

BAC Tracker® v2.1

User Manual



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WELCOME

Welcome to BAC Tracker® v2.1

BAC Tracker® v2.1 is manufactured by BAC Tracker International, Inc. which has been serving the forensic, educational, and legal communities since 2007. BAC Tracker International, Inc. is the leader in forensic estimation of blood alcohol concentration. BAC Tracker® v2.1 is the culmination of years of experience and investment from forensic and legal practitioners making the software uniquely designed and customized for forensic litigation purposes around the world.

BAC Tracker® v2.1 combines professional software development with the expertise and experience of seasoned individuals having backgrounds in forensic toxicology, medicine, and law bringing you the next generation of alcohol estimation software.

WHAT'S NEW

BAC Tracker International, Inc. is committed to providing the most up to date educational and scientific information to the forensic and legal communities for more accurate estimations of blood alcohol concentration. BAC Tracker® v2.1 offers a number of updated and additional features including, but not limited to:

v2.1 offers enhanced operation:

- Improved installation, navigation and speed.
- New and improved user interface

v2.1 offers greater range of user customization:

- Customizable defaults for unit measurements, absorption rates, elimination rates, graphical output display, and user defined standard drinks
- User defined “time of interest” to calculate the BAC according to the particular scenario
- User defined elapsed times for drinking scenarios
- Customizable, real time display instead of relative time elapsed in drinking scenarios
- Customizable reports with the option to bear the logo of the user’s organization
- Expanded drink database containing common alcohol beverages from around the world

v2.1 also improves report generation:

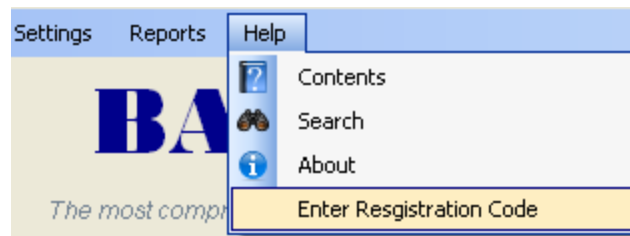
- Volume distribution calculations listed on all reports
- Loading factor calculated and listed on reports at user discretion

- Multiple estimations graphed using multiple lines or as a shaded area at user discretion
- Reports generated directly in PDF format

INSTALLATION

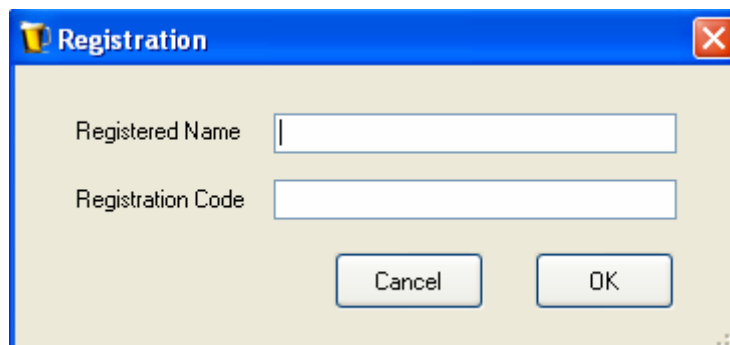
BAC Tracker® v2.1 may be purchased by completing the software request form from our website <http://www.bac-tracker.com/purchase.htm>. Once the form has been completed a BAC Tracker International, Inc. representative will contact you to provide further instructions on the purchase of a license and set you up with the appropriate user credentials based on your needs.

With the purchase of a license, you will receive a registration code that is valid for the time period allotted in your license. Licenses may be purchased for any length of time up to one year. Licenses purchased for the entire year may be renewed on an annual basis at a reduced cost. To active the software once the registration code has been received, enter the registration name and registration code provided by BAC Tracker International, Inc. This is done by one of two ways: If the current version is still active, login and select “Enter Registration Code” from the “Help” menu.



Once selected, the Registration window will appear prompting entry of the registration name and registration code.

