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U.S. E P A, Office of Wastewater Management
PRELIM - Pretreatment Limitations Model
Version 5.0 (June 1996)

Developed by Science Applications International Corporation
under contract with the
U.S. EPA Office of Wastewater Management

USER'S GUIDE

ACKNOWLEDGEMENTS

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DISCLAIMER

This project has been funded by the U.S. Environmental Protection Agency (EPA), Office of Wastewater Management under Contract Nos. 68-C8-0066 and 68-C4-0068. The mention of trade name, commercial products, or organizations does not imply endorsement by the U.S. Government.

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1.0 INTRODUCTION

The PRELIM 5.0 program is designed to be used in conjunction with the U.S. Environmental Protection Agency's (EPA's) 1987 Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program (hereafter referred to as EPA's local limits guidance manual) in developing technically based local limits for publicly owned treatment works (POTWs). The program can be useful to POTWs or consultants for developing or revising local numeric limitations, and to states and EPA personnel for reviewing the proposed specific pollutant limits in POTW pretreatment program submissions or local limits submissions. PRELIM 5.0 simulates the methodology and calculations found in EPA's local limits guidance manual. Users of the program should be familiar with the procedures and methodologies for setting local limits. PRELIM cannot replace sound judgement where interpretation of input or output data is needed. Moreover, the technical adequacy of the PRELIM output is primarily a function of the extent and quality of POTW-specific data input. Extensive reliance on PRELIM literature data will greatly diminish the validity of PRELIM-derived local limits.

A critical part of a municipality's task in developing or implementing a local pretreatment program is the development of technically based numerical effluent limitations (local limits) on the discharge of incompatible pollutants to a POTW. These limitations are often incorporated directly into a municipal ordinance or are applied through individual control mechanisms, such as permits or orders, issued to nondomestic users of the POTW. Such limits are needed to enforce the prohibited discharge standards of the general pretreatment regulations and to implement three fundamental objectives of the National Pretreatment Program:

- To prevent the introduction of pollutants into the POTW which could interfere with its operation
- To prevent pass-through of untreated pollutants which could violate applicable water quality standards or National Pollutant Discharge Elimination System (NPDES) effluent limitations
- To prevent the contamination of POTW sludge which would limit the selected sludge uses or disposal practices.

Local limits supplement national categorical standards, which are federal technology-based limitations, imposed on all facilities in selected industrial categories. Local limits are necessary in cases where an industry is not covered by categorical standards, or where categorical standards are not adequate to protect the POTW or receiving stream or to prevent undue contamination of the sludge.

To gain a better understanding of the local limits development process, PRELIM users should consult the following references for guidance:

- U.S. EPA, Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, December 1987.

- U.S. EPA, Supplemental Guidance on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, 1991.

- U.S. EPA, Guidance Manual for Preventing Interference at POTWs, September 1987.

- U.S. EPA, Quality Criteria for Water, May 1987.

- 40 Code of Federal Regulations, Part 503.

2.0 GETTING STARTED

System Requirements

PRELIM is designed to run on an IBM-PC or on a compatible type computer with at least 640k conventional memory, a hard disk, and DOS Version 3.3 or higher.

PRELIM requires at least 1 megabyte (Mb) of free hard disk space to load the program files and more available hard disk space as the program is run and data are saved.

Installation

To load the PRELIM Version 5.0 program from the distribution diskette, insert the PRELIM distribution diskette into your floppy disk drive (assumed Drive A: in examples; substitute B: for A: if you are utilizing Drive B:) and at DOS type:

A:\> install <Enter>

The following screen will appear:

PRELIM v5.0 - Installation Program

Your are currently installing the latest version of EPA's PRELIM software (Version 5.0). PRELIM is designed to assist POTWs in developing local discharge limitations.

[Enter] to continue, [Esc] to quit.

Figure 2.1 - PRELIM v5.0 Installation

Follow the screen instructions for installing the software to your hard disk drive. Indicate the drive and the subdirectory where you wish to install PRELIM v5.0. The install program will create the specified subdirectory if it does not exist. The install program will also ask you whether you wish it to modify your AUTOEXEC.BAT and CONFIG.SYS files to accommodate the PRELIM v5.0 software.

PRELIM v5.0 - Installation Program

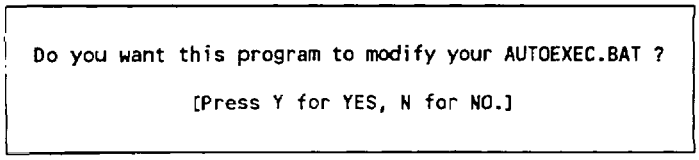


Figure 2.2 - PRELIM v5.0 Installation: AUTOEXEC.BAT Query

If you specify 'YES' the install program will add the following line to your AUTOEXEC.BAT:

```
SET CLIPPER=F35
```

where 35 represents a number equal to the number of files specified in the FILES command described below.

If you respond 'NO' to this question, you must ensure that your current AUTOEXEC.BAT contains, at minimum, the line SET CLIPPER=F##, where ## is set to 35 or above.

In addition to modifying the AUTOEXEC.BAT file, the installation will also ask whether you would like it to modify your CONFIG.SYS file. If you specify 'YES' the install program will add the following lines to your CONFIG.SYS:

```
FILES = 35
BUFFERS = 30
```

If you respond 'NO' to this question, you must ensure that your current CONFIG.SYS contains, at minimum, the FILES command equal to 35 or above.

The FILES command reserves enough room to have 35 files open at one time. If you have other programs running in DOS (i.e., TSRs, Windows 3.1, etc.) you may need to set this number somewhat higher. If you need to set the number higher than 35, you must change both the FILES command in your CONFIG.SYS and the SET CLIPPER command in your AUTOEXEC>BAT. These two commands need to use the same number.

The BUFFERS command reserves memory space for transferring information to and from disks. The optimum number really depends on your particular system (see your DOS manual for more information).

NOTE: IF YOU HAVE MODIFIED YOUR AUTOEXEC.BAT OR CONFIG.SYS FILES, YOU NEED TO REBOOT YOUR COMPUTER PRIOR TO RUNNING PRELIM.

Accessing PRELIM

Once PRELIM is loaded onto the hard disk, you can access PRELIM by going to the PRELIM5 directory and typing the word prelim at the C:\PRELIM5> prompt, as shown below:

C:\PRELIM5> prelim <Enter>

at the DOS prompt of subdirectory where you installed PRELIM. The screen shown in Figure 2.3 will appear. Press any key to access the main menu of PRELIM.

If you do not have a color monitor and encounter problems with a disappearing highlight bar (this may happen on an LCD screen), you can force PRELIM into monocolor by escaping from PRELIM and typing from your PRELIM subdirectory:

C:\PRELIM5> prelim /m <Enter>

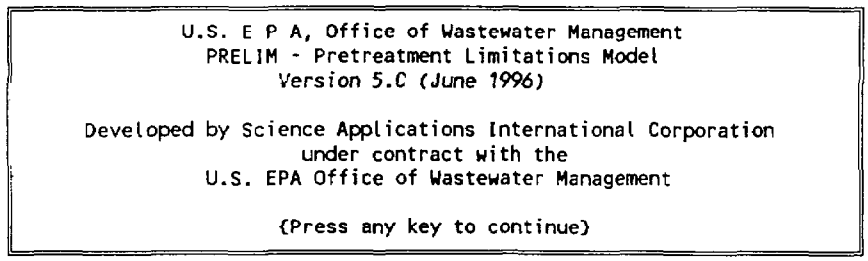


Figure 2.3 - Introduction Screen

3.0. DATA SHEETS

PRELIM v5.0 is designed so that the user may access the program and immediately proceed to enter data. However, you may find that it is easier to collect and manually collate the data onto one or more hard copy data sheets prior to inputting these data into the PRELIM program. Prior versions of the PRELIM manual provided hard copy data sheets for the user to facilitate data collection and organization. Instead of providing these sheets in this manual, PRELIM v5.0 allows you to print blank data sheets directly from the program (see Printing Blank Data Sheets in Section 4.0). These data sheets correspond with the order and organization of the data entry screens of the PRELIM program.

