

# **BAC Tracker®**

## ***Supplemental Technical Guide***

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## WELCOME

Welcome to BAC Tracker®. BAC Tracker® is manufactured by BAC Tracker International, Inc. which has been serving the forensic, educational, and legal communities since 2007. BAC Tracker International, Inc., founded in 2007, is a forensic software and expert witness consultation company that provides forensic alcohol litigation services to the criminal justice community internationally. Our software combines several published methods for calculating alcohol absorption, distribution, and elimination to provide an accurate, unbiased, and comprehensive BAC profile for any scenario. With its simple user interface, anyone can use BAC Tracker to perform hundreds of combinations of complex calculations in a matter of minutes to generate various reports estimating the plausible ranges of alcohol consumption and BAC results at any point in time for a given scenario.

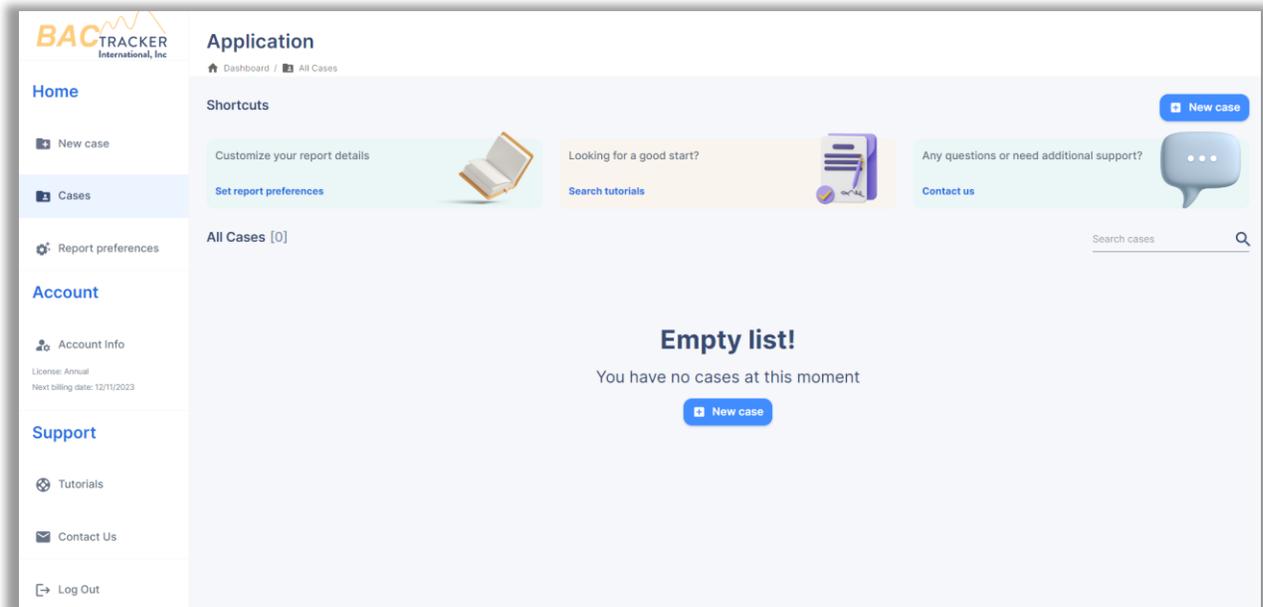
At BAC Tracker International, Inc., we are committed to providing innovative solutions for improving the quality and application of science in the criminal justice system and have become the global leader for forensic estimation of blood alcohol concentration (BAC). We combine professional software development with seasoned experts in the fields of forensic toxicology, medicine, and law bringing you the next generation solution for the extrapolation of blood alcohol concentration (BAC).

