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# **BAC Tracker® v4.1**

## *User Manual*





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## WELCOME

Welcome to BAC Tracker® v4.1

BAC Tracker® v4.1 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® v4.1 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® v4.1 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.

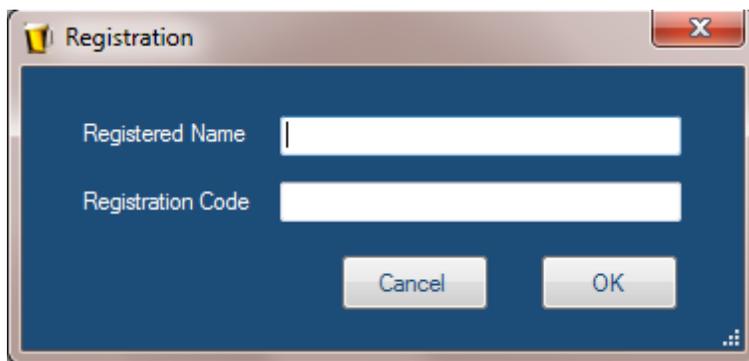
## INSTALLATION and REGISTRATION

BAC Tracker® v4.1 may be purchased by contacting us via email [purchase@bac-tracker.com](mailto:purchase@bac-tracker.com). Once we receive your email, a BAC Tracker International, Inc. representative will contact you to provide further instructions on the purchase of your license(s) and set you up with the appropriate user credentials based on your needs.

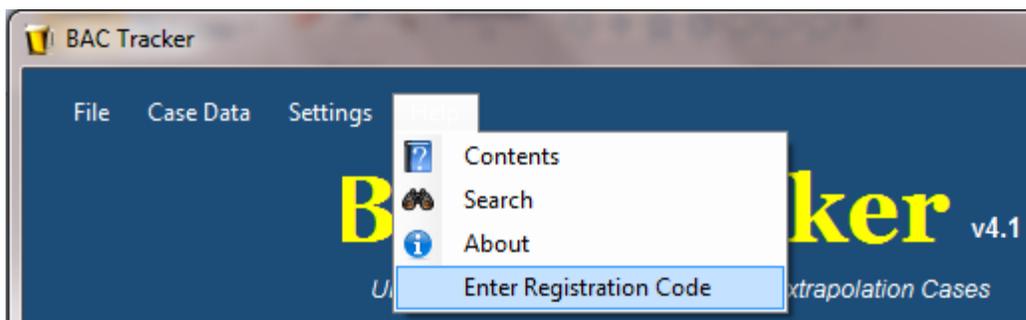
With the purchase of a license, you will receive a registration code that is valid for the time period allotted in your license. Licenses may be purchased on a monthly (Temporary License) or extended basis (Six-Month or Twelve-Month Standard License). Standard Licenses may be renewed on an annual basis at a reduced cost.

To install the software, follow the instructions provided by the BAC Tracker International, Inc. representative and begin the installation wizard. Follow the onscreen instructions for the installation. Once installed, the software will not open without an active license Registration Name and Registration Code. To open the software for the first time, you will need to register your software by entering the Registration Name and Registration Code provided by the BAC Tracker International, Inc. representative. The Registration Name and Registration Code may be entered by one of two ways: (1) If you are registering your software for the first time, upon opening the software you will be prompted to enter your Registration Name and Registration Code (as shown below):

*Note: you must be connected to the internet to perform this operation and you must be an Administrator on your computer*



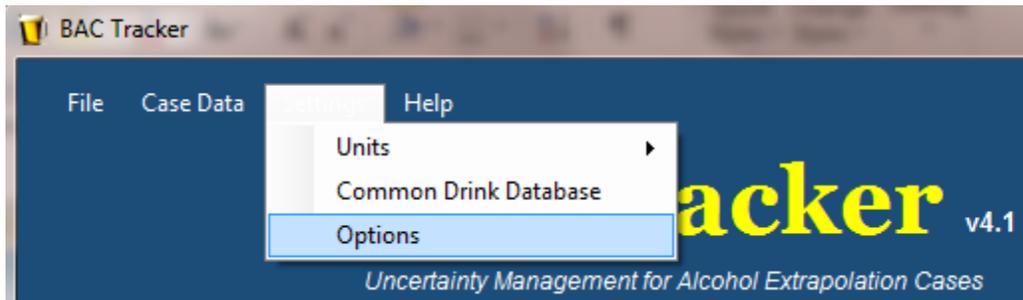
or (2) if the current Registration Code is still active, open the software and select “Enter Registration Code” from the “Help” menu.



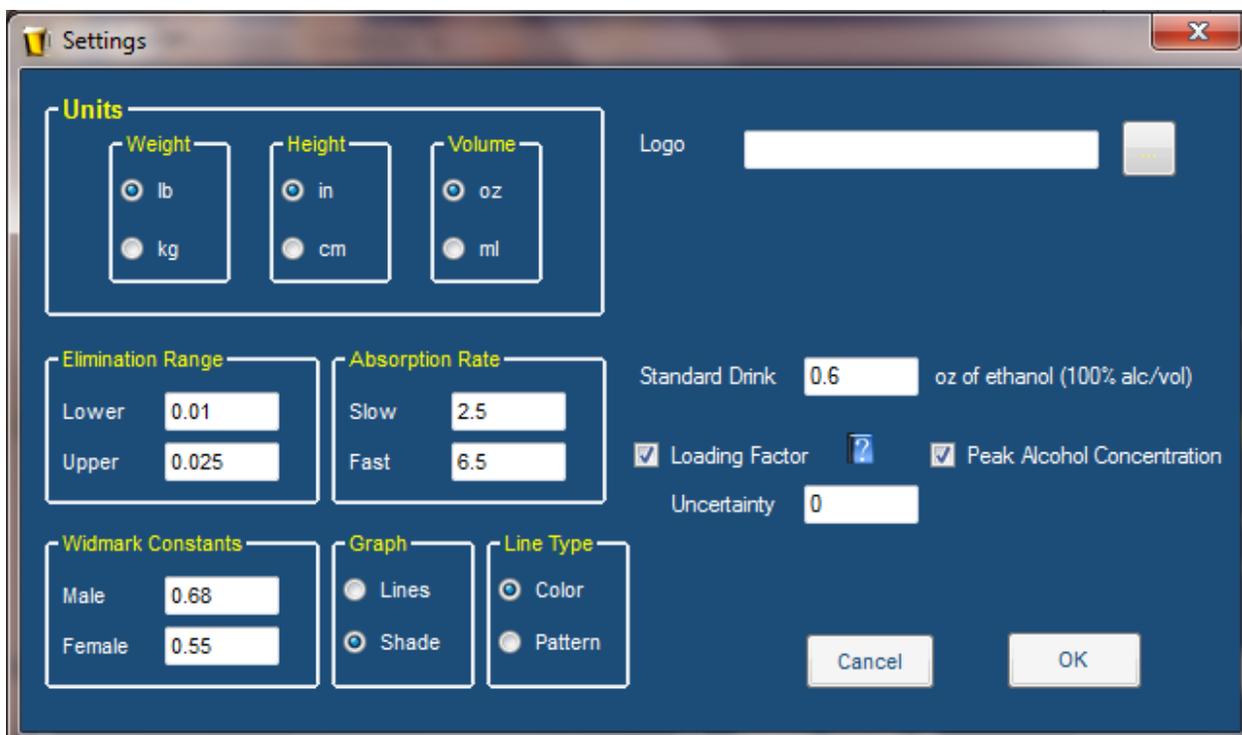
Once the software is successfully registered, you will be able to open and freely use the software for the duration of your license.