The organization of PRELIM data is keyed to a facility profile. When first using PRELIM, a user needs to enter a facility profile before choosing other menu options. A facility profile is defined as basic information about the POTW and all accompanying data (environmental criteria, plant concentration data, removals, and industrial data) needed to develop local limits. A user may develop different local limits scenarios (using different sludge disposal options, different decile removals, different safety factors, etc.) for one POTW and save these scenarios as unique facility profiles. Or, a user developing local limits for more than one treatment plant will use different facility profiles for each treatment plant.

This section of the manual describes each data sheet item and also explains in general how each piece of data is used in the calculations. Detailed explanations of how the data are used in the calculations can be found in Section 5.0 - PRELIM Output.

FACILITY PROFILE - DATA SHEET 1

This data sheet contains general information about a POTW including: a unique POTW name (please note that all other data pertaining to the facility profile is linked to a unique POTW name), wastewater and sludge flow data, effluent and sludge disposal methods and unit operations. When entering a new facility profile into PRELIM, you should enter data to this section first since PRELIM uses the information in creating the other data sheets and performing calculations.

A. POTW Name	Enter the name of your POTW. If you are developing multiple scenarios for one POTW, use some type of identifier in the POTW Name to distinguish between different profiles (e.g. "Northside Plant 001", "Northside Plant 002", "Northside Plant 003", etc.).
B. Wastewater Unit Operations	Mark all operations that are used at the treatment plant by entering an 'X'. The PRELIM program will use this information to display the correct data entry columns in the Standards and Criteria data entry section. If the treatment plant does not use the operations listed, but has other types of secondary (e.g. aerated lagoon) or tertiary treatment processes, indicate this

as "Other Secondary" and/or "Other Tertiary."

C. Plant Flow Information

(POTW Average Flow) Enter the average daily dry weather flow in Million Gallons Per Day (MGD). This flow is used in almost all of the headworks loadings equations.

(Industrial Flow) Enter the total flow (in MGD) received from industrial contributors. Do not include commercial flow (restaurants, gas stations, etc.) in this number unless you also wish to apply local limits to all commercial establishments. This number will be used when allocating maximum allowable headworks loadings using the uniform industrial concentration method.

(Non-industrial Flow) Enter the total flow (in MGD) received from residential contributors. Be sure to include commercial flow unless you are applying local limits to these users. This non-industrial flow is used to determine background loadings from domestic and commercial users.

(Sludge to Digester) Enter the total flow (in MGD) to the digester. This flow will be used in the calculation of headworks loadings based on sludge digester inhibition.

D. Effluent Disposal Method — Mark the appropriate type of receiving water with an 'X'. The PRELIM program will use this information to display the correct EPA water quality criteria when queried for a literature value for acute or chronic water quality criteria. If estuarine or other waters is selected, no literature value will be available for acute or chronic water quality criteria.

E. Receiving Water Dilution — Derive appropriate receiving water dilution by 1) determining and multiplying the 1Q10 (and/or 7Q10) upstream flow(s) by the percent of the receiving water flow available for dilution with the POTW discharge; and 2) dividing the resulting value(s) by the average POTW flow. The resulting receiving water flow value for the 1Q10 (and/or 7Q10) is the value to input into PRELIM v5.0. The receiving water dilution is used to determine headworks loadings based upon acute and chronic water quality criteria.

F. Sludge Digestion Operations	Mark applicable sludge digestion operation(s) with an 'X'. The PRELIM program will use this information to determine the correct data entry columns to display in the Standards and Criteria data entry section.
G. Sludge Flow to Disposal	Enter the sludge flows for each category of disposal in metric tons per day. The PRELIM program will check the values (check for quantities greater than 0) to determine the correct data entry columns to display in the Standards and Criteria data entry section.
(Codisposal/Landfill)	Indicate quantity of sludge disposed to a landfill (using a decimal as appropriate).
(Bulk Land Application) - Agricultural -	Indicate the quantity of sludge that is applied to land and subject to 40 CFR Parts 503.13(a)(1) and (a)(2) pollutant limitations.
(Bulk Land Application) - Lawn/Home -	Indicate the quantity of sludge that is applied to land and subject to 40 CFR Parts 503.13(a)(1) and (a)(3) pollutant limitations.
(Non-bulk Land App.)	Indicate the quantity of sludge that is applied to land and subject to 40 CFR Parts 503.13(a)(1) and (a)(4) pollutant limitations.
(Surface Disposal) -Unlined-	Indicate the quantity of sludge that is disposed on a surface disposal site AND is subject to 40 CFR Part 503.23 pollutant limitations. If the sludge is disposed on a surface disposal site, but is not subject to 40 CFR 503.23 pollutant limitations, you can either (1) enter the sludge quantity in this category and delete the default Federal standards in the Standards and Criteria data entry section or, (2) enter the sludge quantity in the "Other Disposal" category.
(Incineration)	Indicate the quantity of sludge that is fed into a sewage sludge incinerator that is subject to 40 CFR Part 503.43 pollutant limitations.
(Site Area)	Enter the area of the land (agricultural, forest, public contact, or reclamation sites) in hectares to which bulk sewage sludge is applied (subject to 40 CFR 503.13[a][1] and [a][2] pollutant limitations). The PRELIM program will use this site area when determining allowable headworks loadings based upon Federal cumulative pollutant

loading rate limitations (40 CFR Part 503.13, Table 2) and loadings based upon State cumulative pollutant loading rate limitations.

(Site Life) — Enter the expected life of the bulk land application site in years. The PRELIM program will use this site life when determining allowable headworks loadings based upon Federal cumulative pollutant loading rate limitations (40 CFR Part 503.13, Table 2) and when determining allowable headworks loadings based upon State cumulative pollutant loading rate limitations.

(Annual Whole Sludge Application Rate) - AWSAR - — Enter the targeted AWSAR in metric tons per hectare per year for non-bulk sewage sludge land application. The PRELIM program will use the AWSAR to determine allowable sludge concentrations and subsequent allowable headworks loadings based upon Federal annual pollutant loading rate limitations (40 CFR Part 503.13, Table 4).

(Distance from Unit to Property Line) — Indicate the distance (in meters) from a surface disposal unit subject to 40 CFR Part 503.23 pollutant limitations to the property line. The PRELIM program uses this value to select the correct Federal pollutant limitations in the Standards and Criteria data entry section. If a value is not entered, PRELIM will use a distance of zero meters.

H. Incineration — Mark the appropriate type of incinerator with an 'X'. The PRELIM program uses this value to select the correct Risk Specific Concentration (RSC) for chromium in the Standards and Criteria data entry section.

I. Dispersion Factor — Indicate the dispersion factor for the the sewage sludge incinerator. This value is used to determine allowable headworks loadings based on the NAAQS for lead and the RSCs for arsenic, cadmium, chromium, and nickel.

STANDARDS AND CRITERIA - DATA SHEET 2

Data Sheet 2 contains data on Federal and State standards and criteria, inhibition threshold concentrations, POTW pollutant concentrations, receiving water concentrations, nonindustrial pollutant concentrations, POTW removal efficiencies, and pollutant safety factors. The layout of the data entry sheet is a spreadsheet format. All potential data columns are listed on the hard copy data sheet. When entering data into the PRELIM program, only the relevant data columns will appear on the PRELIM standards and criteria data entry spreadsheet (these relevant columns are dependent upon the facility profile defined in Data Sheet 1). Data Sheet 2 only lists those pollutants selected as pollutants of concern, so the user must select pollutants before accessing Data Sheet 2 (see Selecting Pollutants of Concern in Section 4.0).

Where environmental standards or criteria are not applicable, leave these data fields blank.

The remainder of this section describes each of the data columns. Data marked with an asterisk (*) contain embedded literature data within the PRELIM program. If you wish to use literature data for a particular pollutant, you can press the <F10> key during PRELIM data entry (when the appropriate data field is highlighted) to place the literature value on the spreadsheet. More information on using literature data, along with the sources of these data, is provided at the end of Section 3.0.