## REGISTRATION

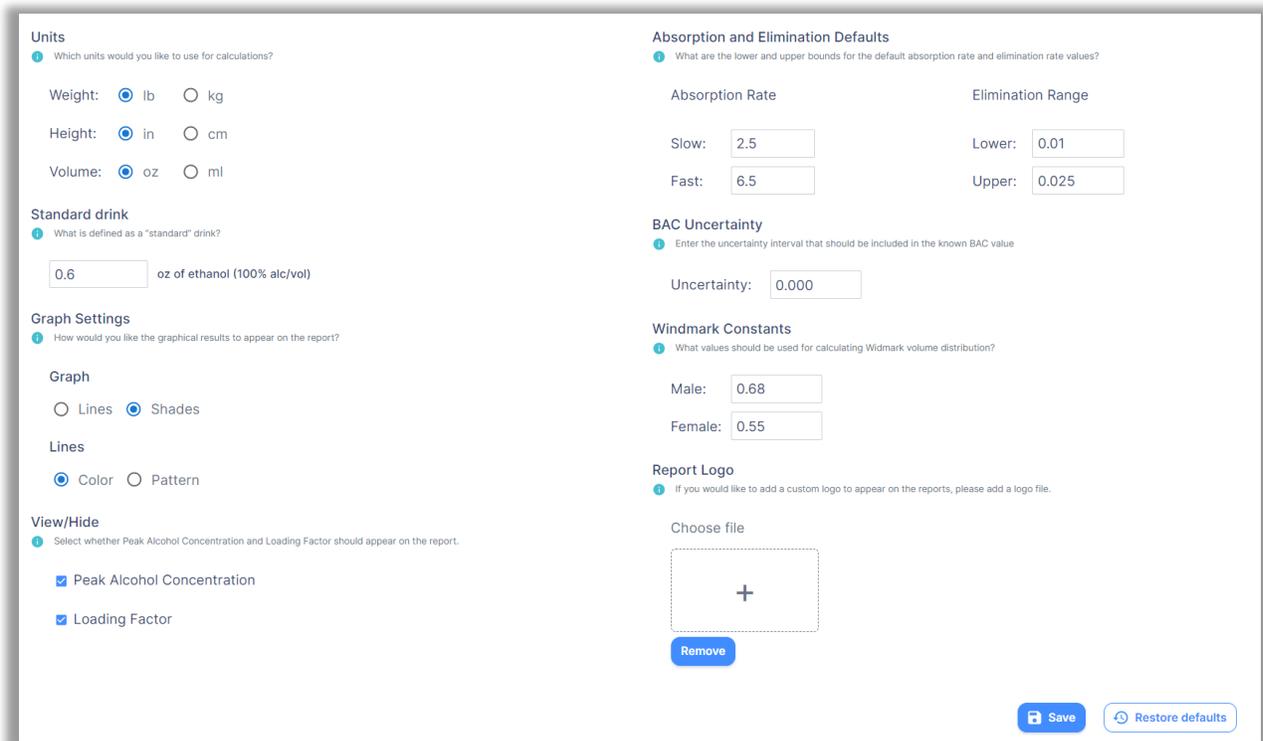
BAC Tracker® can be accessed through our web-based hosted service platform on our website. Once you register an account, you will have the option to select your preferred license type (annual, semi-annual, monthly) and complete the purchase. Our convenient automatic renewal process will ensure you have uninterrupted access to BAC Tracker software. You can manage your billing information, purchase additional licenses, or cancel your license renewal at anytime after logging into your account.

## GETTING STARTED

The first time you login to your BAC Tracker® account you will need to set the default settings 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 future cases and may be changed at any time. This can be accomplished by selecting “Report Preferences” in on the Dashboard menu.



Once selected, the Report Preferences menu will appear allowing the user to define / edit 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.

**Standard Drink** – BAC Tracker® 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. 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.

**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® 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® allows users the ability to set the format in which the lines on the graphs will be displayed using either colors or patterns.

**Peak Alcohol Concentration** – BAC Tracker® 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.

**Loading Factor** – BAC Tracker® 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.

**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).

**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  $0.025\text{g/dl/hr}^{-1}$ . These two defaults may be changed by the user. BAC Tracker® 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.

**Uncertainty** – BAC Tracker® 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.*

**Widmark Constants** – The Widmark formula is one of six volume distribution formulae that the blood alcohol concentrations are calculated in BAC Tracker®. 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® 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.

