

Version History of LA-QUAL

- 10.01 - a) corrected problem with plot not using requested scale
- 10.00 - a) add effective concentrations capability for nonconservative material
 - b) added comma-delimited output file options
 - c) enhanced stream summary report
 - d) added some additional error checking
 - e) reordered plot menu
 - f) reformatted some reports
 - g) added calculation of performance measures
 - h) correct error in coliform calculations from non-point sources
- 9.39 - a) increase maximum number of plots from 12 to 21
 - b) added "flow" to initial constituent to display in additional preferences
 - c) added ability to choose initial plot to display in additional preferences
 - d) added ability to display plot abbreviations rather than numbers in plotting window
- 9.38 - a) correct issue with evaporation error checking
 - b) correct issue with overlay file error checking
 - c) no longer requires an overlay file for every plot
- 9.37 - a) add additional error checking for invalid formats in plot cards
 - b) correct issue with some plot preferences not keeping changes
 - c) increase maximum observed values from 100 to 200
 - d) increase maximum number of plots from 9 to 12
 - e) increase number of recent files opened from 9 to 15
 - f) add option to increase line width of predicted profile on plot
- 9.36 - a) Correct loading table issues with NH3 in withdrawals and BOD1 in phytoplankton and periphyton death
 - b) Add error checking for dam in first reach
 - c) Correct evaporation calculation when advective flow is extremely low.
 - d) Increase maximum observed values from 80 to 100
 - e) Add flow, width, and depth to allowable initial views for plot in additional preferences
 - f) Add warning when negative flows occur in an advective element that may have insufficient depth
 - g) Enable output of a tab-delimited data file
 - h) Correct issue with overlay values plotting outside plot limits
- 9.35 - a) Add nonpoint source loadings for salinity, conservative material #1, and conservative material #2
 - b) Implement a program switch to allow batch run without the GUI interface
 - c) Implement batch mode to allow the user to supply an input file name on the command line
 - d) Correct issue with PO4 nonpoint source loading
 - e) Correct some loading table issues
 - f) Add additional sensitivities.
- 9.34 - a) correct error in loading report when reach is not being modeled (i.e., initial temp = 0)
 - b) correct issue with saving loading report preferences
- 9.33 - a) increased maximum number of dams from 20 to 30
 - b) fix river distance formatting on plots
- 9.32 - a) added additional error checking information for reach id cards (Data Type 8)
- 9.31 - a) increased number of allowable stations in overlay from 50 to 80
 - b) added nonpoint input for NH3, NO3, PO4, and associated sensitivities
 - c) fix line wrapping in rich-text output
- 9.30 - a) corrected error in calculation of constituent CM-2 related to wasteloads (error originated in LA-QUAL v.9.10)
 - b) added sensitivities for dam coefficients
 - c) corrected labeling of plot legend when displaying multiple sensitivity parameters per set
- 9.29 - a) added additional information concerning warnings
 - b) added HELP menu item to access Users Manual
- 9.28 - a) added additional error checking information
 - b) corrected issue with preferences for labeling of filename on plot
 - c) corrected issue with effective concentration adjustments when chlorophyll a is included in headwaters
 - d) added table to show adjustment of concentrations when using effective concentrations
- 9.27 - a) added additional error checking and method for reading legacy overlay cards
- 9.26 - a) add rich-text file format option to output report
- 9.25 - a) corrected input echo in output report for dispersive hydraulic parameters (HYDR-2)
- 9.24 - a) added additional error checking for plot cards (Data Type 30)
 - b) increased number of allowable reaches per RCH card to 40 (Data Type 30)
 - c) added ability to show tributary locations on plots