Note: you must be connected to the internet to perform this operation

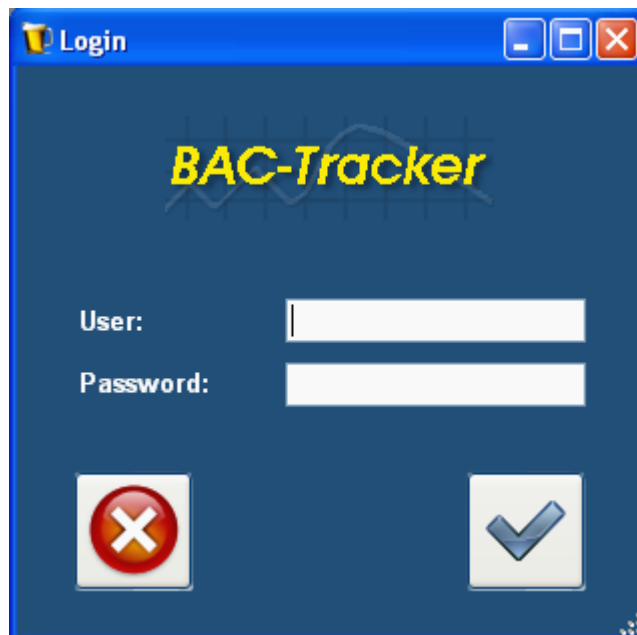
A screenshot of the 'Registration' dialog box. The title bar is blue with a yellow question mark icon and the text 'Registration'. The dialog box has a light beige background. It contains two text input fields: 'Registered Name' and 'Registration Code'. Below the input fields are two buttons: 'Cancel' and 'OK'. The dialog box has a standard Windows-style border with a close button (red X) in the top right corner.

If the current version is no longer active you will not be able to login. Instead, upon opening the software you will be prompted directly to enter the registration name and registration code in the Registration window shown above.

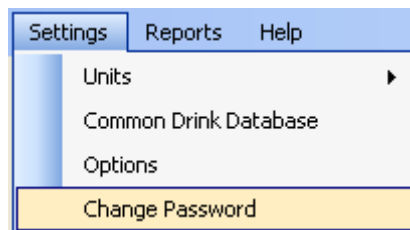
Once the software is successfully registered, you will be able to login with your user name and password.

GETTING STARTED

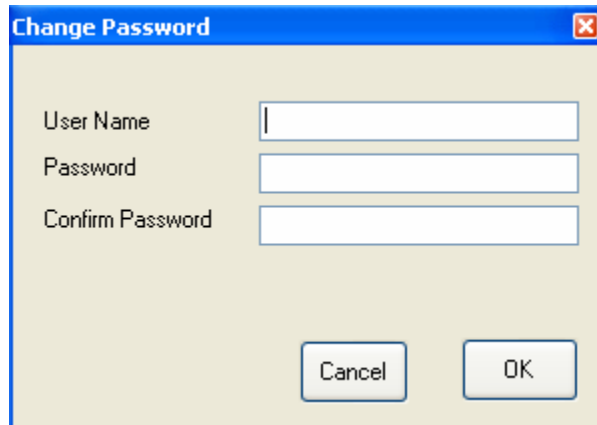
Every time you run BAC Tracker® v2.1 you will be prompted for a login. Enter your user name and password.



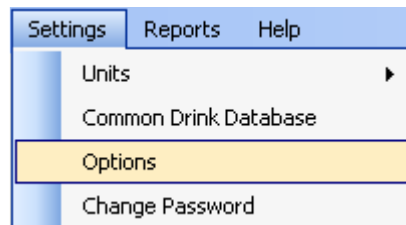
Each user of BAC Tracker® v2.1 is assigned their own unique username and password. If you are unsure of your username and/or password you may obtain a new one by contacting us directly at Support@bac-tracker.com. You may change your username and password once you are successfully logged in by selecting “Change Password” in the “Settings” menu.