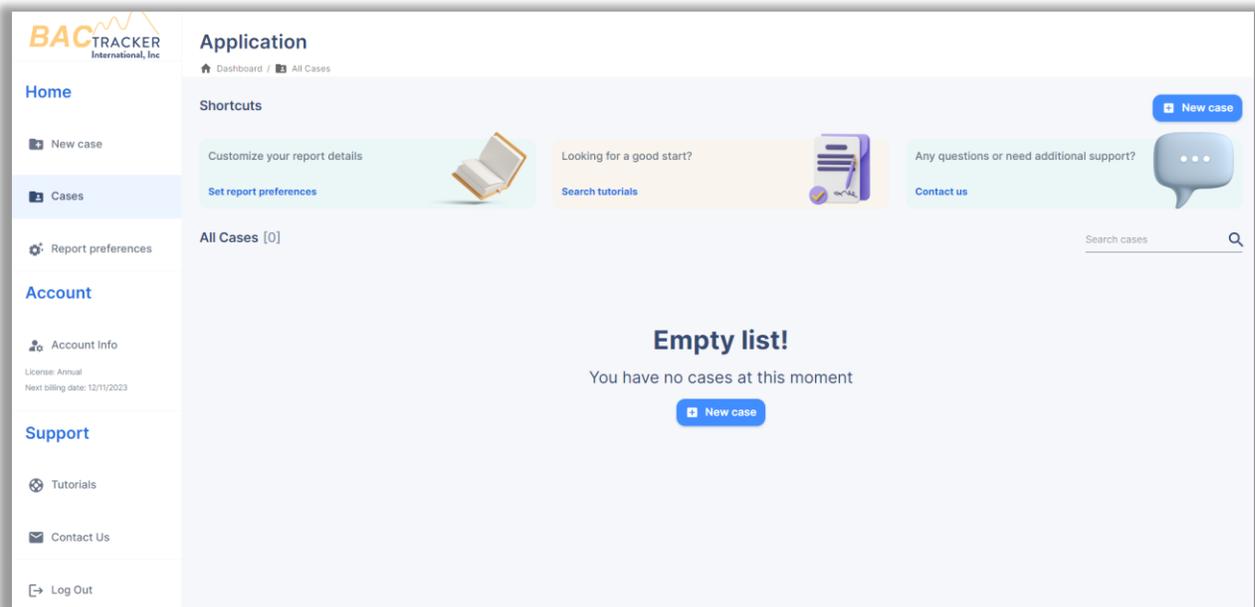
Enter the desired volume distribution constant to correspond to the alcohol estimations from Widmark. The most common Widmark volume distribution constants are 0.68 for males and 0.55 for females, corresponding to the averages published by Widmark in 1932. The remaining five volume distribution values 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.

**Logo** – BAC Tracker® 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.

Once all user defaults have been selected, click "SAVE" to save and then click "Back to Dashboard" to return to the dashboard.