## GETTING STARTED

The first time you use BAC Tracker® v4.1 you will need to set the default for Units, Elimination Range, Absorption Rate, Widmark Volume Distribution Constants, display output of graphs (lines vs. shade), type of graph lines (color vs. pattern), logo image file, standard drink, the option to display Loading Factor, and the option to enter a known Quality Assurance/Quality Control (QA/QC) uncertainty associated with the analytical method of obtaining a known BAC value. 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  $0.018\text{g/dl/hr}^{-1}$ .

The lower range of elimination is set up to default at  $0.010\text{g/dl/hr}^{-1}$  and the upper range is set up to default at  $0.025\text{g/dl/hr}^{-1}$  upon installation. These two defaults may be changed by the user. BAC Tracker® v4.1 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® v4.1. 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  $0.68 \pm 0.17$  for males and  $0.55 \pm 0.11$  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® v4.1 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 Anterograde Alcohol Extrapolation Report and the Retrograde 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 individual lines or as a shaded region between the minimum and maximum values. BAC Tracker® v4.1 allows users the ability to set the format in which the graphs will be displayed using either lines or as a shaded area.

**Line Type** – The Anterograde Alcohol Extrapolation Report and the Retrograde 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 lines may be distinguished by different colors or in black and white color, but by different line patterns. BAC Tracker® v4.1 allows users the ability to set the format in which the lines on the graphs will be displayed using either colors or patterns.

**Logo** – BAC Tracker® v4.1 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® v4.1 allows users to customize the definition of what corresponds to a “standard drink” as it is reported on the Retrograde Alcohol Extrapolation Report and 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 Retrograde Alcohol Extrapolation Report and 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.



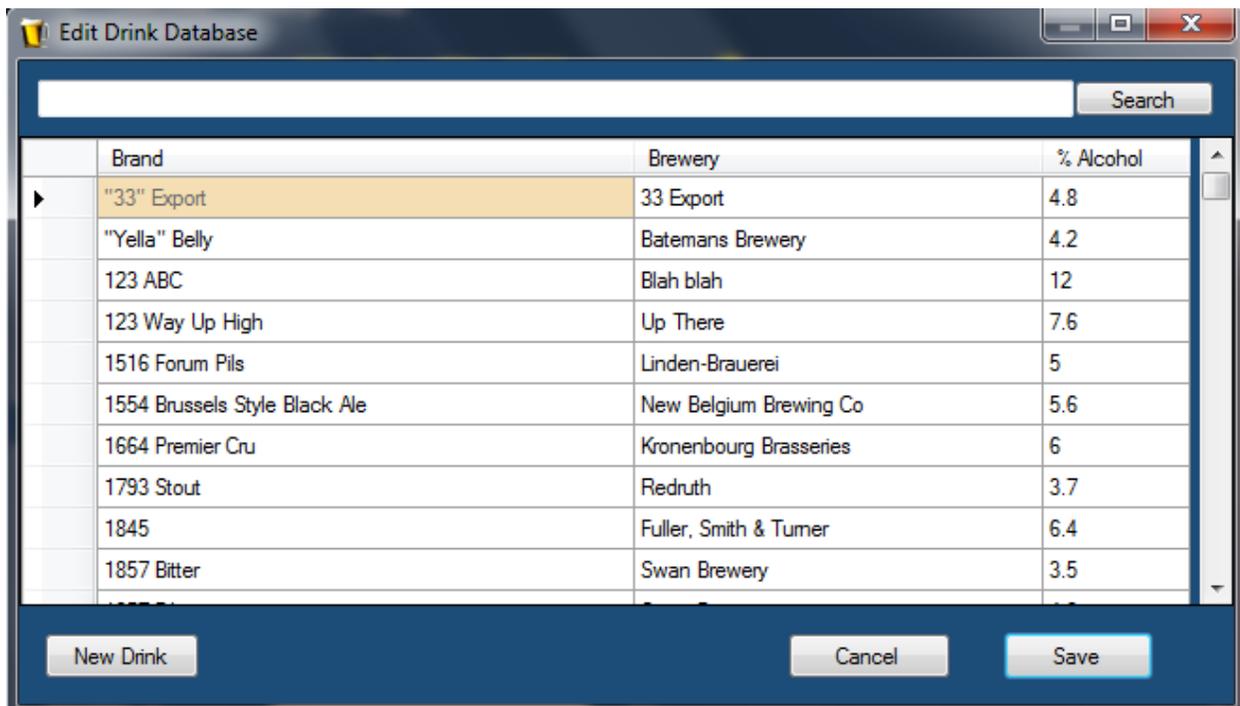
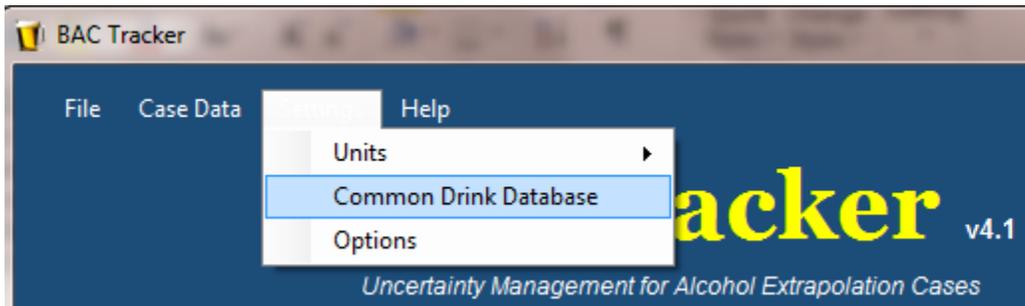
**Loading Factor** – BAC Tracker® v4.1 allows users the ability to calculate and display the loading factor on the Alcohol Extrapolation Report. The loading factor is the theoretical maximum alcohol concentration that could be achieved in an estimation assuming the alcohol was administered instantaneously. This calculation estimates the BAC without taking into consideration absorption or elimination. Check the box to display the loading factor on the Anterograde Alcohol Extrapolation Report and the Retrograde Alcohol Extrapolation Report. NOTE: When loading factor is displayed, the peak alcohol concentration will also be displayed. When the peak alcohol concentration is hidden, the loading factor will also be hidden.