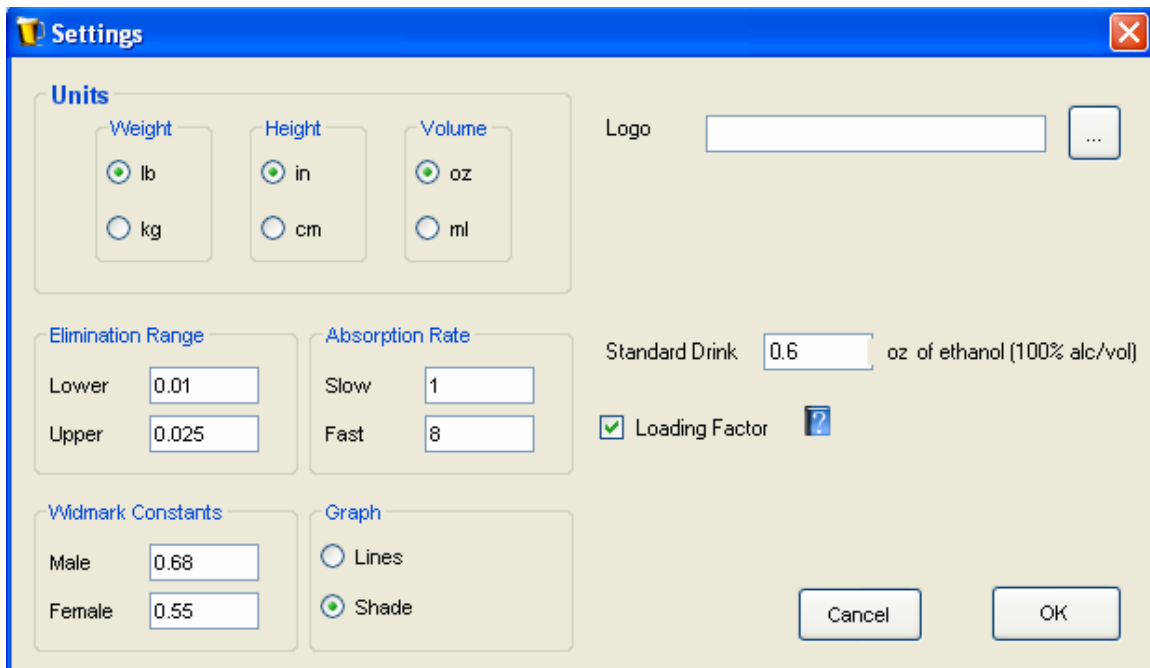
Once selected, the Change Password window will appear prompting entry of the new username and password.



The first time you use BAC Tracker® v2.1 you will need to set the default for Units, Elimination Range, Absorption Rate, Widmark Volume Distribution Constants, display output of graphs, logo image file, standard drink, and the option to display Loading Factor. These user defined defaults will be saved for all users and may be changed at any time. This can be accomplished by selecting “Options” in the “Settings” menu.



Once selected, the Options menu will appear allowing the user to define the defaults.



Units – Select which appropriate units for weight, height, and volume you would like to use in the calculations and appear on the reports.

Elimination Range – The elimination range defines the two extreme rates of elimination the alcohol estimations will be based. Alcohol is metabolized and eliminated by both the alcohol dehydrogenase enzyme (ADH) and the Cytochrome P-450 Dependent Ethanol Oxidizing System (CYP2E1). The elimination rate varies between individuals within the population as well within a single individual during a single drinking scenario depending on a number of different environmental, biological, and pathological factors. Elimination rates tend to correlate strongly, among other factors, with the drinking history of the subject. Habitual users of alcohol tend to eliminate alcohol at a faster rate than abstainers or infrequent users. The “average” elimination rate for the general population is documented to be around 0.018g/dl/hr^{-1} .

