

subjects whichever comes sooner. The reviewer shall sign the report and shall place it in the binder.

- a. If the simulator solution temperature has reached $34^{\circ}\text{C} \pm 0.2$, which is electronically monitored by the temperature probe and the test values are within $\pm 0.010\%$ of the Blood Alcohol Equivalent Simulator Reference Solution value and there are no discrepancies, no further action shall be required of the Forensic Alcohol Supervisor.
- b. For the automatic accuracy check if the simulator test values are not within $\pm 0.010\%$, laboratory shall take corrective action as described in Section III. B.8. For the remote periodic determination of accuracy and interactive accuracy check if the simulator temperature has not reached $34^{\circ}\text{C} \pm 0.2$ and/or if the simulator test values are not within $\pm 0.010\%$ and/or discrepancies are observed with the instrument operation or data collection, the laboratory personnel must travel to the instrument location to identify the problem and corrective action shall be taken to restore the instrument to service. If unable to resolve the problem at the location, the instrument shall be removed from service and taken to the laboratory to perform needed service. If the problem cannot be resolved at the laboratory, the instrument must be sent to the manufacturer for repair.

instrument and the host computer screen will display the actual temperature until it has reached the proper temperature. If it doesn't reach the proper temperature, the instrument will not proceed. If any of the simulator reference solution sample results are not within the proper range, or if any of the blanks are not 0.000%, the instrument shall be disabled. Laboratory personnel must travel to the instrument site and investigate the problem. If unable to resolve the problem, the instrument shall be removed from service and taken to the laboratory and perform needed services.

C. Periodic Determination of Accuracy Records

1. All Periodic Determination of Accuracy and the accuracy checks records shall be transferred to the laboratory host computer via modem every Mondays unless it is a holiday then they will be transferred on Tuesdays. Periodic Determination of Accuracy Records shall be maintained on the laboratory host computer for each instrument in the field according to the instrument serial number. The computer file shall include all automatic accuracy check, interactive accuracy check, Field Site Periodic Determinations of Accuracy, and Remote Periodic Determinations of Accuracy. The computer records are backed up on weekly basis.

a. Each Periodic Determination of Accuracy computer record shall include the following information:

Draeger Alcotest 7110 MK III-C Serial Number
Date of the Periodic Determination of Accuracy
Time of the Periodic Determination of Accuracy
Name of the person who performing the Periodic Determination of Accuracy
Simulator Reference Solution Identification Number
Simulator Reference Solution Blood Alcohol Equivalent
Simulator Reference Solution Temperature
Four (2- IR,2- EC) Simulator Reference Solution Results
Deviations (abort messages, out of accuracy range, blanks not 0.000%, etc.)
Number of Subject Breath Tests since last Periodic Determination of Accuracy.

2. A FIELD SITE PERIODIC DETERMINATION OF ACCURACY WORKSHEET shall be completed for each Field Site Periodic Determination of Accuracy performed. The FIELD SITE PERIODIC DETERMINATION OF ACCURACY WORKSHEET shall be stored by instrument serial number in the maintenance binder at the laboratory.

3. The results of each Periodic Determination of Accuracy (field site and remote) and the accuracy checks (automatic, interactive) shall be reviewed after data is transferred to the host computer at least once every 10 days. The reviewer (FAS,FAA,FAAT) shall check the results of the periodic determination of accuracy to determine whether or not the results are within the acceptable range, or if any errors have occurred during the test. The reviewer also needs to determine that whether or not the remote periodic determination of accuracy has been performed within 10 days or 150

for subject breath tests.