**Peak Alcohol Concentration** – BAC Tracker® v4.1 allows users the ability to calculate and display the peak alcohol concentration and time of peak alcohol concentration on the Alcohol Extrapolation Report. The peak alcohol concentration is determined by the peak BAC calculated in the tabular list of BAC values to the left of the thumbnail graph on the first page of the Anterograde Alcohol Extrapolation Report and Retrograde Alcohol Extrapolation Report. Check the box to display the peak alcohol concentration and time of peak alcohol concentration on the Anterograde Alcohol Extrapolation Report and Retrograde Alcohol Extrapolation Report. NOTE: When peak alcohol concentration is hidden, the loading factor will also be hidden.

**Uncertainty** – BAC Tracker® v4.1 allows users the ability to incorporate a known Quality Assurance/Quality Control (QA/QC) uncertainty associated with the analytical method of obtaining a known BAC value. This uncertainty associated with the known BAC value can be incorporated into the calculations to provide a comprehensive extrapolation report accounting for all sources of uncertainty. The known BAC uncertainty will vary depending on the particular test and instrument utilized. If a particular instrument being used to obtain a known BAC contains a 0.01g/dl uncertainty according to QA/QC data, the user may enter this value of 0.01 in this section and the software will calculate all alcohol extrapolations according to the known BAC value entered by the user +/- the uncertainty value (0.01 in this example). If users do not wish to include a calculation of the known BAC uncertainty, then a value of "0" in this field will remove any uncertainty associated with the known BAC value due to the analytical method. NOTE: This uncertainty associated with the known BAC is only relevant for the Retrograde Alcohol Extrapolation Report and the Alcohol Quantification Report where a known BAC value is entered.

Once all user defaults have been selected, click "OK" to save and exit the window back to the main screen of BAC Tracker v4.1.

BAC Tracker® v4.1 contains a database of over 1,400 beers for reference purposes in the "Common Drink Database". This is a dynamic database that allows users to update the list with common drinks not currently in the database by selecting "Settings" on the main screen and then selecting "Common Drink Database".



Once the Common Drink Database window appears click "New Drink" and in the blank row enter the Brand, Brewery, and % Alcohol by Volume. Before saving, the list may be re-alphabetized by Brand, Brewery, or % Alcohol by Volume simply by double clicking on the respective column heading at the top of the list. Click "Save" when finished in order to reference the recently added drink entry at some time in the future.

*NOTE: This list is maintained by all current users to BAC Tracker via a private, online database. Each new drink entry added to the database is also saved to the online database. Each time BAC Tracker® v4.1 is opened and the user is connected to the internet, the latest version of the Common Drink Database is downloaded to the user's computer. This ensures a community approach to maintaining and building the database.*



## REPORTS

Once all the user defaults have been entered in the Options menu you may begin entering data to generate extrapolation reports. On the main page, the Agency Data, Subject Data, and Elimination Data must be entered before any type of report may be generated.

The screenshot shows the BAC Tracker v4.1 software interface. At the top, there is a menu bar with 'File', 'Case Data', 'Settings', and 'Help'. The main title is 'BAC Tracker v4.1' with the subtitle 'Uncertainty Management for Alcohol Extrapolation Cases'. The interface is divided into three main sections: Agency Data, Subject Data, and Elimination Data. The Agency Data section includes fields for 'Organization' and 'Reference ID #'. The Subject Data section includes fields for 'Subject Name:', 'Gender' (a dropdown menu), 'Age (Yrs):', 'Weight lb', and 'Height in'. The Elimination Data section includes fields for 'Lower Range of Elimination Rate (g/dl/hr)' and 'Higher Range of Elimination Rate (g/dl/hr)'. Below these sections are three buttons: 'Anterograde Alcohol Extrapolation Report', 'Alcohol Quantification Report', and 'Retrograde Alcohol Extrapolation 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).



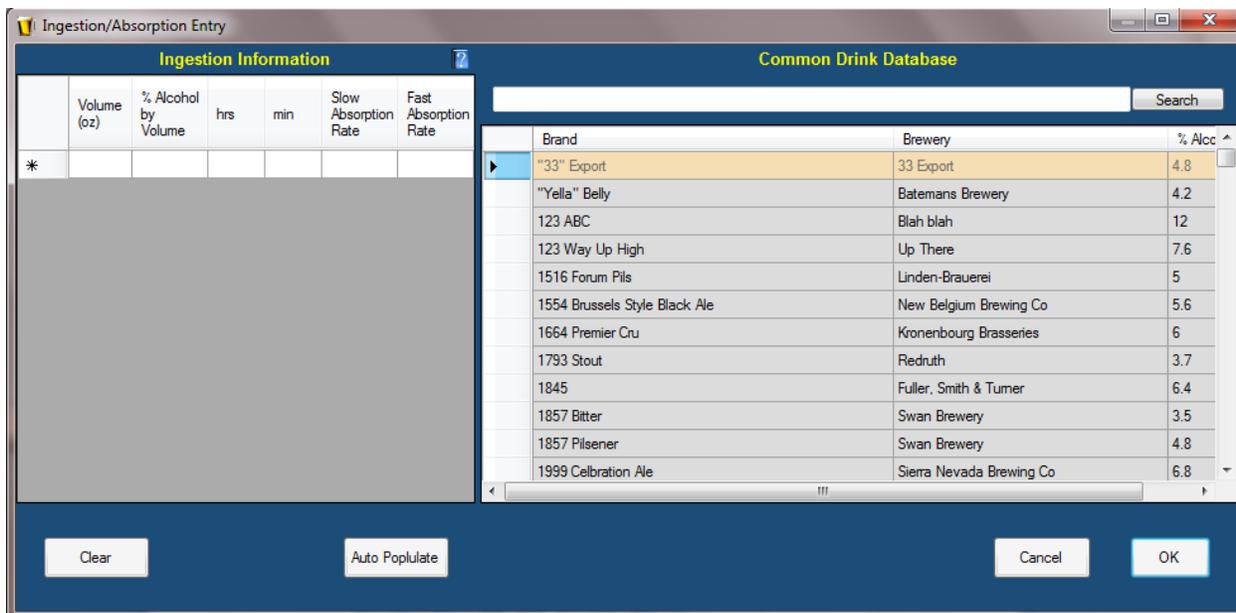
**Elimination Data** – Enter the elimination rate range you wish to use in the alcohol estimations. (See *Elimination Range* above).