The lower range of elimination is set up to default at 0.010g/dl/hr^{-1} and the upper range is set up to default at 0.025g/dl/hr^{-1} upon installation. These two defaults may be changed by the user. BAC Tracker® v2.1 will calculate the average of the two rates of elimination selected unless the user chooses to generate a report displaying elimination rate uncertainty (*see Reports*) in which the alcohol estimations will be calculated using the lower and upper rates of elimination selected by the user to provide a range of estimations.

Absorption Rate – the absorption rate defines the two extreme rates of alcohol absorption from the gastrointestinal tract that the alcohol estimations will be based. The rate of alcohol absorption from the gastrointestinal tract is first order and utilizes an absorption rate constant (k) in the estimation formula. The absorption rate of alcohol varies between individuals within the population as well within a single individual during a single drinking scenario depending on a number of different environmental, biological, and pathological factors. Slower rates of absorption tend to correlate strongly, among other factors, with the consumption of food with or prior to the consumption of alcohol. Furthermore, the macronutritional composition of the food, the quantity of food, and the time since the food was consumed relative to the alcohol all have variable effects on the rate of alcohol absorption. Enter the desired range of k values to correspond as the default for each alcohol drink entry. Values for k can range from 1.0 to 8.0. Lower values for k signify a slower rate of absorption whereas higher values for k signify a faster rate of absorption. The slow rate of absorption is set up to default with a k value of 1.0 and the fast rate of absorption is set up to default with a k value of 8.0 upon installation corresponding to the entire range of alcohol absorption rates discussed in the literature as being found to occur in humans (Uemura et al., 2005).

Widmark Constants – The Widmark formula is one of six volume distribution formulae that the blood alcohol concentrations are calculated in BAC Tracker® v2.1. The volume distribution defines the distribution of alcohol between the tissue and the blood. The Widmark volume distribution constant was derived from a study by Widmark in 1932 where it was published that the average volume distribution constant was found to be

0.68 +/- 0.17 for males and 0.55 +/- 0.11 for females. Since 1932 five prominent refinements to the volume distribution defined by Widmark have been studied and published as separate formulae by Watson et al (1981), Forrest (1986), Seidl et al (2000), Ulrich et al (1987), and Posey and Mozayani (2007). BAC Tracker® v2.1 utilizes all six volume distribution calculations in the alcohol estimations in order to fully account for the various factors that affect the volume distribution of alcohol in the human body which include, among other factors, the individual's gender, age, weight, height, body mass index, percent body fat, water content in blood, water content in fat-free body mass, and total body water.

Enter the desired volume distribution constant to correspond to the alcohol estimations from Widmark. The most common Widmark volume distribution constants are 0.68 for males and 0.55 for females, corresponding to the averages published by Widmark in 1932. The remaining five volume distribution values are calculated by the formulae derived from each of the respective refinements – Watson et al (1981), Forrest (1986), Seidl et al (2000), Ulrich et al (1987), and Posey and Mozayani (2007) and are not able to be edited by the user.


Graph – The Alcohol Extrapolation Report allows users to view the alcohol estimations in both a tabular and graphical format. Depending on the type of report being generated, some reports provide multiple estimations accounting for an alcohol estimation range calculated from multiple rates of absorption, volume distribution, and/or elimination which are being graphed simultaneously. These estimation ranges plotted on the graph may be displayed using multiple lines or as a shaded region. BAC Tracker® v2.1 allows users the ability to set the format in which the graphs will be displayed using either lines or as a shaded area.

Logo – BAC Tracker® v2.1 allows users to customize the reports by allowing the ability to upload an image file logo that will be displayed in the upper left hand corner of each report that is generated. Click on the button to the right labeled “. . .” to browse your computer directory and select the image you would like to appear on the reports. It is not necessary that an image file logo be uploaded. If no image file logo is uploaded the reports will not contain any logo or proprietary identifying information.