- d) added ability to specify different programs for viewing and editing
- 9.23 - a) corrected display issue in the File dialog menu when more than 9 files had been opened
- 9.22 - a) corrected issue with reading HDWTR-2 values in sequenced files
 - b) added additional error checking for overlay cards
 - c) corrected dimensioning of RSENS from MXH to MXR
- 9.21 - a) made some unit conversions more precise
- 9.20 - a) added evaporation component to hydraulics
 - b) corrected problem with width going negative during flow reversals
 - c) corrected some sensitivity problems (incorrect array dimension; crashed when mixing 1 and 2 columns per set)
 - d) default of .inp extension added to open list options
 - e) added option to KTIDE to set all dispersion to 0
 - f) added salinity to loading table
 - g) added additional tidal information to final report
- 9.14 - a) added error message when no reaches are specified for a plot
- 9.13 - a) corrected factor when using English units
 - b) added flow in both English and metric units on some output reports
- 9.12 - a) added code to close sequential files after they are read
- 9.11 - a) increased number of stations that the model could handle in the overlay
- 9.10 - a) changed river kilometers to double precision so model could handle large river kilometers and small element lengths
 - b) corrected sensitivity runs for dispersion sensitivity when using dispersion equation 1
 - c) corrected immediate display of reports and sensitivity table when "Run Sensitivity" selected in Preferences
 - d) corrected sensitivity exclusion issue for headwaters and wasteloads
 - e) added sensitivity exclusion capability for reach hydraulics (depth, width, velocity)
 - f) added width parameter to sensitivity
 - g) added additional dam reaeration equations
 - h) added error message for Evans and Butts dam equation for depths greater than 4.6 meters
- 9.09 - a) corrected sensitivity parameter descriptions in sensitivity report
- 9.08 - a) corrected program crash when the maximum 9 overlay plots were used
- 9.07 - a) corrected how physical coefficients plotted in sensitivity runs
 - b) enhanced reaeration rate plot and legend
- 9.06 - a) changed how physical coefficients plotted
 - b) added ability to change some labels and fonts on plot
 - c) added some error checking to headwaters and wasteloads related to sensitivity
- 9.05 - a) changed some output format in capsule summary
 - b) corrected how nitrogen preference is selected when phytoplankton is not being simulated
 - c) corrected some error checking
 - d) added ability to name plot image capture file to Preferences
- 9.04 - a) added additional error checking for plot cards
- 9.03 - a) added deprecated NBOD OXY code word in Data Type 1
 - b) added ability to alter phytoplankton self-shading coefficients/exponents (now in Data Type 6)
- 9.02 - a) corrected spelling of KL MINIM code word in Data Type 3
- 9.01 - a) corrected initialization of CCONT(2) for periphyton
- 9.00 - a) added Organic Phosphorus constituent
 - b) corrected KSETT for phytoplankton
 - c) fixed problem with english/metric conversion of settling rate
 - d) changed some THETA, SENS, OPTION, PROGRAM code words to avoid confusion
 - e) added "Effective Concentration" option and corrected some conversions
 - f) added hydrolysis from BOD2 to BOD1
 - g) changed how denitrification is handled
 - h) added algae death term
 - i) combined input parameters for available settled SOD
 - j) changed how periphyton are modeled
 - k) simplified plot card input
- 8.11 - a) corrected error checking for light limitation equation in INDATA
- 8.10 - a) corrected algae/macrophyte growth rate equation
 - b) added solar information output report
 - c) added option for no light limitation in algae/macrophyte growth calculation
- 8.01 - a) added ability to change temperature equation for atmospheric attenuation
 - b) added ability to change temperature equation for atmospheric longwave radiation
 - c) added bank shading coefficient to temperature and algae simulations