### ANTEROGRADE ALCOHOL EXTRAPOLATION REPORT

This report provides a comprehensive, multi-point curve extrapolation of the entire drinking scenario when a no analytically determined known BAC is available, but information pertaining to what the individual consumed and approximate times of consumption are known. This type of report may generate up to 252 different reports using any combination of the six volume distribution formulae calculated with various combinations of absorption and elimination rates chosen by the user.

To generate an Anterograde Alcohol Extrapolation Report, follow the steps listed below:

1. Click on the button labeled “Anterograde Alcohol Extrapolation Report” in the lower right hand corner of the main screen.
2. Once selected, the Ingestion/Absorption Entry window will appear as shown below.

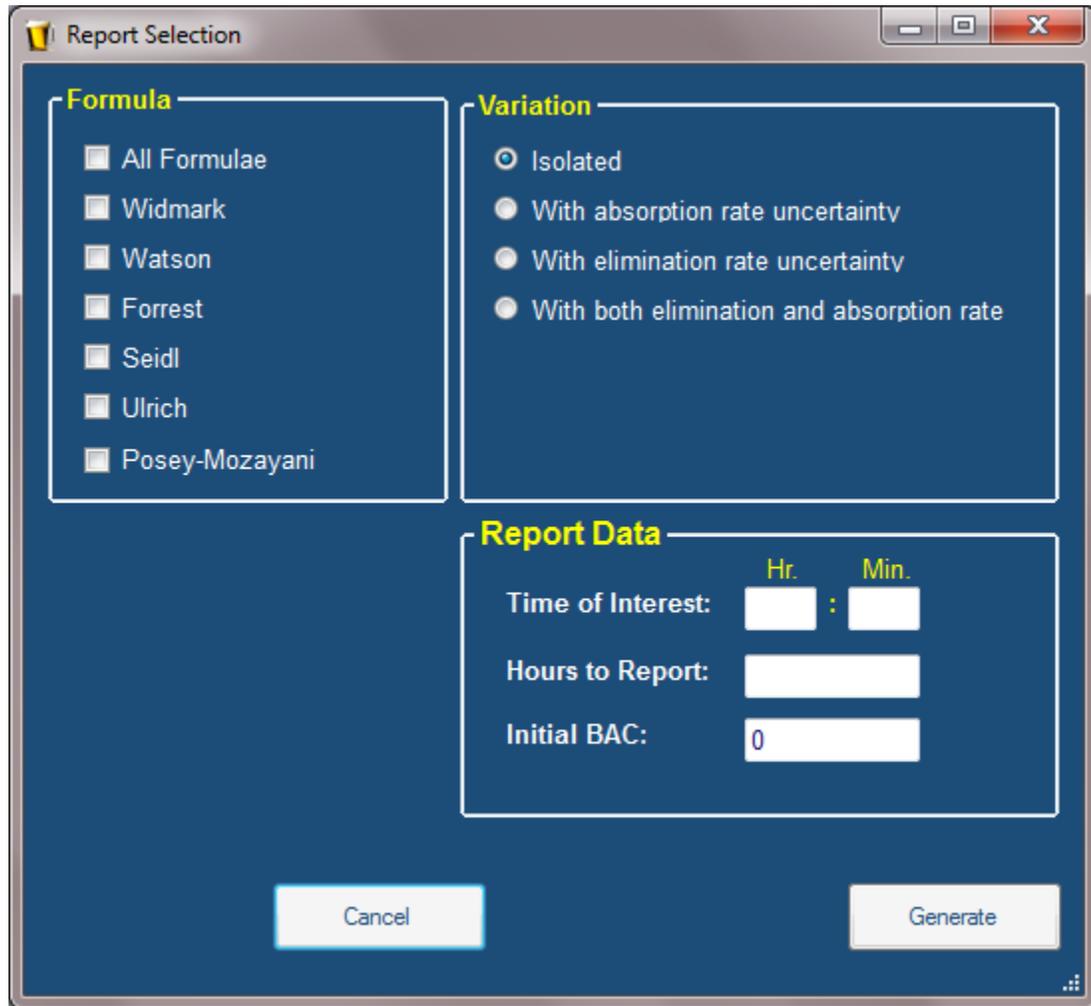


- a. Enter each particular drink that was consumed by the individual as well as the time it was consumed. Enter the volume of the drink, % alcohol by volume, and the particular time the drink was consumed in a 24hrs format (0 - 23hrs and 0 - 59min). The slow and fast rates of absorption default to the values chosen in the user Settings menu, but may be changed for each particular drink in those respective fields by entering an absorption rate constant value between 1 and 8.

- b. The common drink database lists over 1,400 beers for reference purposes. Users may double click on a particular drink in the database in order to automatically record the % alcohol by volume for a drink being entered in the "Ingestion Information" section.
- c. The "Auto Populate" feature allows for the Ingestion Information table to be automatically populated according to a large amount of alcohol being consumed during an extended period of time, i.e. 2 bottles of wine being consumed over a period of 4 hours. This feature will automatically populate the Ingestion Information table with standard drinks (according to the user defined "standard drink" in the Settings menu) each at regularly spaced time intervals within the time frame specified between the "Time of First Drink" and "Time of Last Drink" listed by the user. The number of drinks calculated and time interval between drinks depend on the Volume, % Alcohol by Volume, and the duration specified in which the alcohol was consumed between the time of first drink and time of last drink. To auto-populate the Ingestion Information table click the button labeled "Auto Populate" (second button from the left on the lower portion of the Ingestion/Absorption Entry window).



- d. In the "Auto Populate" window, enter the Volume of the alcohol consumed, the % Alcohol by Volume, and the Time of First Drink and Time of Last Drink ("hr" between 0 and 23 and "min" between 0 and 59).
3. Once the Ingestion/Absorption Entry window has been completed (from step #2), click OK to continue to the next window "Report Selection".