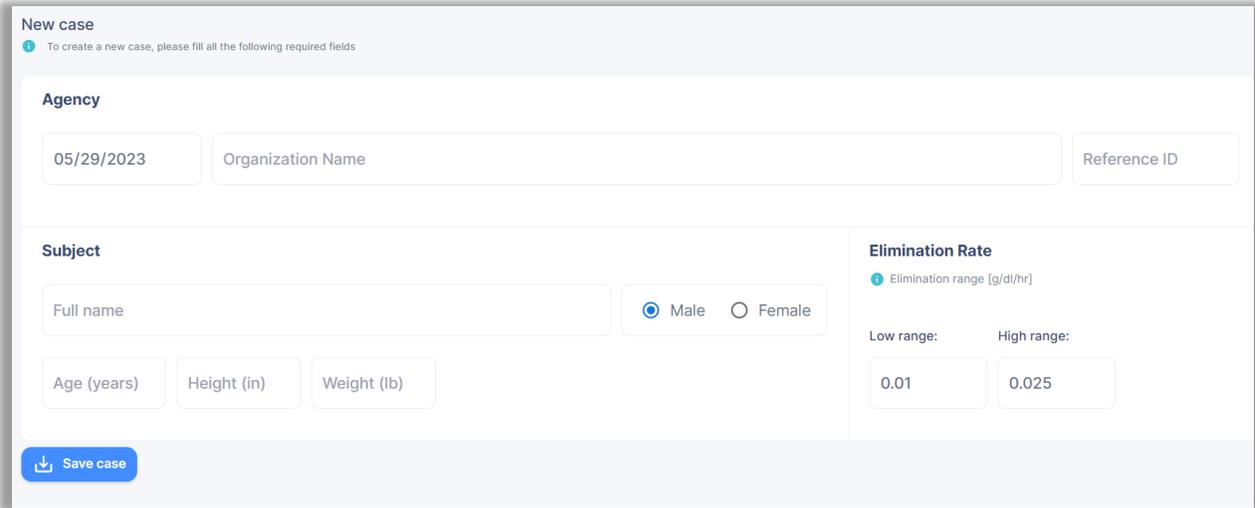
## CASE FILE

Once all the user defaults have been entered in the Settings menu you may begin entering data to create new cases and generate extrapolation reports. On the dashboard, select “New Case” to generate a new Case file or select “Cases” to open a previously saved Case file. There are no limits to the number of Case files or reports within each Case file that can be generated.



To open a previously created Case file, select “Cases”. Once selected, the user will view a list of all cases that have been created in their account. Users may add a new Case, delete an existing Case, or search for a specific Case based on Organization Name, Reference ID #, or Subject Name.

To create a new Case file, select “New Case”. Once selected, a new Case Entry page will appear allowing the user to enter the Agency Data, Subject Data, and Elimination Data related to the case.



The screenshot shows a 'New case' form with the following sections:

- Agency:** Includes a date field (05/29/2023), a large text field for 'Organization Name', and a 'Reference ID' field.
- Subject:** Includes a 'Full name' field, gender selection (Male/Female), and three fields for 'Age (years)', 'Height (in)', and 'Weight (lb)'.
- Elimination Rate:** Includes a title, a sub-label 'Elimination range [g/d/hr]', and two input fields for 'Low range:' (0.01) and 'High range:' (0.025).

A 'Save case' button is located at the bottom left of the form.

**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*).

## REPORTS

Once the required fields have been completed in a Case file, select the type of report to generate within that Case.



The user may return to the Case at any time by selecting “Cases” and then open the specific case.

### 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, select the Anterograde Report on the Report Selection page. This will take you to the data entry page for the Anterograde Report.

**Anterograde Report**

**Formula**  
Select which volume distribution formulae to include on the report. Select "All Formulae" to select all.

All Formulae  Widmark  Watson  Forrest  Seidi  Ulrich  Average

**Variation**  
Select which type or combination of variations pertaining to absorption and elimination rates to include on the report.

Isolated  With absorption rate uncertainty  With elimination rate uncertainty  With both absorption and elimination

**Report Data**  
Enter the "Time of Interest" ("Hr." based on a 24hr format and "Min." between 0 and 59), "Hours to Report" (hour-increments, e.g. "0" hrs or "10.25" hrs), and "Initial BAC" value (e.g. "0.02").

Time of Interest:  Hours  Minutes    Hours to Report:  Hours    Initial BAC:  0

**Ingestion/Absorption Entry**  
Enter each drink that was consumed, the time it was consumed ("Hr." based on a 24hr format and "Min." between 0 and 59), and the range of absorption rates.

<input type="checkbox"/>	Volume (oz)	% Alcohol by volume	Hours	Minutes	Slow Absorption Rate	Fast Absorption Rate
<input type="checkbox"/>					2.5	6.5

1. Complete the Formula, Variation, and Report Data sections.

- a. **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”. 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.
- b. **Variation** – Select which type of uncertainty you would like to account for when generating the report.
  - i. 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).
  - ii. 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).