- 8.00 - a) made major changes to temperature simulation
- b) added ability to exclude specific wasteloads for WSL FLOW sensitivities
- c) added ability to exclude specific headwaters for HDW FLOW sensitivities
- 7.04 - a) added ability to change sensitivity color preferences
- 7.03 - a) corrected number of allowable cards from 11 to 12 in DATA TYPE 5
- b) corrected a minKL plotting problem
- c) added k2 value before applying minKL on reaeration plot
- d) corrected error message for missing Chl a card in LBC Data Type 27
- e) increased allowable sensitivities to 100
- f) added sensitivities LBC Salinity, Wind Velocity, Pressure, Dry Bulb Temp, Wet Bulb Temp
- 7.02 - a) corrected model sequencing for BOD2
- 7.01 - a) corrected DOSENS sensitivities from 67 to 90
- b) allow comments in overlay file
- c) corrected initialization of certain LBC concentrations
- d) added ability to print out wasteload names on plots
- e) added ability to open previous files in Open dialog
- f) corrected problems in loading summary
- g) corrected fatal error termination when there was an error junction input
- h) added additional options for nutrient limitations
- i) added additional options for nutrient limitations
- j) added option to calculate dispersion as a function of mean velocity
- k) changed default KL min from 0.6 to 0.7 to reflect Louisiana defaults
- l) corrected wasteload locations on plot
- m) added ability to show reaches on plot
- 6.20 - made code modifications to allow compilation under Intel IVF 8.1
- 6.11 - added check for observed values to make sure minimum & maximum are not reversed
- 6.10 - a) added dispersion through headwater to allow second boundary condition
- b) corrected problem with reading certain sensitivities
- c) changed address/email for LaDEQ in About box
- 6.03 - a) removed generation of debug.txt file
- b) corrected error in reading of Data Type 6/7 input
- c) corrected problem with detection of errors in overlay cards
- d) added ability to turn max/min DO text on or off on plots
- 6.02 - corrected a Lower Boundary problem if no boundary conditions were present
- 6.01 - corrected a dimension problem in the plots if there were exactly 3000 elements
- 6.00 - a) added inhibition to organic nitrogen for use as NBOD
- b) added BOD#2 constituent
- c) corrected temperature correction for phosphorus source and some defaults
- d) corrected some sensitivity factors
- e) added sensitivity factors for non-point source
- f) added ability to specify oxygen inhibition equations for each inhibited constituent
- g) added ability to specify oxygen threshold in equations for each inhibited constituent
- h) added short names for use in plot menu push-buttons and in certain columns of output
- 5.02 - corrected problem with echoing of input data for wasteload flows
- 5.01 - a) corrected certain problems in preferences
- b) added option to select editor in preferences and set colors back to default
- c) added title to sensitivity table
- d) corrected problems with English/Metric option
- e) modified format in some reports
- 5.00 - added dam capability and corrected sensitivity table problem
- 4.13 - added shelter coefficient for wind driven reaeration
- 4.12 - a) Corrected coliform temperature correction theta
- b) Corrected NCM oxygen inhibition iterative technique
- c) Corrected program crash for non-convergence
- 4.11 - a) Corrected variable and column alignment in 20 deg rate reporting in final summary
- b) Corrected coefficient in Owen-Gibbs <5fps reaeration equation (option 4)
- 4.10 - a) Corrected input/output fields to allow more than 1000 elements
- b) Moved report options to "Preferences"
- c) Added optional colors to graphic display
- d) Added crossbar option to ranges of observed values
- e) Added option to show wasteload locations on graphic display

- f) Added option to view graphics, reports, or sensitivity table after execution
- g) Removed flow augmentation and line printer plots
- 4.00 - a) Modified the intermediate, final, and capsule summary reports by extending the decimal place holder on many of the fields.
- b) Added a header to the sensitivity analysis report.
- c) Corrected zip code to address field
- 3.03 - corrected DO in intermediate report
- 3.02 - added extra error detection in input
- 3.01 - corrected temperature correction constants
- 3.00 - added sensitivity table
- 2.00a - a) Address & phone number change,
- b) Temperature Correction Constants for Reaeration, BOD Decay, NCM Decay, Benthals, and Organic Nitrogen changed to Louisiana Technical Procedures Manual Defaults
- c) Default of .in extension added to load list options and .txt moved to top choice.
- d) Moved Exit, Print, and Capture buttons to left side of screen
- e) Modified to accept 9 plots instead of 5
- 1.00b - added dlguninit() to winplot
- 1.00a - original version