Average Influent Concentration (mg/l)	Enter average pollutant concentrations received in the POTW influent. Blank data will be treated as zero.
Average Nonindustrial Concentration (mg/l) *	Enter the average nonindustrial concentration. Blank data will be treated as zero.
NPDES Effluent Limit (mg/l)	Enter any applicable NPDES effluent limits.
Background Concentration in Receiving Waters (mg/l)	Enter the background receiving water concentrations. These values will be used when calculating allowable headworks loadings based on acute, chronic, and other water quality criteria. A blank value will be treated as a zero.
Chronic Water Quality * Criterion/Standard (mg/l)	Enter Federal or state chronic water quality criteria for each pollutant of concern. Be sure to enter a 7Q10 based receiving water dilution ratio in Data Sheet 1 otherwise a dilution of zero will be utilized. PRELIM will not consider chronic water quality criteria for a pollutant unless the data are entered in this column.
Acute Water Quality * Criterion/Standard (mg/l)	Enter Federal or state acute water quality criteria for each pollutant of concern. Be sure to enter a 1Q10 based receiving water dilution ratio in Data Sheet 1, otherwise a dilution of zero will be utilized. PRELIM will

	not consider acute water quality criteria for a pollutant unless data are entered in this column.
Other Water Quality Criterion (mg/l)	Enter other applicable water quality criteria not previously specified. The PRELIM program will utilize the 7Q10-based receiving water dilution ratio from Data Sheet 1 when calculating allowable headworks loadings based upon this value. PRELIM will not consider other water quality criteria for a pollutant unless the data are entered in this column.
Pollutant Level in Sludge to Digester (mg/l)	Enter pollutant levels in the sludge going to the digester. These concentrations are used to determine allowable headworks loadings based on sludge digester inhibition for nonconservative pollutants.
Pollutant Level in Sludge to Disposal (mg/kg)	Enter pollutant levels in the sludge going to disposal. These concentrations are used to determine allowable headworks loadings based on sludge disposal for nonconservative pollutants.
Federal Land Application Ceiling Conc. (mg/kg) *	If you entered sludge disposal quantities greater than zero for any sludge land application option in Data Sheet 1, PRELIM automatically enters these pollutant limitations into Data Sheet 2. You may enter a different value by typing over the ceiling concentration value. To retrieve the Federal ceiling concentration, press the <F10> key on the appropriate data field.
Federal Cumulative Pollut. Load. Rate (kg/ha) *	If you entered a sludge disposal quantity greater than zero for bulk land application to agricultural, forest, public contact, or reclamation sites in Data Sheet 1, PRELIM automatically enters these pollutant limitations into Data Sheet 2. You may enter a different value by typing over the cumulative pollutant loading rate. To retrieve the Federal cumulative pollutant loading rate, press the <F10> key on the appropriate data field.
Federal Land Application Pollutant Conc. (mg/kg) *	If you entered sludge disposal quantities greater than zero for bulk land application to lawn or home garden, or for non-bulk land application, in Data Sheet 1, PRELIM automatically

enters these pollutant limitations into Data Sheet 2. You may enter a different value by typing over the land application pollutant concentration. To retrieve the Federal land application pollutant concentration, press the <F10> key on the appropriate data field.

Federal Annual Pollut. * Loading Rate (kg/ha/yr)

If you entered a sludge disposal quantity greater than zero for non-bulk land application in Data Sheet 1, PRELIM automatically enters these pollutant limitations into Data Sheet 2. You may enter a different value by typing over the annual pollutant loading rate. To retrieve the Federal annual pollutant loading rate, press the <F10> key on the appropriate data field.

Federal Surface * Disposal Criterion (mg/kg)

If you entered a sludge disposal quantity greater than zero for surface disposal in Data Sheet 1, PRELIM automatically enters these pollutant limitations into Data Sheet 2. You may enter a different value by typing over the surface disposal criterion. To retrieve the Federal surface disposal criterion, press the <F10> key on the appropriate data field.

NEESHAP (g/day) *

If you entered a sludge disposal quantity greater than zero for incineration in Data Sheet 1, PRELIM automatically enters the NEESHAP pollutant limitations for beryllium and mercury into Data Sheet 2. You may enter a different value by typing over the NEESHAP value. To retrieve the NEESHAP pollutant limitations, press the <F10> key on the appropriate data field.

NAAQS and RSC (ug/m3) *

If you entered a sludge disposal quantity greater than zero for incineration in Data Sheet 1, PRELIM automatically enters the NAAQS pollutant limitation for lead and the Risk Specific Concentration pollutant limitations for arsenic, cadmium, chromium, and nickel. You may enter a different value by typing over the NAAQS or RSC value. To retrieve the NAAQS or RSC value, press the <F10> key on the appropriate highlighted field. For the chromium RSC, the correct incinerator type must be selected on Data Sheet 1.

Incineration Control Efficiency (%)	Enter the incinerator removal efficiency for each pollutant. A blank value will be interpreted as a zero by PRELIM.
State Sludge Cumulative Application Rate (kg/ha)	Enter any state cumulative application rate criterion for bulk land application of sewage sludge to agricultural, forest, public contact, or reclamation sites.
State Sludge Annual Application Rate (kg/ha/yr)	Enter any state annual application rate criterion for non-bulk land application of sewage sludge.
State Sludge Conc. Criterion (mg/kg)	Enter any other state sludge disposal concentration criterion (e.g., Grade 1, Class A, state criteria for surface disposal to a unit with liner/leachate collection). If a facility is subject to state annual pollutant loading rates for bulk land application, the rates must be converted to maximum pollutant concentrations (in mg/kg) by the user before they are entered. (See Section 5.4, Column 10 of this User's Guide.)
State Incinerator Emissions Limits (g/day)	Enter any state sludge incinerator emissions limits.
Inhibition Criteria (mg/l) - Activated Sludge * - Trickling Filter/RBC * - Other Secondary - Nitrification - Other Tertiary	Enter known and/or literature inhibition threshold levels for applicable unit processes. PRELIM will ignore all blank data values in headworks loadings calculations.
Removal Efficiency Through Primary (%) *	If you operate a secondary or tertiary treatment plant, you should enter a primary removal efficiency for each pollutant which has a corresponding secondary inhibition level. The primary removal is only used to calculate allowable headworks loadings based on secondary inhibition levels. PRELIM will interpret a blank value as a zero.
Removal Efficiency Through Secondary (%) *	If you operate a tertiary treatment plant, you should enter a secondary removal efficiency for each pollutant which has a corresponding tertiary inhibition level. The secondary removal is only used to calculate allowable headworks loadings based on tertiary inhibition levels. PRELIM will interpret a blank value as a zero.

Plant Removal Efficiency - Pass-Through - (%) *	Enter the through plant removal efficiency which you would like PRELIM tc use in calculating allowable headworks loadings based on pass-through. This removal may be the same as the plant removal efficiency chosen for calculations based on sludge disposal, but the removal efficiency must also be entered here. If you have entered POTW removal data for this pollutant in Data Sheet 3, you can access average daily, mean, and decile removals for the pollutant by pressing <F8>.
Plant Removal Efficiency - Sludge - (%) *	Enter the through plant removal efficiency which you would like PRELIM to use in calculating allowable headworks loadings based on sludge disposal and sludge digester inhibition. This removal may be the same as the plant removal efficiency chosen for calculations based on pass-through, but the removal efficiency must also be entered here. If you have entered POTW removal data for this pollutant in Data Sheet 3, you can access average daily, mean, and decile removals for the pollutant by pressing <F8>.
Safety Factor (%)	Enter an optional safety factor for each pollutant as in concurrence with Regional or State policy. A blank will be interpreted by PRELIM as a zero.

REMOVAL EFFICIENCY DATA - DATA SHEET 3

If you wish to calculate removals based upon POTW plant data, you can enter either percentage removal rates, or sets of influent/effluent pairs into Data Sheet 3. When entered into PRELIM 5.0, these values can be used to calculate the mean, daily average, or decile values for each pollutant. For a discussion of calculated removal rates, refer to EPA's 1991 Supplemental Guidance on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program.

Date and Flow	For each POTW sampling event, enter the date the sampling event took place. If you are entering influent/effluent concentrations and wish to calculate mean removals, enter the POTW daily flow for that date in MGD.
Total Removal (%)	Enter the total daily removal for the POTW on the sampling date. If you also enter influent and effluent concentrations, PRELIM will use the total daily removal, as entered by the user, for the calculations. PRELIM will not correct an incorrectly entered total daily removal when the

	influent/effluent concentrations indicate a different removal for that day.
	AND/OR
Influent and Effluent (mg/l)	Enter the influent and effluent concentrations for the pollutant for the given date. If you do not enter a corresponding total removal rate percentage, PRELIM will calculate this automatically.