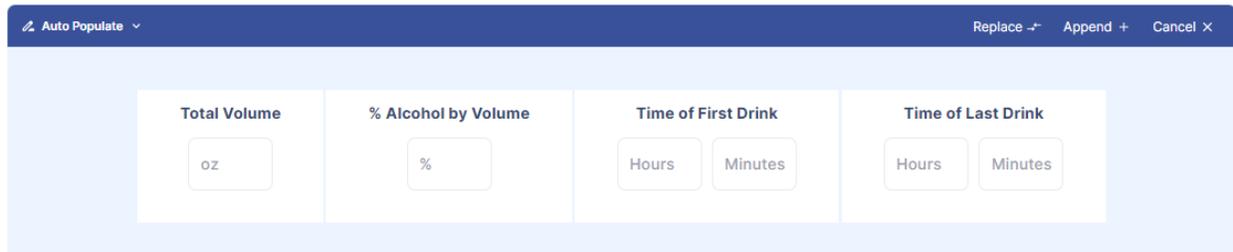
- iii. With Elimination Rate Uncertainty – This selection will generate the report using the volume distribution formulae combination selected and the combination of elimination rates (“Low Range of Elimination Rate” and “High Range of Elimination Rate”) chosen by the user, but only a single rate of absorption (the average of the “Slow Absorption Rate” and “Fast Absorption Rate” chosen for each drink).
  - iv. 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).
- c. **Report Data** – Enter the “Time of Interest”, “Hours to Report”, and “Initial BAC” in this area.
- i. 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).
  - ii. 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.

- iii. 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”).

2. Complete the Ingestion/Absorption Entry section.

- 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.
  - i. To add a row, click the  icon.
  - ii. To delete a row, select the row on the left-hand side and then click the  icon.
  - iii. To use the “Auto Populate” feature for bulk drink entry, expand the “Auto Populate” window above the drink entry table. The “Auto Populate” data entry fields will appear above the drink entry table as shown below. 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. 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).

1. Click “Append” to add the new drink entries to the end of those already in the table or click “Replace” to clear the table and add the new drink entries to the table.



The screenshot shows a software interface with a dark blue header bar. On the left, there is a dropdown menu labeled "Auto Populate". On the right, there are three buttons: "Replace" with a left arrow, "Append" with a plus sign, and "Cancel" with an X. Below the header is a light blue area containing four white input boxes. The first box is labeled "Total Volume" and contains the unit "oz". The second box is labeled "% Alcohol by Volume" and contains the unit "%". The third box is labeled "Time of First Drink" and contains two sub-inputs: "Hours" and "Minutes". The fourth box is labeled "Time of Last Drink" and contains two sub-inputs: "Hours" and "Minutes".

3. Once the Ingestion/Absorption Entry table has been completed, click “Save & Open” or “View Only.”
  - a. The “Save & Open” option will save a PDF of the report in the Case file and open the report in a new browser window. Users may view saved reports at any time by opening the relevant Case file or users may save a copy of the report directly on their computer.
  - b. The “View Only” will open a PDF of the report in a new browser window, but the report will not be saved in the Case file. Users may save a copy of the report directly on their computer.

## 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, select the Retrograde Report (Type I or Type II) on the Report Selection page. This will take you to the data entry page for the Retrograde Report. On the Retrograde Report screen, select “Type I” or “Type II” in the “Type Selection”. The relevant data entry fields for selected type will appear.

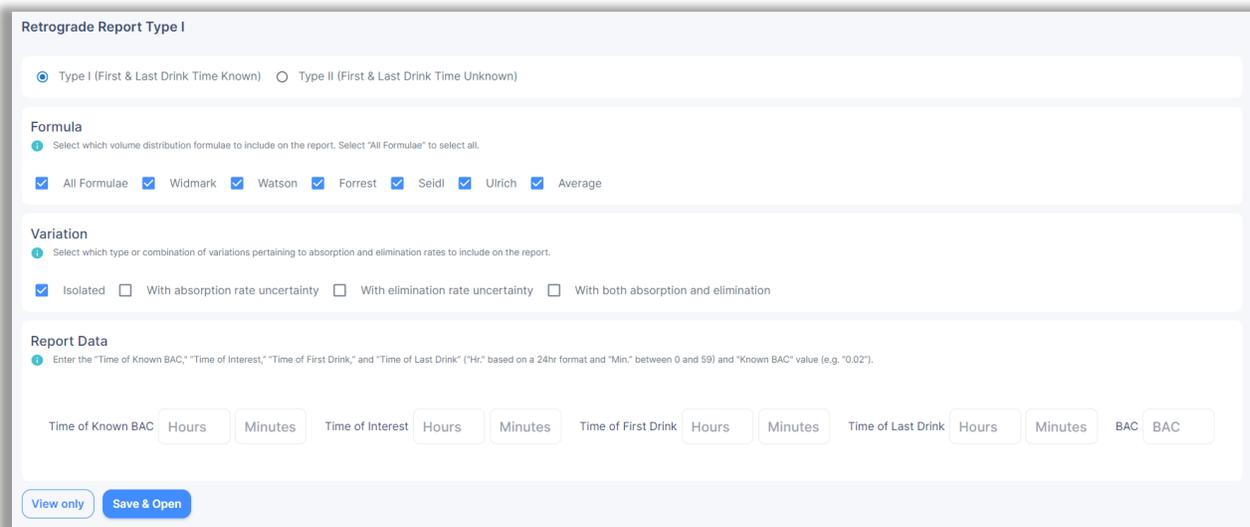
If the Time of First Drink and Time of Last Drink are known, generate a Type I Retrograde Alcohol Extrapolation Report. If the Time of First Drink and Time of Last Drink are not known, generate a Type II Retrograde Alcohol Extrapolation Report.