Standard Drink – BAC Tracker® v2.1 allows users to customize the definition of what corresponds to a “standard drink” as it is reported on the Alcohol Quantification Report. Many jurisdictions, regions, or countries differ in the definition of a “standard drink”. Enter the volume of pure ethanol (100% alc/vol) that defines a “standard drink”. For example, a standard drink being defined as 0.6oz or 17.74ml of ethanol (100% alc/vol) would correspond to a 12oz or 355ml beverage containing 5% alc/vol (i.e. Budweiser Beer). The calculation of “standard drink” on the Alcohol Quantification Report gives readers of the report the convenience of understanding how many “standard” alcoholic beverages were consumed by an individual given a particular BAC and time lapse of drinking.

Loading Factor – BAC Tracker® v2.1 allows users the ability to calculate and display the loading factor on the Alcohol Extrapolation Report. The loading factor is the theoretical maximum alcohol concentration that could be achieved in an estimation assuming the alcohol was administered instantaneously. This calculation estimates the BAC without taking into consideration absorption or elimination. Check the box to display the loading factor in the Alcohol Extrapolation Reports.

Once all the user defaults have been entered in the Options menu you may begin entering data to generate estimation reports. On the main page, the Agency Data, Subject Data, Elimination Data, and Report Data must be entered. (*Note: report Data is only necessary for generating the Alcohol Extrapolation Report*).



The screenshot shows a web-based form with the following sections:

- Agency Data:** Includes text input fields for "Organization" and "Reference ID #". An image of a beer mug is positioned to the right of these fields.
- Subject Data:** Includes text input fields for "Subject Name:", "Age (Yrs):", "Weight lb", and "Height in". A dropdown menu is provided for "Gender".
- Elimination Data:** Includes text input fields for "Lower Range of Elimination Rate (g/dl/hr⁻¹)" (with a value of 0.01) and "Higher Range of Elimination Rate (g/dl/hr⁻¹)" (with a value of 0.025).
- Report Data:** Includes input fields for "Time of Interest" (split into "Hr." and "Min.") and "Hours to Report".

Buttons at the bottom include "Enter Ingestion Information", "Alcohol Extrapolation Report", and "Alcohol Quantification Report".

Agency Data – Enter the name of the organization, agency, or company generating the report. Also enter a reference identification number or case number pertaining to this particular report or scenario. Enter this information in the manner desired for it to appear on the report.

Subject Data – Enter the name (as it is desired to appear on the report – i.e. last name first, etc...), gender, age, weight, and height of the individual pertaining to the alcohol scenario. Be sure to enter the weight and heights in the correct measuring units (lb v.s. kg and in v.s. cm).

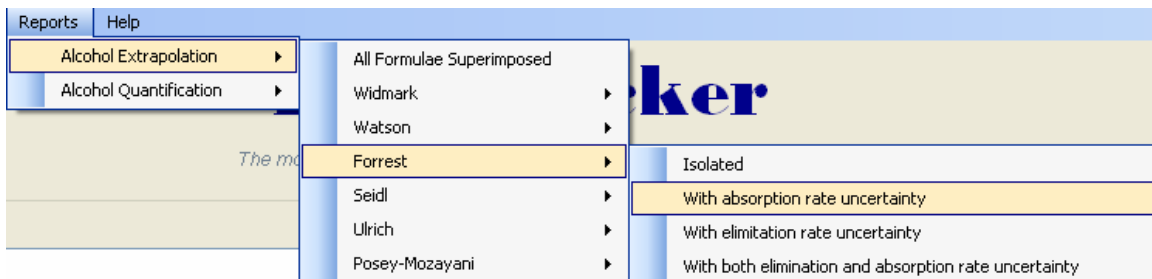
Elimination Data – Enter the elimination rate range you wish to use in the alcohol estimations. (See *Elimination Range above*).

Report Data – Enter the particular time in which you are interested in estimating the alcohol concentration in the Time of Interest field. The time of interest may relate to the time a particular incident occurred that you are interested in knowing what the estimated BAC was at that particular time. Also, enter the number of hours you would like to include on the Alcohol Extrapolation Report (i.e. some scenarios may last two hours while others may last twelve hours or more). The number of hours to report determines the duration of time for which you are estimating.