INDUSTRIAL USER DATA - DATA SHEET 4

If you are planning to allocate allowable headworks loadings based on the industrial contributory, mass proportion, or the selected industrial reduction method (see EPA's 1987 local limits guidance manual for a description of these methods), you must enter industrial data by completing Data Sheet 4. You will not need to enter industrial data if you are planning to allocate allowable headworks loadings based on the uniform concentration method. To complete this sheet, industry specific monitoring data must be used, including flow data and pollutant concentrations for those pollutants that are expected to be regulated. No literature data for industrial contributors are provided since site-specific industrial data must be used to accurately characterize an industry, and to correctly allocate loadings to industry.

IU	Provide a unique name for the industry.
Flow (MGD)	Enter the average industrial flow in MGD.
Average Effluent (mg/l)	Enter the average industrial pollutant concentration. PRELIM will interpret blank values as zero.
Selected Removal (%)	Enter a selected industrial removal if this industry is targeted for reductions in its pollutant loadings to the POTW. PRELIM will interpret blank values as zero and no reduction will be required for those industries.

LITERATURE DATA

Some literature data for background concentrations, inhibition levels, removal rates, and water quality criteria have been included in the PRELIM 5.0 program. To access these data, use the <F10> key when the appropriate data field is highlighted during data entry or data editing. If a literature value is present for a particular pollutant, the value will be added to the data entry screen. If you decide not to use it, just type over the value to replace it. Literature data available in PRELIM 5.0 include:

- Nonindustrial pollutant concentrations as presented in Table 2 of EPA's 1991 *supplemental local limits guidance*

- EPA 1986 Gold Book Water Quality Criteria (chronic and acute) as presented in Table 3.1 of EPA's 1987 local limits guidance manual.

- Process inhibition criteria (activated sludge and other secondary processes, anaerobic digestion, nitrification) based on minimum reported values for these units (see EPA's 1987 guidance, Chapter 3 tables).

- Sludge land application, surface disposal, and incineration pollutant limitations from 40 CFR Part 503.

- Standards for incinerators from 40 CFR Part 503 and 40 CFR Part 61.

- Median plant removal efficiencies for primary, secondary, and tertiary treatment processes as presented in Tables 3-9, 3-10, 3-11, and 3-12 of the 1987 local limits guidance manual.

4.0 DATA ENTRY

This section explains the general data entry procedures and gives information on areas where users most commonly have questions when entering data into PRELIM.

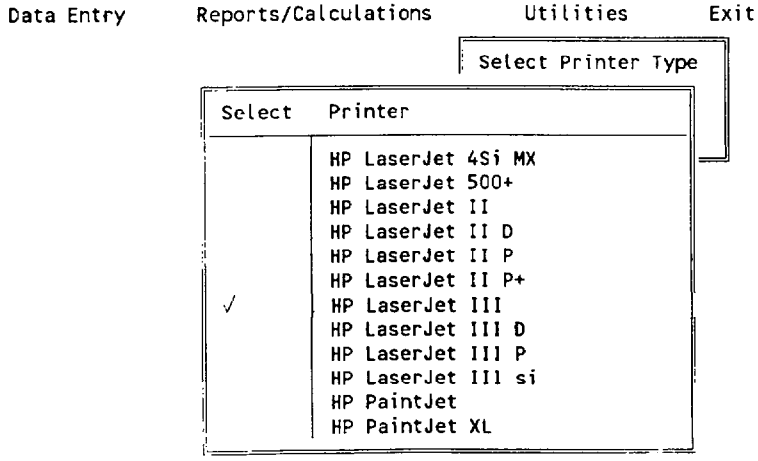
MENU NAVIGATION and KEYS

The use of the menu system is based upon a series of menus and highlight bars which can be manipulated and navigated using the arrow keys, and the <Enter> and <Esc> keys. When browsing a list of items (e.g. list of pollutants, list of printers, etc.) you may also have the option of using the <PgDn>, <PgUp>, <Home>, and <End> keys. When selecting from a list of items (e.g. facility profile selection, pollutant selection, etc.) you will generally use the <Space> bar to toggle a check mark on or off. Item lists may also give you the option of adding (<Ins> key), editing (<F2> key), or deleting (<Del> key) a row on the list (pollutant selection, removal dates, and industrial users). The spreadsheet style data entry for standards and criteria, removals, and industrial data, allow you to quickly add data and move about the screen using arrow keys. Note that when entering data in these spreadsheet style screens, you DO NOT have to press <Enter> to confirm each value. When you use <Esc> to exit a data entry screen, the data are automatically saved.

SETTING UP TO PRINT

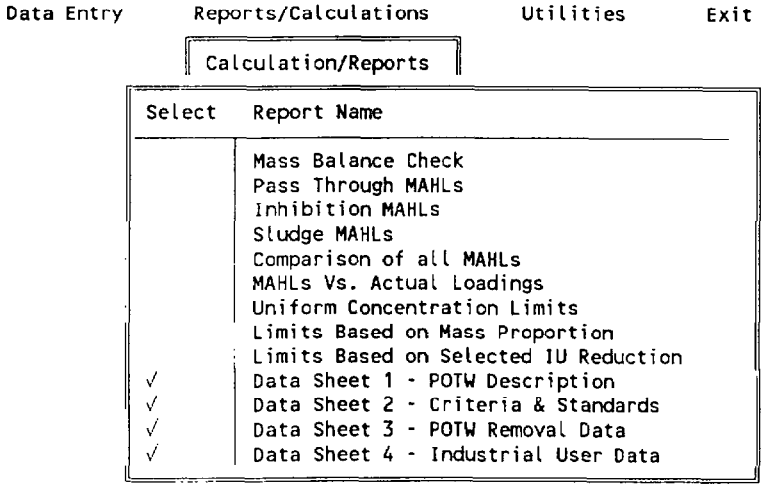
Because the PRELIM reports (including the blank data sheets) are printed in a compressed 132-column format, you need to define your printer type the first time you run PRELIM. If a printer type is not selected, any data sheets or reports you print may be too large for a page and be cutoff. Choose the "Select Printer Type" option from the "Utilities" menu to access a list of defined printers in PRELIM. If your specific printer is not listed, try to select a similar type of printer (e.g. if you have an unlisted laser printer, try the HP Laserjet).

After you have selected a printer type, move to the "Select Printer Port" option of the "Utilities" menu. Select the printer port of your computer (the initial default setting is 'LPT1'). Once you have defined your printer type and printer port, you will not need to define these again, unless your printer or printer port changes.



PRINTING BLANK DATA SHEETS

PRELIM will allow you to print data sheets at any time during the data entry process. PRELIM will need however, at minimum, a facility name in order to create a new facility profile. To print properly, PRELIM also needs a printer type defined (see previous section). To create blank data sheets, first add a facility name in the "Facility Profile" section of the "Data Entry" menu. Once you have added a facility name, but before entering any other data, escape <Esc> from the data entry process and proceed directly to the "Skip Calculations" option of the "Reports/Calculations" menu. Upon pressing <Enter> for this option, the following screen will appear:



Use the cursor keys and the <Space> bar to select the four data sheets at the bottom of the report selection menu. Press <Enter> and PRELIM will begin to generate a new set of data sheets for your selected facility (note: this option can also be used to print your facility data once you have completed entering data into PRELIM). Once PRELIM has generated the data sheets, it will give you the option of printing the data sheets to the screen, printer, or file. If you expect to print additional blank data sheets in the future, you may want to add a facility named "Blank Data Sheets" following the above procedure, and leave the rest of the data sheets blank. This facility can then be selected and blank data sheets generated, as explained above.

ADDING A NEW FACILITY PROFILE

To add a facility profile, select the "Facility Profile" option from the "Data Entry" menu. If you have not defined any previous facility profiles, PRELIM will immediately send you to the Facility Profile Data Entry screen, similar to the one shown below. If there are other profiles that you have added, PRELIM will display a Facility Profile selection menu where you can choose to add, edit, or delete facility profiles.