### RETROGRADE ALCOHOL EXTRAPOLATION REPORT (TYPE I):

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:



The screenshot shows the 'Retrograde Report Type I' form. It has three main sections: 'Formula', 'Variation', and 'Report Data'. The 'Formula' section has a radio button for 'Type I (First & Last Drink Time Known)' selected and a list of checkboxes for 'All Formulae', 'Widmark', 'Watson', 'Forrest', 'Seidl', 'Ulrich', and 'Average', all of which are checked. The 'Variation' section has a radio button for 'Isolated' selected and checkboxes for 'With absorption rate uncertainty', 'With elimination rate uncertainty', and 'With both absorption and elimination', all of which are unchecked. The 'Report Data' section has input fields for 'Time of Known BAC', 'Time of Interest', 'Time of First Drink', and 'Time of Last Drink', each with 'Hours' and 'Minutes' sub-fields, and two 'BAC' input fields. At the bottom, there are 'View only' and 'Save & Open' buttons.

1. Complete the Formula, Variation, and Report Data sections.

- a. **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”. 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.
- b. **Variation** – Select which type of uncertainty you would like to account for when generating the report.
  - i. 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).

- ii. 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).
  - iii. 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).
  - iv. 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).
- c. **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.
- i. 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).
  - ii. 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).
  - iii. 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).

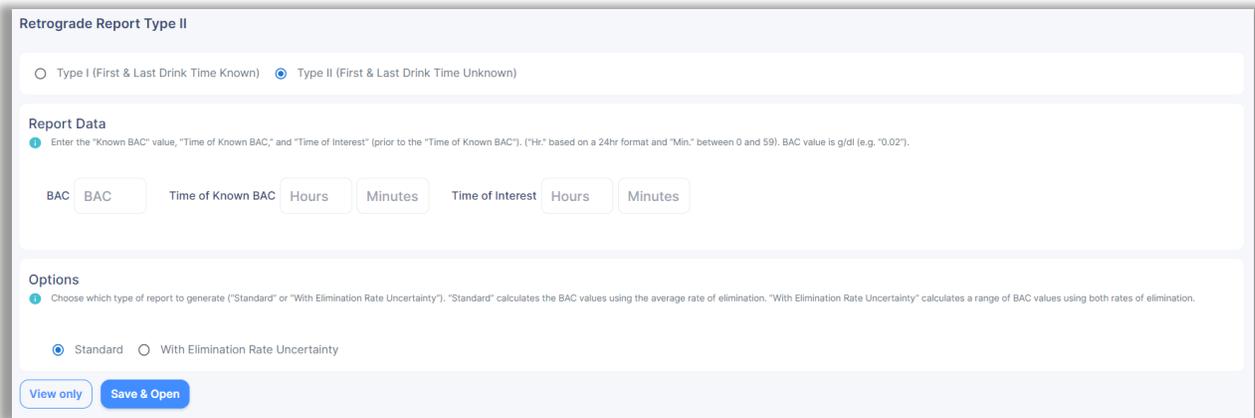
- iv. Time of Last Drink – Enter the time that the last drink of alcohol was consumed ("Hr." based on a 24hr format and "Min." between 0 and 59).
  - v. Known BAC – Enter the known BAC obtained from the analytical method (i.e. breath, blood, etc.). Enter the known BAC as only the numerical portion. For example, a BAC value of 0.080g/dl or a BrAC value of 0.080g/210L will both be entered in the same manner as "0.080."
2. The software will use the information in the Formula, Variation, and Report Data sections to calculate the alcohol volume consumed from each of the different distribution formulae volume estimations and separate them 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. 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.
  3. Once the Formula, Variation, and Report Data sections have been completed, click "Save & Open" or "View Only."
    - a. The "Save & Open" option will save a PDF of the report in the Case file and open the report in a new browser window. Users may view saved reports at any time by opening the relevant Case file or users may save a copy of the report directly on their computer.
    - b. The "View Only" will open a PDF of the report in a new browser window, but the report will not be saved in the Case file. Users may save a copy of the report directly on their computer.