The image shows a software dialog box titled "Report Selection". It has a dark blue background and a white border. The dialog is divided into three main sections: "Formula", "Variation", and "Report Data".  
1. **Formula**: A list of seven items, each with a small square checkbox to its left. The items are: "All Formulae", "Widmark", "Watson", "Forrest", "Seidl", "Ulrich", and "Posey-Mozayani".  
2. **Variation**: A list of four items, each with a radio button to its left. The items are: "Isolated", "With absorption rate uncertainty", "With elimination rate uncertainty", and "With both elimination and absorption rate".  
3. **Report Data**: A section with three input fields. The first is "Time of Interest:" followed by two small input boxes labeled "Hr." and "Min." separated by a colon. The second is "Hours to Report:" followed by a single input box. The third is "Initial BAC:" followed by an input box containing the number "0".  
At the bottom of the dialog, there are two buttons: "Cancel" on the left and "Generate" on the right. A small icon of three dots is in the bottom right corner of the dialog box.

- a. In this window, complete the Formula, Variation, and Report Data sections.
- i. **Formula** – Select which individual (or any combination thereof) of volume distribution formulae you would like to use when generating your report. To select, simply click on the box to the left of each name so that a check mark appears. To generate a report with all formulae, simply click the box labeled “All Formulae” at the top. By selecting multiple volume distribution formulae, the report will generate with each formulae superimposed on the graph and taking into account any variability or uncertainty associated with the volume distribution of alcohol in the human body.
  - ii. **Variation** – Select which type of uncertainty you would like to account for when generating the report.



1. Isolated – This selection will generate the report using the volume distribution formulae combination selected, but with only a single rate of absorption (the average of the “Slow Absorption Rate” and “Fast Absorption Rate” chosen for each drink) and a single rate of elimination (the average of the “Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).
  2. With Absorption Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of absorption rates (“Fast Absorption Rate” and “Slow Absorption Rate”) chosen for each drink, but only a single rate of elimination (the average of the “Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).
  3. With Elimination Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of elimination rates (“Low Range of Elimination Rate” and “High Range of Elimination Rate”) chosen by the user, but only a single rate of absorption (the average of the “Slow Absorption Rate” and “Fast Absorption Rate” chosen for each drink).
  4. With Both Elimination and Absorption Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of both the various absorption rates (“Fast Absorption Rate” and “Slow Absorption Rate” chosen for each drink) and various elimination rates (Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).
- iii. **Report Data** – Enter the “Time of Interest”, “Hours to Report”, and “Initial BAC” in this area.
1. Time of Interest – Enter the time you would like software to extrapolate the BAC. The time of interest may be related to the time a particular incident occurred that you are interested in knowing what the estimated BAC was at that particular time. While the software will generate a tabular list of times and the extrapolated BAC values at those times, this feature also allows you to extrapolate the BAC at any single time during a drinking



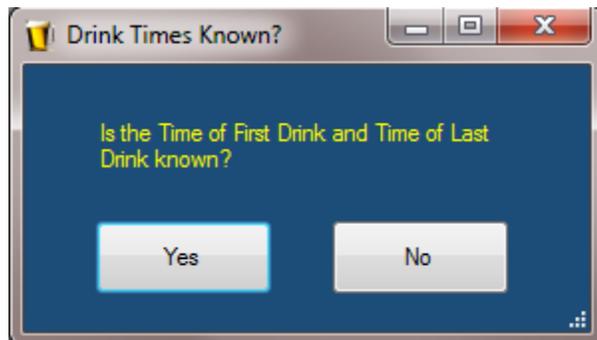
scenario. Enter the “Hr.” and “Min.” of your time of interest (“Hr.” based on a 24hr format and “Min” between 0 and 59).

2. Hours to Report – Enter the number of hours you would like to include on the extrapolation report (i.e. some scenarios may last two hours whereas others may last ten hours or more. The number of hours to report determines the duration of time for which you are extrapolating beginning with the time of the first drink of alcohol. For example, if the time of the first drink of alcohol is 1600hrs and you enter a duration of 6 hours in the “Hours to Report” section, your report will generate with an extrapolation beginning with 1600hrs and ending 6 hours later at 2200hrs.
3. Initial BAC – This field allows the user to specify whether the BAC at the beginning of this drinking scenario is 0.000g/dl or some BAC value greater. This feature allows users to extrapolate an individual’s BAC as a result of additional alcohol consumed even though the individual has an existing BAC. Enter the BAC for which you would like the extrapolation to begin (i.e. for an initial BAC of 0.050g/dl simply enter the numerical portion “0.050”).
4. Click “Generate” to generate the Anterograde Alcohol Extrapolation Report in a PDF format which may then be saved for later reference.

### RETROGRADE ALCOHOL EXTRAPOLATION REPORT

Two different types of Retrograde Alcohol Extrapolation Reports (Type I or Type II) can be generated depending on whether relevant begin and end times of alcohol consumption are known.

To generate a Retrograde Alcohol Extrapolation Report and choose which type is appropriate for the specific case at hand, click on the button labeled “Retrograde Alcohol Extrapolation Report” in the lower right hand corner of the main screen. Once selected, the following window will appear:

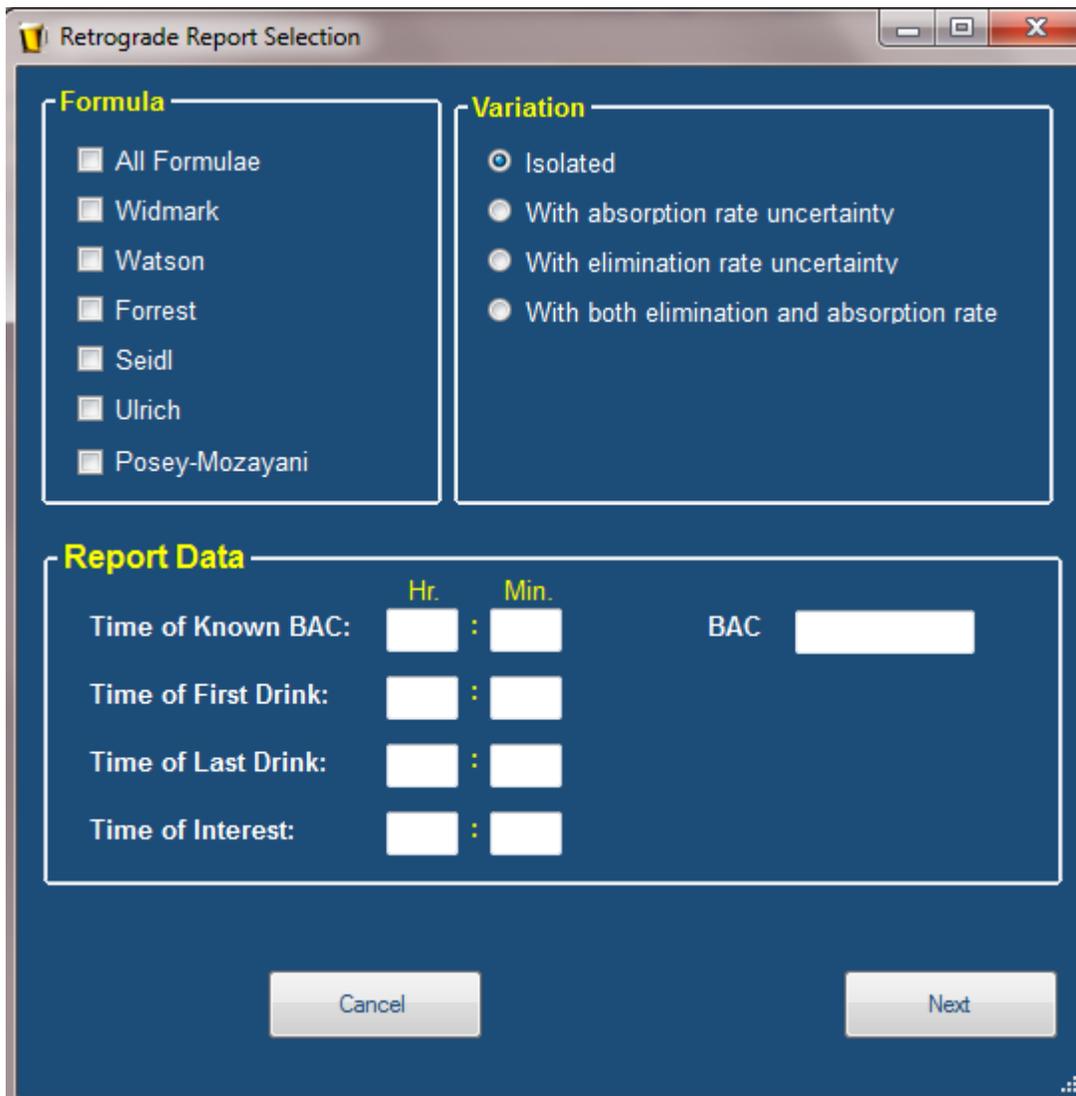


If the Time of First Drink and Time of Last Drink are known, select “Yes” to generate a Type I Retrograde Alcohol Extrapolation Report. If the Time of First Drink and Time of Last Drink are not known, select “No” to generate a Type II Retrograde Alcohol Extrapolation Report.

**TYPE I RETROGRADE ALCOHOL EXTRAPOLATION REPORT:** This report provides a comprehensive, multi-point curve extrapolation of the entire drinking scenario when an analytically determined known BAC is available as well as approximate times of alcohol consumption (time of first drink and time of last drink), but information pertaining to what the individual consumed, how much the individual consumed, and exactly when the individual consumed each individual drink are unknown. This type of report may generate up to 252 different reports using any combination of the six volume distribution formulae calculated with various combinations of absorption and elimination rates chosen by the user.

To generate a Type I Retrograde Alcohol Extrapolation Report, follow the steps listed below:

1. After clicking on the button labeled “Retrograde Alcohol Extrapolation Report” in the lower right hand corner of the main screen and selecting “Yes” in the window labeled “Drink Times Known” (shown above), the Retrograde Report Selection window will appear as shown below.



- a. In this window, complete the Formula, Variation, and Report Data sections.
  - i. **Formula** – Select which individual (or any combination thereof) of volume distribution formulae you would like to use when generating your report. To select, simply click on the box to the left of each name so that a check mark appears. To generate a report with all formulae, simply click the box labeled “All Formulae” at the top. By selecting multiple volume distribution formulae, the report will generate with each formulae superimposed on the graph and taking into account any variability or uncertainty associated with the volume distribution of alcohol in the human body. NOTE: Because a known BAC value is entered when generating this type of report, the software will calculate each distribution



formulae with a different total volume of alcohol consumed so that each distribution formulae represents the known BAC entered at the known BAC time. The differences in the volume for each distribution formula are listed on the final report. These differences in total volume consumed represent the uncertainty associated with the total amount of alcohol consumed by the individual based on the uncertainty in which the alcohol is distributed throughout the individual's body. The graph, therefore, will represent all distribution formulae overlaying each other and estimating the same BAC values to ensure each distribution formula includes the known BAC at the known time.

- ii. **Variation** – Select which type of uncertainty you would like to account for when generating the report.
  1. Isolated – This selection will generate the report using the volume distribution formulae combination selected, but with only a single rate of absorption (the average of the “Slow Absorption Rate” and “Fast Absorption Rate” chosen for each drink) and a single rate of elimination (the average of the “Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).
  2. With Absorption Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of absorption rates (“Fast Absorption Rate” and “Slow Absorption Rate”) chosen for each drink, but only a single rate of elimination (the average of the “Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).
  3. With Elimination Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of elimination rates (“Low Range of Elimination Rate” and “High Range of Elimination Rate”) chosen by the user, but only a single rate of absorption (the average of the “Slow Absorption Rate” and “Fast Absorption Rate” chosen for each drink).
  4. With Both Elimination and Absorption Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of both the various absorption rates (“Fast Absorption Rate” and “Slow Absorption Rate” chosen for each drink) and various elimination