Modifications that were made during the development of LA-QUAL from QUAL-TX are listed as follows:

- 1) Conformance of the core code to American National Standard Fortran 90 (ANSI X.198-1992) and International Standards Organization standard ISO/IEC 1539-1991(E).
- 2) Development of a Windows graphical interface.
- 3) Development of on-screen graphic output showing predicted profiles and observed data.
- 4) Development of on-screen graphic output for sensitivity analysis
- 5) Allowing hydraulics to be based on width/depth input in addition to velocity/depth input.
- 6) Allowing settling rates to be input on a per day basis in addition to a settling velocity basis.
- 7) Addition of new reaeration equations that more closely fit Louisiana conditions.
- 8) Addition of low dissolved oxygen concentration inhibition of NCM decay rates.
- 9) Corrections to certain errors in coding related to reaeration rate equations, settling rates, and effective BOD in lower boundary conditions.
- 10) Corrections to certain errors in coding related to the coliform temperature correction theta, the NCM oxygen inhibition technique, and nonconvergence problems
- 11) Corrections to the Owens-Edwards-Gibbs reaeration equation in option 4 of Data Type 12 (<5fps, 1964).
- 12) Temperature Correction Defaults changed to values listed in the LTP.
- 13) Addition of a Special Report Sensitivity Table.
- 14) Modified the number of significant digits reported for many of the fields in the capsule summary, intermediate report, and final report.
- 15) Corrections to variable and column alignment in 20 deg rate reporting in final report.

Modifications that were made during the conversion of QUAL-II to QUAL-TX are listed as follows:

- 1) Removal of the dynamic capability because of the steady-state hydraulic assumptions and numerical dispersion inherent with the solution technique.
- 2) Addition of more diagnostics to identify errors in the input data and format.
- 3) Addition/modification of various output reports including the creation of line printer plots and overlays.
- 4) Allowing input/output of metric units.
- 5) Allowing nitrification, BOD decay, and benthic demand inhibition at low dissolved oxygen concentrations.
- 6) Addition of sensitivity analyses for modeling runs.
- 7) Addition of macrophytes as a water quality constituent.
- 8) Combining of nitrite nitrogen and nitrate nitrogen into a single nitrite-nitrate nitrogen constituent.
- 9) Ability to alter many of the constants utilized in the model.
- 10) Removal of the flag field to facilitate adding or deleting waste loads
- 11) Allowing computational element size to vary from reach to reach.
- 12) Removing the limit in the number of computational elements per reach.
- 13) Ability to handle highly dispersive systems as well as advective systems.
- 14) Changes to reaeration equations including the ability to specify the maximum allowable reaeration rates and use tidal velocities in reaeration equations and the addition of new reaeration equations.
- 15) Conversion of benthic rates and settling rates to more conventional units.
- 16) Allowing settled BOD, algae, and conservative materials to be converted to sediment oxygen demand.
- 17) Allowing settled organic nitrogen to be converted to ammonia benthic source rate.
- 18) Addition of denitrification and anaerobic BOD decay as processes.
- 19) Inclusion of photo-inhibition, self-shading, a preference factor for ammonia or nitrate nitrogen, and a new convergence technique in the algae simulation.
- 20) Allowing multiple waste loads to be input into a single computational element including headwater and junction elements.
- 21) Accommodation of flow reversals due to withdrawals in tidal areas.
- 22) Addition of lower boundary conditions for dispersive systems and systems with flow reversals at the lower boundary.
- 23) Ability to link several separate models together in sequence to simulate very large, very detailed, or bifurcated systems.
- 24) Restructuring of the program to make it compatible with DOS-based personal computers.