### RETROGRADE ALCOHOL EXTRAPOLATION REPORT (TYPE II):

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:



The screenshot shows a web form titled "Retrograde Report Type II". At the top, there are two radio buttons: "Type I (First & Last Drink Time Known)" and "Type II (First & Last Drink Time Unknown)", with the latter selected. Below this is a "Report Data" section with a blue dot icon and a small text instruction: "Enter the 'Known BAC' value, 'Time of Known BAC,' and 'Time of Interest' (prior to the 'Time of Known BAC'). ('Hr.' based on a 24hr format and 'Min.' between 0 and 59). BAC value is g/dl (e.g. '0.02')." The form contains three input fields: "BAC" with a placeholder "BAC", "Time of Known BAC" with sub-fields for "Hours" and "Minutes", and "Time of Interest" with sub-fields for "Hours" and "Minutes". Below the input fields is an "Options" section with a blue dot icon and a text instruction: "Choose which type of report to generate ('Standard' or 'With Elimination Rate Uncertainty'). 'Standard' calculates the BAC values using the average rate of elimination. 'With Elimination Rate Uncertainty' calculates a range of BAC values using both rates of elimination." There are two radio buttons: "Standard" (selected) and "With Elimination Rate Uncertainty". At the bottom of the form are two buttons: "View only" and "Save & Open".

1. Complete the Known BAC, Time of Known BAC, Time of Interest, 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 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).
  - c. **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).
  - d. **Options** – Choose which type of report to generate (“Isolated” or “With Elimination Rate Uncertainty”).
    - i. **Standard** – 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.

- ii. **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. Once the relevant data has been entered, click “Save & Open” or “View Only.”
  - a. The “Save & Open” option will save a PDF of the report in the Case file and open the report in a new browser window. Users may view saved reports at any time by opening the relevant Case file or users may save a copy of the report directly on their computer.
  - b. The “View Only” will open a PDF of the report in a new browser window, but the report will not be saved in the Case file. Users may save a copy of the report directly on their computer.

## 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, select the Quantification Report on the Report Selection page. This will take you to the data entry page for the Quantification Report.

The screenshot shows the 'Report Data' section with a text input field for 'BAC' and two dropdown menus for 'Time Elapsed' labeled 'Hours' and 'Minutes'. Below this is the 'Options' section with two radio buttons: 'Standard' (selected) and 'With Elimination Rate Uncertainty'. At the bottom are 'View only' and 'Save & Open' buttons.

1. Complete 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” in the ‘Hr.’ field and “15” in the ‘Min.’ field.
  - 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.

2. Once the relevant data has been entered, click “Save & Open” or “View Only”
  - a. The “Save & Open” option will save a PDF of the report in the Case file and open the report in a new browser window. Users may view saved reports at any time by opening the relevant Case file or users may save a copy of the report directly on their computer.
  - b. The “View Only” will open a PDF of the report in a new browser window, but the report will not be saved in the Case file. Users may save a copy of the report directly on their computer.

## CONTACT US

For additional information about BAC Tracker® 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®.