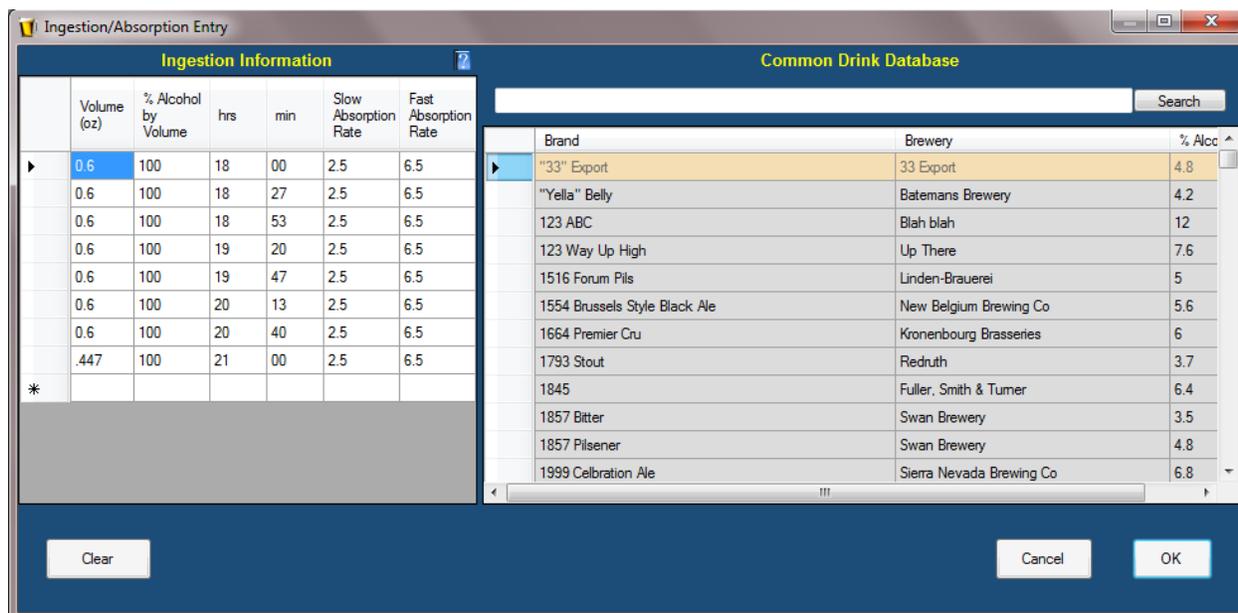


rates (Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user).

- iii. **Report Data** – Enter the “Time of Known BAC”, “Known BAC”, “Time of First Drink”, “Time of Last Drink”, and “Time of Interest” in this area.
  1. Time of Known BAC – Enter the time of which the known BAC value was obtained (“Hr.” based on a 24hr format and “Min” between 0 and 59).
  2. Known BAC – Enter the known BAC obtained from the analytical method (i.e. breath, blood, etc.). Enter the known BAC as only the numerical portion. For example, a BAC value of 0.080g/dl and a BrAC value of 0.080g/210L will both be entered in the same manner as “0.080”.
  3. Time of First Drink – Enter the time that the first drink of alcohol was consumed, i.e. time of which the drinking scenario began (“Hr.” based on a 24hr format and “Min” between 0 and 59).
  4. Time of Last Drink – Enter the time that the last drink of alcohol was consumed (“Hr.” based on a 24hr format and “Min” between 0 and 59).
  5. Time of Interest – Enter the time you would like software to extrapolate the BAC. The time of interest may be related to the time a particular incident occurred that you are interested in knowing what the estimated BAC was at that particular time. While the software will generate a tabular list of times and the extrapolated BAC values at those times, this feature also allows you to extrapolate the BAC at any single time during a drinking scenario prior to the Time of Known BAC (“Hr.” based on a 24hr format and “Min” between 0 and 59).
2. Once the Retrograde Report Selection Data is complete, click “Next” to continue to the “Ingestion/Absorption Entry” window.
  - a. Based on the information provided in the previous section (“Time of Known BAC”, “Known BAC”, “Time of First Drink”, “Time of Last Drink”, and “Time of Interest”), the software will calculate the median value of alcohol volume consumed from each of the different distribution formulae volume estimations and separate the medium volume consumed into individual “Standard” drinks (according to the user defined “standard drink” in the Settings menu) each at

regularly spaced time intervals within the time frame specified between the “Time of First Drink” and “Time of Last Drink” listed by the user. This allows for the user to edit absorption rates for each of the individual drinks (between a value of 1.0 and 8.0). The number of drinks calculated and time interval between drinks depend on the total volume of alcohol calculated to have been consumed in order to reach the Known BAC at the Time of Known BAC and the duration specified in which the alcohol was consumed between the time of first drink and time of last drink. *NOTE: the volume and % alcohol by volume should not be edited by the user in this window.*

- b. The Common Drink Database appears to the right, but is not relevant when generating this type of report since the software automatically calculates the volume of alcohol consumed by the individual.



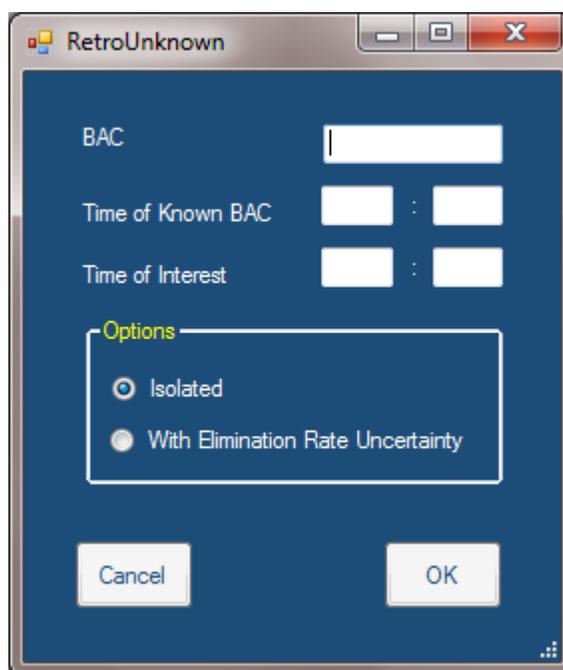
- 3. Click “OK” to generate the Retrograde Alcohol Extrapolation Report in a PDF format which may then be saved for later reference.

**TYPE II RETROGRADE ALCOHOL EXTRAPOLATION REPORT:** This report provides a multi-point extrapolation of the blood alcohol concentration when an analytically determined known BAC is available, but information pertaining to what the individual consumed, how much the individual consumed, and exactly when the individual consumed the alcohol are unknown. This type of report assumes alcohol absorption is complete and estimates the BAC by calculating the amount of alcohol metabolized between the Time of Interest and the Time of the Known BAC taking into account the uncertainty associated with alcohol elimination. Additionally, the

software will take into account the uncertainty associated with the known BAC from QA/QC data to ensure all sources of uncertainty are accounted for in the extrapolation.

To generate a Type II Retrograde Alcohol Extrapolation Report, follow the steps listed below:

1. After clicking on the button labeled “Retrograde Alcohol Extrapolation Report” in the lower right hand corner of the main screen and selecting “No” in the window labeled “Drink Times Known” (shown above), the “RetroUnknown” window will appear as shown below.

The image shows a screenshot of a software dialog box titled "RetroUnknown". The dialog has a dark blue background and a white border. It contains several input fields: a single-line text box for "BAC", and two pairs of spinners for "Time of Known BAC" and "Time of Interest". Below these is an "Options" section with two radio buttons: "Isolated" (which is selected) and "With Elimination Rate Uncertainty". At the bottom of the dialog are "Cancel" and "OK" buttons. The window title bar shows standard minimize, maximize, and close buttons.