Please note that there are two screens in the Facility Profile data entry section. You may hit the <PgDn> from the first screen at any time to go to

the second screen. Conversely, you may hit the <PgUp> key when in the second screen to go back to the first screen.

```
                    Facility Profile: Data Sheet #1A

POTW Name: 32nd Street Plant

WASTEWATER UNIT OPERATIONS:              EFFLUENT DISPOSAL METHOD:
(Use an 'X' where appropriate)           (Use an 'X' where appropriate)
 X - (1) Primary Clarification:           X - Fresh:          - Estuarine:
 X - (2) Activated Sludge:                  - Salt:           - Other:
   - (2) Trickling Filter:
   - (2) Other Secondary:                RECEIVING STREAM DILUTION:
   - (3) Nitrification:                  - 1Q10 Based:    4.000
   - (3) Other Tertiary:                 - 7Q10 Based:    2.000

PLANT FLOW INFORMATION:                  SLUDGE DIGESTER OPERATIONS:
- POTW Average Flow (mgd):     10.000    (Use an 'X' where appropriate)
- Industrial Flow (mgd):        1.000      - Aerobic:        - Other:
- Non-industrial Flow (mgd):    9.000     X - Anaerobic:
- Sludge to Digester (mgd):     0.2200

     <PgDn> next page, <Enter> next field,  <Esc> to exit (data saved).
```

Your current facility selection stays active throughout the data entry process, unless you change the selection status in the Facility Profile selection screen shown below:

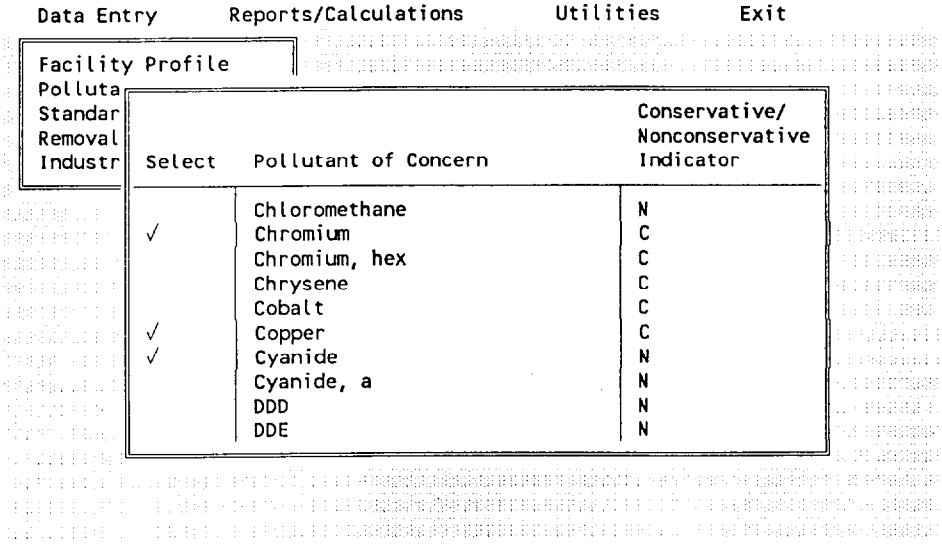
```
  Data Entry      Reports/Calculations      Utilities      Exit

 Facility Profile
 Pollutant Selection
 Standards/C
 Removal Eff
 Industrial
              Select   POTW Name
                       32nd Street Plant
                  √    North Side Plant
```

SELECTING POLLUTANTS OF CONCERN

Once you have entered a facility in the facility profile section, you will need to define the pollutants of concern. Choose the "Pollutant Selection"

option from the "Data Entry" menu. The Pollutant Selection screen shown below will appear. By default, the initial pollutants selected include EPA's list of ten pollutants of concern (arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, and zinc). You can deselect these pollutants if desired, and select additional pollutants of concern as needed (using the <Space> bar to "switch" pollutants on or off). If you have a pollutant of concern which is not on the list, you may add it to the selection screen with the <Ins> key. If you add a pollutant, you must enter 'C' for conservative, or an 'N' for a nonconservative pollutant. Pollutants may also be edited (<F2> key) or deleted. Once pollutants have been selected for a facility profile, they will be displayed on subsequent data entry screens for that facility profile.

Note: If you want to deselect a previously selected pollutant for a particular facility, use the <Space> bar on the Pollutant Selection screen for that facility. If you want to delete a pollutant from ALL facilities and future Pollutant Selection screen lists, use the <Del> key. Using the <Del> key will DELETE the pollutant for ALL facilities (including from the data entry screens), unless it is one of EPA's 10 pollutants of concern, which may not be deleted.



ADDING STANDARDS AND CRITERIA

Once you have added a facility profile and selected pollutants of concern, you may select the "Standards and Criteria" option on the "Data Entry" menu. When you press <Enter> on this option, a spreadsheet style data entry menu will appear with standards and criteria on the top columns, and a selected pollutant on each row. The highlight bar will be on one "cell" of the spreadsheet. On this "cell" you should enter the appropriate data for the given pollutant. Notice that only the first four columns of Data Sheet 2 are displayed. When entering data, you may scroll up, down, or across the spreadsheet using the arrow keys. The spreadsheet will pan as you move your highlight bar displaying hidden columns or rows.

Literature data for a given standard/criteria and pollutant may be accessed by pressing the <F10> key on the appropriate column and row. If literature data are not available, PRELIM will provide a warning message to alert the user.

Though PRELIM does not validate the data entered into this screen, these data should all be numeric values or left blank. Values such as "BDL" or "< 0.05" should not be used as they will be interpreted as zeros or as only the value of the numeric portion depending upon how the data are formatted. All data are automatically saved as they are entered. You may escape <Esc> data entry at any time, however, all changes made will be saved.

Pollutant of Concern	POTW Average Influent Conc. (mg/l)	Average Non-Indust. Conc. (mg/l)	NPDES Effluent Limit (mg/l)	Backgrd. Receiving Water Conc. (mg/l)
Arsenic	0.0023	0.007		0.0001
Beryllium	0.002			0
Cadmium	0.0071	0.008	0.02	0.0021
Chromium	0.013	0.034		0.003
Copper	0.12	0.109	0.17	0.006
Cyanide	0.05	0.082		
Lead	0.055	0.116	0.08	0.001
Mercury	0.0002	0.002		
Molybdenum				
Nickel	0.046	0.021		0.05
Selenium	0.02	0.004		
Silver	0.0093	0.019	0.061	
Zinc	0.29	0.212		0.035

ADDING REMOVAL DATA

If you wish PRELIM to calculate averages or deciles from your treatment plant data, you may enter these data under the "Removal Efficiency" option in the "Data Entry" menu. After pressing <Enter> on this option, a Date Selection screen will appear allowing you to add, edit, or delete dates and average POTW flows for these sampling dates. Once you add a new sampling date and flow, PRELIM will keep you at the date selection screen, unless you select the date by pressing <Enter>. In this way, you may add all the date and flow information first, then proceed to enter the POTW removal efficiency data for each of the dates. When you select a date, PRELIM will display the following screen.

Data Entry Reports/Calculations Utilities Exit

Faci
Poll
Stan
Remo
Indu

01/01/94

Pollutant Name	Total Removal Rate (%)	Influent Conc. (mg/l)	Effluent Conc. (mg/l)
Arsenic		0.003	0.001
BOD5		178	10
Beryllium		0.002	0.002
Cadmium		0.04	0.013
Chromium	67		
Copper	50		
Cyanide			
Lead	45		
Mercury	10		

PRELIM allows you to enter either the total removal rate or a set of influent/effluent concentrations for the POTW for a sampling event. You may enter both if you wish, and you may mix and match these choices for different pollutants, or across sampling events. PRELIM will consider negative removals in its calculations. Users obtaining negative removal efficiencies should contact their approval authority to determine how to treat negative values.

SELECTING DECILE REMOVALS

If you have entered removal data, you can access these data while in the Standards and Criteria data entry section. To access these data, scroll across the spreadsheet to the columns labeled "Plant Removal (Pass-Through)" and "Plant Removal (Sludge)." Once the highlight bar is in one of these two columns, and on a pollutant (a row) with removal data, you may press the <F8> key to access the PRELIM's calculated average daily removal, mean removal, or decile removals if applicable.

