limit after subtracting the two above factors of safety (generally only one or the other is used)
 80 WA Dangerous Waste Threshold – See additional thresholds at the tab “HW_Thresholds”
 81 Existing local limit (for comparison purposes).

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