REPORTS

Alcohol Extrapolation Report – The Alcohol Extrapolation Report provides a comprehensive, multi-point curve extrapolation of the entire drinking scenario. Twenty-five separate estimation reports may be generated using the six volume distribution formulae superimposed on a single report or any of the six volume distribution formulae calculated with various rates and combinations of absorption and elimination chosen by the user.

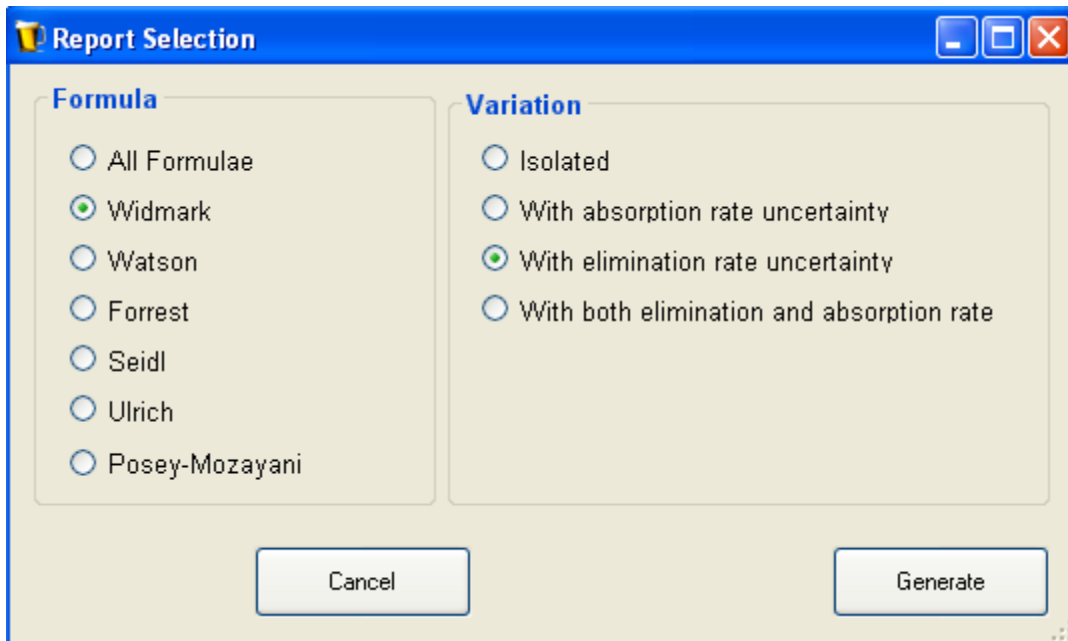
The Alcohol Extrapolation Reports may be generated in one of two ways: (1) Simply click on the desired report after selecting the “Alcohol Extrapolation Report” from the “Reports” menu



Or (2) click on the button labeled “Alcohol Extrapolation Report” near the bottom right corner of the main screen and select the desired volume distribution formulae on the left side of the window as well as the desired variation in the estimation on the right hand side of the window.



Once selected the Report Selection Window will appear.

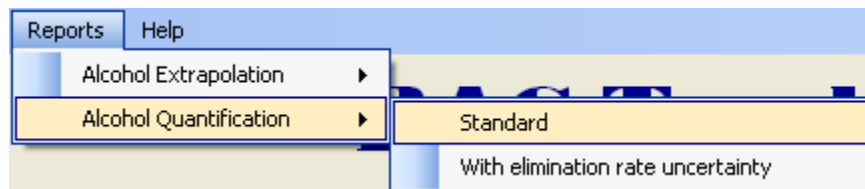


By selecting “All Formulae Superimposed” users may generate an Alcohol Extrapolation Report displaying alcohol estimations using all volume distribution formulae providing a full estimation range taking into account any variability or uncertainty in the distribution of alcohol in the human body. The average of the two absorption rate constant (k) values and the average of the two rates of elimination selected by the user are used in these estimations.