Pollutant of Concern	Through Primary Removal Rate (%)	Plant Removal (Pass-Through) (%)	Plant Removal Rate (Sludge) (%)	Polltant Safety Factor (%)
Arsenic	10	45	55	10

Daily Avrage Remval	Mean Remval	Decile Removals for Cadmium 1st	2nd	3rd	4th	5th	6th	7th	8th	9th
35.4	0.0	-18.4	2.8	14.8	22.4	34.0	45.6	59.2	72.4	85.2

Molybdenum	0	5.0	60	10
Nickel	14.00	42.00	42.00	10
Selenium	10	50.00	50.00	10
Silver	20.00	75.00	75.00	10
Zinc	27.00	79.00	79.00	10

Daily average removal is calculated by averaging the total plant removals for all sampling events for a pollutant. If you have entered influent/effluent concentrations, PRELIM will automatically calculate daily removal for each sampling event. Mean removal is obtained by calculating removal based on the mean influent and effluent loading to the treatment plant. Deciles are calculated based upon total plant removals, and are only calculated when there are nine or more data points. Please consult the 1987 EPA local limits guidance manual or the 1991 EPA supplemental local limits guidance manual for a more detailed description of these removals.

When the removal selection screen is displayed you can move the highlight bar to the removal you wish to select. By pressing <Enter> on a given removal, you will transfer that value to the corresponding Plant Removal column in Data Sheet 2. If you press <Esc> at the removal selection screen, you will be returned to the Standards and Criteria spreadsheet without transferring any removal value. When entering removals, you must enter removals for both the Pass-through and the Sludge columns, even if they are the same value.

EPA's local limits guidance manual recommends using 2nd decile removals for pass-through calculations and 8th decile removals for sludge calculations. It is recommended that you check with State or Regional policy prior to determining appropriate removal efficiencies for your facility.

ADDING INDUSTRIAL DATA

If you wish PRELIM to calculate industrial limits based upon the industrial contributory, mass proportion, or selected industrial reduction methods, you must enter site-specific industrial data. You may enter these data under the "Industrial Data" option in the "Data Entry" menu. After pressing <Enter> on this option, an Industry Selection screen will appear allowing you to add, edit, or delete industries and industrial flows. Once you add a new industry and flow, PRELIM will keep you at the industry selection screen, unless you select the industry by pressing <Enter>. In this way, you may add all the industry name and flow information first, then proceed to enter the industrial concentration data for each of industry. When you select an industry, PRELIM will display the following screen.

Data Entry Reports/Calculations Utilities Exit

Facility
Pollutan
Standard
Removal
Industri

Town Electroplaters

Pollutant Name	Average Conc. (mg/l)	Selected Percent(%) Reduction
Arsenic	0.002	0
BOD5		
Beryllium		
Cadmium	0.8	25
Chromium	2.65	50
Copper	1.2	50
Cyanide	0.64	
Lead		
Mercury		

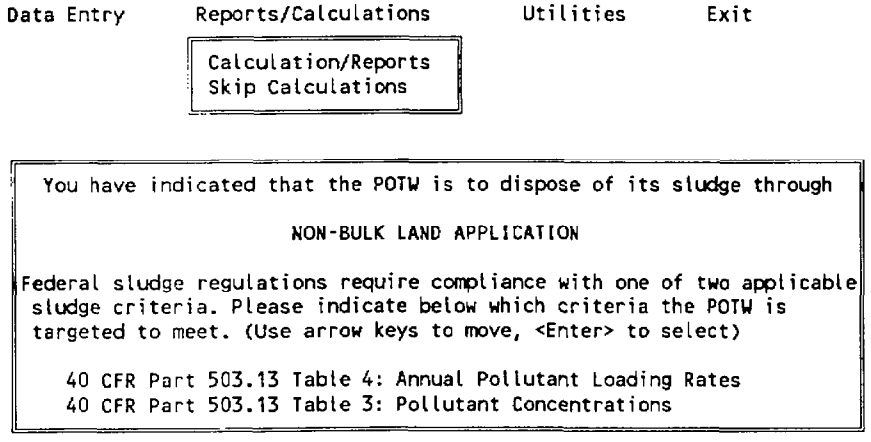
If you will be utilizing the selected industrial reduction method, you may enter a percent reduction on a pollutant by pollutant basis in this screen.

PERFORMING CALCULATIONS AND PRINTING REPORTS

After you have entered all relevant data for a facility profile, you can have PRELIM calculate local limits by selecting the "Calculation/Reports" option on the "Reports/Calculations" menu. After pressing <Enter> on this selection, PRELIM immediately begins calculating limits for all selected pollutants. If you wish to calculate limits on a subset of your selected pollutants, you should deselect unwanted pollutants in the "Pollutant Selection" section of the "Data Entry" menu. When you deselect pollutants from the Pollutant Selection" screen you will not be losing any data you have entered for these

pollutants. By deselecting a pollutant, you simply suppress the display of this pollutant in subsequent data entry screens or reports. Upon reselecting a pollutant, these data will be redisplayed as they were originally saved. If however, you DELETE a pollutant from the Pollutant Selection screen, you will lose all data entered for this pollutant.

If the facility sludge is subject to Federal bulk land application (agricultural, forest, etc.) or non-bulk land application requirements under 40 CFR Part 503, a screen will appear during calculations asking which criteria [either cumulative pollutant loading rates or pollutant concentrations for bulk (agric., etc.) or annual pollutant loading rates or pollutant concentrations for non-bulk] PRELIM should use in calculating limits. For example, for non-bulk land application, a screen similar to the following will appear during calculations:



Choose the appropriate portion of the standard you wish the facility sludge to meet. PRELIM will calculate allowable headworks loadings based upon both choices, however, when selecting a maximum allowable headworks loading based on sludge disposal, PRELIM will use your selection to compare with other allowable sludge disposal loadings.

During calculation, you may also see the following screen regarding inhibition criteria when compared to influent concentrations. If the plant is receiving influent loadings higher than allowable headworks loadings based upon inhibition, PRELIM will query whether inhibition is occurring.

```
                The influent loading for Cadmium
is greater than the maximum allowable loadings based on inhibition.

 Has inhibition occurred at the POTW due to this chemical (Y/N)? N

      (A 'Y' will retain the calculated MAHL for inhibition )
      (A 'N' will replace inhibition MAHL with influent load)
```

Once calculations are complete the Report Selection menu will be displayed (see Printing Blank Data Sheets in this section). Choose which reports and/or data sheets you would like to see using the <Space> bar to select/deselect reports. Once the reports have been generated, you may direct the output to the screen, printer, or a file. If you save the report(s)/data sheet(s) to a file, PRELIM will save the file to the directory where you loaded PRELIM 5 (usually your PRELIM5 directory). If you want to save more than one set of reports/data sheets to files, you must enter unique filenames each time or your files will be overwritten.

If you choose the Skip Calculations option and go directly to generating reports, please note that the reports (described in Section 5.0) will not be updated since calculations were last performed by PRELIM. However, the data sheets will be automatically updated. The Skip Calculations is primarily provided to allow users to print blank data sheets for assistance in gathering data for input to PRELIM.

When viewing the reports, the user should keep in mind that any nonapplicable values will appear as 10000000.000. For example, if a user any inhibition limits in the Standards and Criteria section, the MAHLs for inhibition for that pollutant would appear as 10000000.000 to indicate that PRELIM did not have sufficient data to calculate the value.

DATA MAINTENANCE

When the user deletes data (e.g., a facility profile), PRELIM marks the appropriate records for deletion in the affected databases. However, these records are not actually deleted until the databases are packed using the "Data Maintenance" option under the "Utilities" menu. The user should periodically run the Data Maintenance utility to eliminate unnecessary records from the databases and thus free up disk space. Note that PRELIM does not keep a backup copy of the deleted records.

5.0 PRELIM OUTPUT EQUATIONS

The PRELIM output is formatted in a series of output tables which show calculated allowable headworks loadings for various criteria for all pollutants of concern. The descriptions below pertain to the eight PRELIM output tables and the equations used to determine each of their respective columns. Descriptions of the variables in the equations are also included. A number designation after the description [e.g. (1),(2),(3), or (4)] indicates from which data sheet the value is extracted. For reports 1 through 7, Column 1 contains the pollutant name. For reports 8 & 9, Column 1 contains the industry name.