If simulator reference solution temperature is not within the acceptable range, the instrument and the host computer will display the actual temperature until it has reached the proper temperature. If it does not reach the proper temperature, the instrument will not proceed. If any of the simulator reference solution sample results are not within the proper range, or if any of the blanks are not 0.000%, the instrument shall disable itself. The host computer at the laboratory shall be informed of the situation by displaying **Disabled** on the screen. The FAS, FAA, FAAT shall contact the officer who is assigned to change the simulator solution to find out whether or not the simulator tubings are connected properly. If they are not connected properly, the officer shall reconnect them and the technician shall conduct an interactive accuracy check using the host computer. If the results are within the acceptable range, the status of the instrument shall change from **DISABLED TO ENABLED**. If the officer finds all the simulator tubings are connected properly, the laboratory personnel must travel to the instrument location to identify the problem and corrective action shall be taken to restore the instrument to service. If unable to resolve the problem at the location, the instrument shall be removed from service and taken to the laboratory to perform needed service. If the problem cannot be resolved at the laboratory, the instrument must be sent to the manufacturer for repair.

9. For the Field Site Periodic Determination of Accuracy conducted at an instrument location, if each of the simulator reference solution temperature has reached $34^{\circ}\text{C} \pm 0.2$, which is electronically monitored by the temperature probe and the results are within the proper BAE value $\pm 0.010\%$ the field site Periodic Determination of Accuracy shall be concluded. The instrument shall remain in use for subject breath tests.

If simulator reference solution temperature is not within the acceptable range, the instrument will display the actual temperature until it has reached the proper temperature. If it doesn't reach the proper temperature, the instrument will not proceed. If any of the simulator reference solution sample results are not within the proper range, or if any of the blanks are not 0.000%, the cause of the discrepancy shall be determined and corrected. If the problem cannot be corrected, the instrument shall be removed from service and taken the laboratory and perform needed services.

10. For the Remote Periodic Determination of Accuracy and the interactive accuracy check conducted on an instrument in the field using the host computer, if each of the simulator reference solution temperature has reached $34^{\circ}\text{C} \pm 0.2$, which is electronically monitored by the temperature probe and if the results are within the proper BAE value $\pm 0.010\%$ the interactive accuracy check or the remote Periodic Determination of Accuracy shall be concluded. The instrument shall remain in use for subject breath tests.

If simulator reference solution temperature is not within the acceptable range, the

- b. Laboratory personnel can set up the parameters by using the host computer. Communication between the host computer and an instrument in the field must be established to access the function prompts **ACC-CONFIG** and **AUTO-CHECK**. A black access key is not necessary. At these function prompts, select the appropriate parameters as described in steps III.B.3. c. and d. above.
7. The Periodic Determination of Accuracy and the accuracy check test sequence are the same whether the instrument initiates an automatic accuracy check, a laboratory person (FAS, FAA, or FAAT) inserts a black access key and initiates a Field Site Periodic Determination of Accuracy, contacts the instrument using the host computer and performing a remote Periodic Determination of Accuracy or re-enables the instrument to conduct an interactive accuracy check.
 - a. The instrument conducts a **SYSTEM CHECK** to ensure proper operating conditions exist.
 - b. The instrument runs a purge cycle and an air blank check. If the air blank reads 0.000%, the instrument proceeds with the Periodic Determination of Accuracy.
 - c. The instrument obtains a simulator reference solution sample and analyzes it. If the sample reads the proper BAE value of the target concentration $\pm 0.010\%$ (e.g. 0.103 ± 0.010) which is entered in to the instrument, the instrument proceeds with the Periodic Determination of Accuracy or the accuracy check.
 - d. The instrument runs a purge cycle and an air blank check. If the air blank reads 0.000%, the instrument proceeds with the Periodic Determination of Accuracy or the accuracy check.
 - e. The instrument obtains a second simulator reference solution sample and analyzes it. If the sample reads the proper BAE value $\pm 0.010\%$, the instrument proceeds with the Periodic Determination of Accuracy or the accuracy check.
 - f. The instrument runs a purge cycle and an air blank check. If the air blank reads 0.000%, the Periodic Determination of Accuracy or the accuracy check is concluded and the information stored in memory.
8. For the automatic accuracy check, if each of the simulator reference solution temperature has reached $34^{\circ} \text{C} \pm 0.2$, which is electronically monitored by the temperature probe and the results are within the proper BAE value $\pm 0.010\%$ the accuracy check shall be concluded. The instrument shall place itself ready to be used