- a. In this window, enter the Known BAC, Time of Known BAC, Time of Interest, and which option of this type of report to generate.
  - i. **BAC** – Enter the known BAC obtained from the analytical method (i.e. breath, blood, etc.). Enter the known BAC as only the numerical portion. For example, a BAC value of 0.080g/dl and a BrAC value of 0.080g/210L will both be entered in the same manner as “0.080”.
  - ii. **Time of Known BAC** – Enter the time of which the known BAC value was obtained (“Hr.” based on a 24hr format and “Min” between 0 and 59).
  - iii. **Time of Interest** – Enter the time you would like software to extrapolate the BAC. The time of interest may be related to the time a particular incident occurred that you are interested in knowing what the estimated



BAC was at that particular time. While the software will generate a tabular list of times and the extrapolated BAC values at those times, this feature also allows you to extrapolate the BAC at any single time during a drinking scenario prior to the Time of Known BAC ("Hr." based on a 24hr format and "Min" between 0 and 59).

- iv. **Options** – Choose which type of report to generate ("Isolated" or "With Elimination Rate Uncertainty").
  1. **Isolated** – This type of report extrapolates the alcohol concentration from the Known BAC at the Time of Known BAC to the Time of Interest earlier in the scenario using only one rate of elimination (the average of the "Low Range of Elimination Rate" and "High Range of Elimination Rate" chosen by the user). If the user has defined an uncertainty associated with the known BAC in the User Settings menu, the software will include the +/- variation in the extrapolated BAC based on the uncertainty associated with the known BAC.
  2. **With Elimination Rate Uncertainty** – This type of report extrapolates the alcohol concentration from the Known BAC at the Time of Known BAC to the Time of Interest earlier in the scenario using both rates of elimination (the "Low Range of Elimination Rate" and "High Range of Elimination Rate") chosen by the user. The uncertainty associated with the elimination rate will be included as +/- variation in the extrapolated BAC. Additionally, if the user has defined an uncertainty associated with the known BAC in the User Settings menu, the software will include this +/- variation in the extrapolated BAC as well.
2. Click "OK" to generate the Retrograde Alcohol Extrapolation Report in a PDF format which may then be saved for later reference.

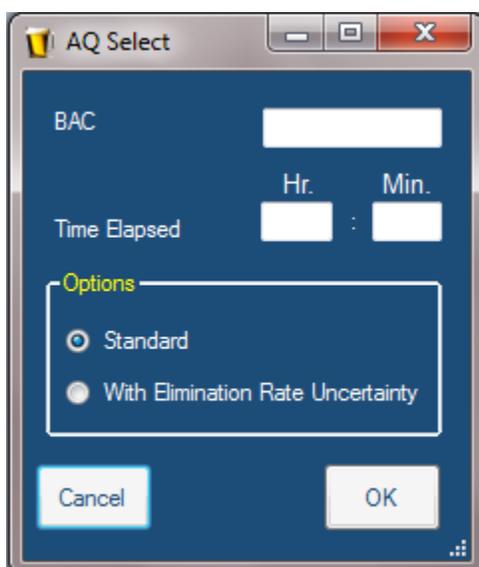
### ALCOHOL QUANTIFICATION REPORT

This report provides a comprehensive extrapolation of the amount of alcohol consumed by an individual in order to reach a particular BAC after a specified time lapse since the first drink of alcohol. This report quantifies the amount of alcohol (displayed in grams and volume of 100% alcohol by volume 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 the uncertainty associated with the volume distribution and elimination. Additionally, the software will take into account the uncertainty

associated with the known BAC from QA/QC data to ensure all sources of uncertainty are accounted for in the extrapolation.

To generate an Alcohol Quantification Report, follow the steps listed below:

1. Click on the button labeled “Alcohol Quantification Report” in the lower right hand corner of the main screen.
2. Once selected, the AQ Select window will appear as shown below.

The image shows a screenshot of a software dialog box titled "AQ Select". The dialog has a dark blue background and a white border. It contains several input fields: a text box for "BAC", two spinners for "Hr." and "Min." under the label "Time Elapsed", and a section titled "Options" with two radio buttons: "Standard" (which is selected) and "With Elimination Rate Uncertainty". At the bottom of the dialog are two buttons: "Cancel" and "OK".

3. Enter the Known BAC, Time Elapsed, and which option of this type of report to generate.
  - a. **BAC** – Enter the known BAC obtained from the analytical method (i.e. breath, blood, etc.). Enter the known BAC as only the numerical portion. For example, a BAC value of 0.080g/dl and a BrAC value of 0.080g/210L will both be entered in the same manner as “0.080”.
  - b. **Time Elapsed** – Enter the amount of time which has elapsed between the time of the start of drinking to the time of the known BAC. For example, if the known BAC was taken at 2200hrs and the first drink of alcohol was consumed at 1845hrs, then the time elapsed between 1845hrs and 2200hrs is 3 hr and 15 min. Using this example, enter the time lapse of “3” beneath ‘Hr.’ and “15” beneath ‘Min.’
  - c. **Options** – Choose which type of report to generate (“Standard” or “With Elimination Rate Uncertainty”).



- i. **Standard** – This type of report quantifies the amount of alcohol consumed by each volume distribution formulae and using only one rate of elimination (the average of the “Low Range of Elimination Rate” and “High Range of Elimination Rate” chosen by the user). If the user has defined an uncertainty associated with the known BAC in the User Settings menu, the software will include the +/- variation in the amount of alcohol estimated to have been consumed based on the uncertainty associated with the known BAC.
  - ii. **With Elimination Rate Uncertainty** – This type of report quantifies the amount of alcohol consumed by each volume distribution formulae and using both rates of elimination (the “Low Range of Elimination Rate” and “High Range of Elimination Rate”) chosen by the user. The difference in the estimated amounts of alcohol consumed due to the uncertainty associated with the elimination rate will be included as +/- variation in the amount of alcohol estimated to have been consumed next to each volume distribution formula estimation. Additionally, if the user has defined an uncertainty associated with the known BAC in the User Settings menu, the software will also include this +/- variation in the amount of alcohol estimated to have been consumed based on the uncertainty associated with the known BAC as well. The user defined uncertainty associated with the known BAC will be reported below each volume distribution formula estimation on the report.
4. Click “OK” to generate the Alcohol Quantification Report in a PDF format which may then be saved for later reference.

#### CONTACT US

For additional information about BAC Tracker® v4.1 please visit us online at <http://www.bac-tracker.com> or contact us directly at [support@bac-tracker.com](mailto:support@bac-tracker.com). We are happy to provide assistance with problems and/or questions associated with BAC Tracker® v4.1.

BAC Tracker International, Inc. also provides training and certification for the proficient use of BAC Tracker® v4.1 for the estimation of blood alcohol concentration. Please visit us online to learn more about our training and certification courses <http://www.bac-tracker.com/training.htm>.