The remaining six volume distribution formula selections allow the user to define and generate an Alcohol Extrapolation Report displaying alcohol estimations using a particular volume distribution formula. Users may further choose to define a combination of various pre-selected absorption and elimination rates to be calculated for the particular volume distribution formula in order to estimate a range of alcohol concentrations taking into account any variability or uncertainty in the rates of absorption and/or elimination. By selecting “Isolated” the average of the two absorption rate constant (k) values and the average of the two rates of elimination selected by the user are used in these estimations. By selecting “With absorption rate uncertainty” the two absorption rate constant (k) values and the average of the two rates of elimination selected by the user are used in these estimations. By selecting “With elimination rate uncertainty” the average of the two absorption rate constant (k) values and the two rates of elimination selected by the user are used in these estimations. By selecting “With both elimination and absorption rate uncertainty” the two absorption rate constant (k) values and the two rates of elimination selected by the user are used in combination in these estimations. The slow rate of absorption and the fast rate of elimination selected by the user are calculated and graphed as well as the fast rate of absorption and the slow rate of elimination providing a full estimation range taking into account any variability or uncertainty in absorption and elimination.

Alcohol Quantification Report – The Alcohol Quantification Report provides a comprehensive estimation of the amount of alcohol consumed by an individual in order to reach a particular blood alcohol concentration after a specified time lapse since the first drink of alcohol. The Alcohol Quantification Report quantifies the amount of alcohol (displayed in grams and volume of 100% alc/vol as well as the number of user-defined “standard drinks”) according to each of the six different volume distribution formulae and calculated using various rates of elimination chosen by the user thereby taking into account any variability or uncertainty in alcohol distribution and elimination.

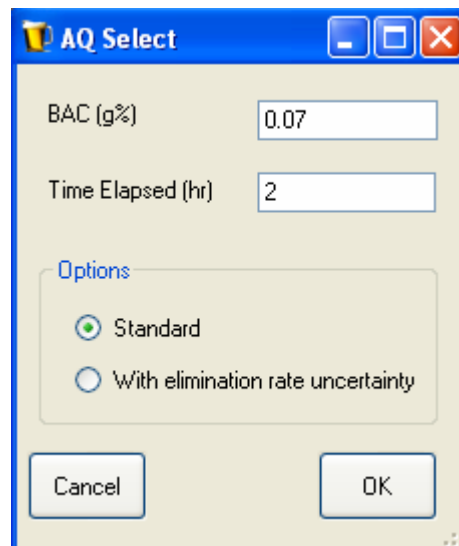
The Alcohol Quantification Reports may be generated in one of two ways: (1) Simply click on the desired report after selecting the “Alcohol Quantification Report” from the “Reports” menu



Or (2) click on the button labeled “Alcohol Quantification Report” near the bottom right corner of the main screen.



Once the Alcohol Quantification Report is selected a window will appear prompting the input of the BAC and the time elapsed.



Enter the known BAC and the elapsed time since the first drink of alcohol to the time the BAC reading was taken. Next, select the particular Alcohol Quantification Report to

generate – “Standard” or “With elimination rate uncertainty”. By selecting “Standard” the average of the two rates of elimination selected by the user are used in these estimations. By selecting “With elimination rate uncertainty” the average of the two rates of elimination selected by the user are used in the estimations along with a +/- range calculating the variation in the estimations due to the two rates of elimination chosen by the user taking into account any variability or uncertainty in the rate of elimination.

CONTACT US

For additional information about BAC Tracker® v2.1 please visit us online at <http://www.bac-tracker.com> or contact us directly at support@bac-tracker.com. We are happy to provide assistance with problems and/or questions associated with BAC Tracker® v2.1.

BAC Tracker International, Inc. also provides training and certification for the proficient use of BAC Tracker® v2.1 for the estimation of blood alcohol concentration. Please visit us online to learn more about our training and certification courses as well as locate and register for our next available course <http://www.bac-tracker.com/training.htm>.