5.1 MASS BALANCE CHECK

COLUMN 2: Uncontrollable (Nonindustrial) Sources (pounds/day)

$$L:dom = (8.34)(C:dom)(Q:dom)$$

L:dom = Nonindustrial loading in lbs/day
C:dom = Average nonindustrial concentration (mg/l) (2)
Q:dom = Nonindustrial flow (MGD) (1)

COLUMN 3: Controllable (Industrial) Sources (pounds/day)

$$L:ind = \Sigma\ [(8.34)(C:ind)(Q:ind)]$$

L:ind = Total industrial loading in lbs/day
Σ = Summation of industrial loadings from all industries
C:ind = Industrial concentration for Industry #n (4)
Q:ind = Industrial flow for Industry #n (4)

COLUMN 4: Total Sources (cols. 2 & 3) (pounds/day)

$$L:tot = L:dom + L:ind$$

L:tot = Total calculated loading to the POTW in lbs/day

COLUMN 5: POTW Influent Load (pounds/day)

$$L:inf = (8.34)(C:inf)(Q:potw)$$

L:inf = Actual POTW influent loading in lbs/day
C:inf = Average POTW influent concentration (2)
Q:potw = POTW average flow (MGD) (1)

COLUMN 6: Difference (cols. 4 & 5) (percent)

$$\text{Percent Difference} = \frac{(L:inf - L:tot)(100)}{L:tot}$$

5.2. CALCULATION OF PASS-THROUGH HEADWORKS LOADING LIMITATIONS

COLUMN 2: NPDES Permit

$$L:npdes = \frac{(8.34)(C:crit)(Q:potw)}{(1-R:potw)}$$

L:npdes = Maximum allowable headworks loading (lbs/day) based on NPDES permit limit
C:crit = NPDES effluent limits (mg/l) (2)
Q:potw = POTW average flow (MGD) (1)
R:potw = POTW removal efficiency (pass-through)(decimal) (2)

COLUMNS 3, 4, and 5 : Water Quality Criteria - Chronic, Acute, Other

$$L:chronic\ (L:acute)\ (L:other) = \frac{(8.34)\ [(C:wq)(Q:str + Q:potw) - (C:str)(Q:str)]}{(1-R:potw)}$$

L:chronic (L:acute) (L:other) = Maximum allowable headworks loading (lbs/day) based on chronic, acute, or other water quality criteria respectively

C:wq = EPA or state chronic, acute, or other water quality criteria in mg/l (2)

Q:str = 7Q10 or 1Q10 based receiving water dilution in Data Sheet 1 multiplied by the POTW average flow. Use 7Q10 dilution for chronic and other calculations and 1Q10 dilution for acute calculations (1)

Q:potw = POTW average flow (MGD) (1)

C:str = Background concentration in receiving waters (mg/l) (2)

R:potw = POTW removal efficiency (pass-through)(decimal) (2)

COLUMN 6: Final Pass-Through Limitation

L:pass = Minimum of L:npdes, L:chronic, L:acute, and L:other. This value is equal to the maximum allowable headworks loading based on pass-through criteria.

5.3. CALCULATION OF PROCESS INHIBITION HEADWORKS LOADING LIMITATIONS

COLUMNS 2, 3, and 4: Secondary Biological Processes (Activated Sludge, Tricking Filter, Other)

$$L:inhib2 = \frac{(8.34)(C:crit)(Q:potw)}{(1-R:prim)}$$

L:inhib2 = Maximum allowable headworks loading (lbs/day) based on inhibition of secondary process
C:crit = Inhibition level (mg/l) (2)

Q:potw = POTW average flow (MGD) (1)
R:prim = Primary removal efficiency (decimal) (2)

COLUMNS 5 and 6: Tertiary Biological Processes (Nitrification, Other)

$$L:inhib3 = \frac{(8.34)(C:crit)(Q:potw)}{(1-R:sec)}$$

L:inhib3 = Maximum allowable headworks loading (lbs/day) based on inhibition of tertiary process
C:crit = Inhibition level (mg/l) (2)

Q:potw = POTW average flow (MGD) (1)
R:sec = Secondary removal efficiency (decimal) (2)

COLUMNS 7, 8 and 9: Sludge Digestion Processes (Aerobic Digestion, Anaerobic Digestion, Other)

$$L:inhib/sludge = \frac{(8.34)(C:crit)(Q:dig)}{R:potw} \quad \text{(Conservative Pollutants)}$$

L:inhib/sludge = Maximum allowable headworks loading (lbs/day) based on inhibition of sludge unit process
C:crit = Inhibition level (mg/l) (2)
Q:dig = Sludge flow to digester (MGD) (1)
R:potw = POTW removal efficiency (sludge)(decimal) (2)

$$L:inhib/sludge = \frac{(L:inf)(C:crit)}{C:dig} \quad \text{(Nonconservative pollutants)}$$

L:inhib/sludge = Maximum allowable headworks loading (lbs/day) based on inhibition of sludge unit process

L:inf = Existing headworks loading (lbs/day) based on existing influent concentrations (see Column 10 of this section for calculation)
C:crit = Inhibition level (mg/l) (2)
C:dig = Pollutant level in sludge to digester (mg/l) (2)

COLUMN 10: Existing Headworks Loading

$$L:inf = (8.34)(C:potw)(Q:potw)$$

L:inf = Existing headworks loading (lbs/day) based on existing influent concentrations
C:potw = Average POTW influent concentration (2)
Q:potw = POTW average flow (MGD) (1)

COLUMN 11: Final Inhibition Limitation

L:inhib = Maximum allowable headworks loading (lbs/day) based on inhibition. PRELIM uses either the minimum of L:inhib2, L:inhib3 and L:inhib/sludge, or the maximum of L:inf. If L:inf is greater than the (minimum of L:inhib2, L:inhib3, and L:inhib/sludge), PRELIM will ask whether the treatment plant is experiencing inhibition due to this pollutant. If you answer "Yes", PRELIM will use the (minimum of L:inhib2, L:inhib3, and L:inhib/sludge). If the you respond "No", PRELIM will use the L:inf.

5.4 CALCULATION OF SLUDGE DISPOSAL HEADWORKS LOADING LIMITATIONS

All the sludge calculations are based upon determining the maximum pollutant concentration allowable in the sludge for each disposal option. Once these maximum pollutant concentrations are determined, headworks loadings are calculated for all columns in the output using the following equations.

(a) $$L:sludge = \frac{0.0022(C:crit)(Q:disp)}{R:potw}$$ (Conservative Pollutants)

(b) $$L:sludge = \frac{(L:inf)(C:crit)}{C:disp}$$ (Nonconservative pollutants)

L:sludge = Maximum allowable headworks loading (lbs/day) for given sludge disposal option
C:crit = Maximum pollutant concentration for sludge to disposal (mg/kg dry weight) (2)
Q:disp = Total POTW sludge flow to disposal (dry metric tons per day)
R:potw = POTW removal efficiency (sludge)(decimal) (1)

L:inf = Existing headworks loading (lbs/day) (see Column 10 in Section 5.3)
C:disp = Existing pollutant levels in sludge to disposal (mg/kg) (2)

The variable C:crit will be different for each column. The source or the calculation of C:crit for each column in the PRELIM output is described below:

COLUMN 2: Land Application (Ceiling Concentrations)

C:crit = Federal land application pollutant ceiling concentrations listed in Table 1 of 40 CFR Part 503.13. Entered in Data Sheet 2.

COLUMNS 3 and 8: Federal or State Cumulative Pollutant Loading Rates

$$C:crit = \frac{(C:cum)(SA)}{(SL)(Q:la)0.365}$$

C:cum = Federal (Table 2 of 40 CFR Part 503.13) or State land application cumulative pollutant loading rates (kg/ha). Entered in Data Sheet 2.
SA = Site area (hectares) (1)
SL = Site life (years) (1)
Q:la = Sludge flow to bulk land application (agricultural, forest, public contact, or reclamation site in dry metric tons per day) (1)

COLUMN 4: Bulk Land Application (Pollutant Concentration)

C:crit = Federal land application pollutant concentrations listed in Table 3 of 40 CFR Part 503.13. Entered in Data Sheet 2.

COLUMNS 5 and 9: Non-bulk Land Application (Federal or State Annual Pollutant Loading Rates)

$$C:crit = \frac{(C:ann)}{(AWSAR)(0.001)}$$

C:ann = Federal land application annual pollutant loading rates listed in Table 4 of 40 CFR Part 503.13. Entered in Data Sheet 2.
AWSAR = Annual whole sludge application rate (mt/ha/yr dry weight basis) (1)

COLUMN 6: Surface Disposal

C:crit = Federal surface disposal pollutant concentrations listed in Tables 1 and 2 of 40 CFR Part 503.23. Entered in Data Sheet 2.

COLUMN 7: Incinerator

C:crit for incinerator represents the maximum pollutant concentration in the incinerator feed. Depending upon the pollutant, C:crit for the incinerator feed is determined by one of the following equations:

$$\text{(a)}\quad C{:}crit = \frac{(NESHAP)}{(1\text{-}CE)(Q{:}incin)} \qquad \text{(Beryllium and Mercury)}$$

$$\text{(b)}\quad C{:}crit = \frac{0.1\ (NAAQS)(86{,}400)}{(DF)(1\text{-}CE)(Q{:}incin)} \qquad \text{(Lead)}$$

$$\text{(c)}\quad C{:}crit = \frac{(RSC)(86{,}400)}{(DF)(1\text{-}CE)(Q{:}incin)} \qquad \text{(Arsenic, Cadmium, Chromium, and Nickel)}$$

NESHAP = National Emission Standard for beryllium and mercury (g/day) in *40 CFR Part 61*. Entered in *Data Sheet 2*.

NAAQS = National Ambient Air Quality Standard for lead (ug/m3). Entered in Data Sheet 2

RSC = Federal Risk-specific concentration limits for arsenic cadmium, chromium, and nickel in 40 CFR Part 503.43. Entered in Data Sheet 2.

DF = Dispersion Factor in micrograms per cubic meter per gram per second. (1)

CE = Pollutant-specific sewage sludge incinerator control efficiency (removal efficiency) as a decimal. (2)

Q:incin = Sludge flow to incinerator (dry metric tons per day) (1)

COLUMN 10: State Sludge Disposal Criteria

C:crit = State sludge disposal concentration criteria (Grade 1, Class A, etc. in milligrams per kilogram). Enter in Data Sheet 2.

Note: For State Annual Pollutant Loading Rates for bulk land application, the user must first convert the loading rates to maximum pollutant concentrations using the formula below. Then enter in Column 10.

$$C{:}crit = \frac{(C{:}ann)(SA)}{(Q{:}la)0.365}$$

C:ann = State land application annual pollutant loading rate limits (kg/ha/year).

SA = Site area (hectares) (1)

Q:la = Sludge flow to bulk land application (agric., forest, pub. contact, or recl. site in dry metric tons per day) (1)

COLUMN 11: State Incinerator Emission Limit

$$C:crit = \frac{L:std}{(1-CE)(Q:incin)}$$

L:std = State incinerator emission standard (g/day) (2)
CE = Pollutant-specific sewage sludge incinerator control efficiency (removal efficiency) as a decimal. (2)
Q:incin = Sludge flow to incinerator (dry metric tons per day) (1)

The final sludge limitation in COLUMN 12 is determined by the minimum of headworks loadings in columns 2 through 11. This value is equal to the maximum allowable headworks loading based on sludge disposal methods.

5.5. COMPARISON OF HEADWORKS LOADING LIMITATIONS

COLUMN 2: Final Pass-Through Loading

L:pass (see Section 5.2 - COLUMN 6 for calculation)

COLUMN 3: Final Inhibition Loading

L:inhib (see Section 5.3 - COLUMN 11 for calculation)

COLUMN 4: Final Sludge Loading

L:sludge (see Section 5.4 - COLUMN 12 for calculation)

COLUMN 5: Final Headworks Loading Limitation

L:final (Minimum of L:pass, L:inhib, and L:sludge)

5.6. TOTAL POUNDS OF POLLUTANT COMPARED TO ACTUAL POUNDS/DAY

COLUMN 2: Allowable Total Pounds/day

L:max (see Section 5.5 - COLUMN 5 for calculation)

COLUMN 3: Expansion and Safety Factor

L:sf = (L:max)(SF)

L:sf = Loading allocated as a safety factor

SF = Safety factor for pollutant (2)

COLUMN 4: Actual Uncontrollable Pounds/day

L:dom (see Section 5.1 - COLUMN 2 for calculation)

COLUMN 5: Allowable Industrial Pounds/day

L:all = L:max - L:sf - L:dom

If L:all is less than zero, PRELIM overrides the L:all value with zero.

COLUMN 6: Actual Industrial Pounds/day

L:ind (see Section 5.1 - COLUMN 3 for calculation)

COLUMN 7: Required Industrial Removal Pounds/day

L:rem = Maximum of L:ind - L:max and zero.

5.7. UNIFORM CONCENTRATION INDUSTRIAL EFFLUENT LIMITS (mg/l)

COLUMN 2: Using Total Industrial Flow

$$C:lim = \frac{L:all}{(8.34)(Q:ind)}$$

L:all (see Section 5.6 - COLUMN 5 for calculation)
Q:ind = Total industrial flow (MGD) (1)

COLUMN 3: Using Industrial Contributory Flow

$$C:lim = \frac{L:all}{(8.34)(Q:cont)}$$

L:all (see Section 5.6 - COLUMN 5 for calculation)
Q:cont = Industrial contributory flow (MGD) (sum of all industrial flows from industries that discharge greater than 0 mg/l of a particular pollutant) (4)

COLUMN 4: Contributory Flow

Q:cont = Industrial contributory flow (MGD) (see COLUMN 3 above)

COLUMN 5: Basis in Derivation of Limit

The limiting criteria in the calculation of an allowable headworks loading are:

I = Inhibition of unit process
P = Pass-through criteria
S = Sludge disposal criteria.

5.8. INDUSTRIAL EFFLUENT LIMITS BASED ON MASS PROPORTION

COLUMN 2: Industrial Flow

Q:ind(n) = Flow in MGD from Industry #n

COLUMN 3: Actual Load

$$L:ind(n) = (8.34)(Q:ind(n))(C:ind(n))$$

L:ind(n) = Loading (lbs/day) from Industry #n
Q:ind(n) = Flow in MGD from Industry #n
C:ind(n) = Average pollutant concentration from Industry #n (4)

COLUMN 4: Allowable Proportion

$$K = \frac{L:all}{L:ind}$$

K = Allowable proportion (unitless)
L:all = Maximum allowable industrial loading (lbs/day) (see Section 5.6 - COLUMN 5 for calculation)
L:ind = Total current industrial loading (lbs/day) to the POTW (see Section 5.1 COLUMN 3 for calculation)

COLUMN 5: Allowable Load (pounds/day) (from Industry #n)

$$L:all(n) = (K)(L:ind(n))$$

L:all(n) = Loading (lbs/day) allowable from Industry #n
K = Allowable proportion (unitless)
L:ind(n) = Loading (lbs/day) from Industry #n

COLUMN 6: Allowable Industrial Concentration

$$C:lim(n) = \frac{L:all(n)}{(8.34)(Q:ind(n))}$$

C:lim(n) = Allowable concentration (mg/l) for Industry #n
L:all(n) = Loading (lbs/day) allowable from Industry #n
Q:ind(n) = Flow in MGD from Industry #n

5.9. INDUSTRIAL EFFLUENT LIMITS BASED ON SELECTED INDUSTRIAL REDUCTION

COLUMN 2: Industrial Flow

Q:ind(n) = Flow in MGD from Industry #n

COLUMN 3: Actual Load

L:ind(n) = (8.34)(Q:ind(n))(C:ind(n))

L:ind(n) = Loading (lbs/day) from Industry #n
Q:ind(n) = *Flow in MGD from Industry #n*
C:ind(n) = Average pollutant concentration from Industry #n (4)

COLUMN 4: Reduction Proportion

R = 1 - R:(x)

R = Reduction proportion
R:(x) = Selected industrial removal rate for this pollutant as a decimal (4)

COLUMN 5: Allowable Load (pounds/day) (from Industry #n)

L:all(n) = (R)(L:ind(n))

L:all(n) = *Loading (lbs/day) allowable from Industry #n*
R = Reduction proportion (unitless)
L:ind(n) = Loading (lbs/day) from Industry #n

COLUMN 6: Allowable Industrial Concentration

$$C{:}lim(n) = \frac{L{:}all(n)}{(8.34)(Q{:}ind(n))}$$

C:lim(n) = Allowable concentration (mg/l) for Industry #n
L:all(n) = Loading (lbs/day) allowable from Industry #n
Q:ind(n) = Flow in MGD from Industry #n