- Type 2 as the # of tests to be run and press ENTER.
2. Type 2 to select **Inlet/Gas Type**, press ENTER.
At the prompt, <1> **Hose** <2> **Cuv. Inlet** <3> **Gas Port**
Type 2 for **Cuv. Inlet** and press ENTER.
At the prompt, <1> **Wet** <2> **Wet+CO2** <3> **Dry** <4> **Dry+CO2**
Type 1 for wet and press ENTER
 3. Type 3 to select **Conc/Tol**, press ENTER.
At the prompt, **Conc.**enter value(e.g. **0.100**)
Verify entry is correct and press ENTER again.
At the prompt, **ABS-TOL (0.005 . . . 0.020 % BAC):**
Type absolute value (i.e. **0.010**) and press ENTER
Verify entry is correct and press ENTER again.

Press the ESC key to ACC-CONFIG.

- d. The FAS, FAA, or FAAT shall initiate the Field Site Periodic Determination of Accuracy by pressing the ESC key on the keyboard of the Draeger Alcotest 7110 MK III-C. At the function prompt, type in **ACC-CHECK** and press enter. The prompt **Swipe Technician Card ? <Y/N>** will appear. The technician must choose whether to swipe his technician card or enter his name manually (last name, first name, middle initial). After technician identification has been entered, the instrument proceeds with the field site periodic determination of accuracy sequence.
 - e. After completion of the Field Site Periodic Determination of Accuracy sequence, Draeger Alcotest 7110 MK III-C will print the Periodic Determination of Accuracy record. The technician shall complete a **FIELD SITE PERIODIC DETERMINATION OF ACCURACY WORKSHEET** and attach the Periodic Determination of Accuracy test record (see Appendix C).
6. A Remote Periodic Determination of Accuracy shall be conducted on an instrument in the field by an FAS, FAA, or FAAT using the host computer. Simulator reference solution must be changed prior to the laboratory conducted remote periodic determination of accuracy. Prior to conducting the Remote Periodic Determination of Accuracy the FAS, FAA, or FAAT who conducting the test will contact a trained operator to ensure that a new "I" reference solution has been changed or personally change the solution as described in the operator training section of the method (Section VI). The trained officer will notify the FAS, FAA, or FAAT the new batch number of the simulator reference solution.
- a. In a Remote Periodic Determination of Accuracy, the term "periodic" means a period of time not exceeding 10 days or following the testing of every 150 subjects, whichever ever comes sooner. This procedure satisfies the Title 17 requirement of the regulations.

field at any time and to check the accuracy of the instrument or the status of the instrument.

- a. When the instrument that renders itself **DISABLED**, (e.g. out of range accuracy check) the function **STATUS** shall be used to re-enable the instrument from the host computer by the FAS, FAA, or FAAT. The message **UNIT DISABLED; RE-ENABLE (Y OR N)** shall be displayed. If Y is entered, the instrument shall start the warm up process. A temperature probe will electronically monitor the simulator temperature. When the operational temperature has obtained $34^{\circ} \text{C} \pm 0.2$, **Ready** mode is reached. The FAS, FAA, or FAAT shall contact the officer who is assigned to change the simulator solution to find out whether or not the simulator tubings are connected properly. If they are not connected properly, the officer shall reconnect them and the technician shall conduct an interactive accuracy check using the host computer. If the results are within the acceptable range, the status of the instrument shall change from **DISABLED** TO **ENABLED**. If the officer finds all the simulator tubings are connected properly, the laboratory personnel must travel to the instrument location to identify the problem and corrective action shall be taken to restore the instrument to service. If unable to resolve the problem at the location, the instrument shall be removed from service and taken to the laboratory to perform needed service. If the problem cannot be resolved at the laboratory, the instrument must be sent to the manufacturer for repair.

5. A Field Site Periodic Determination of Accuracy shall be conducted by a FAS, FAA, or FAAT on an instrument at a field location when a remote periodic determination of accuracy has failed, or when a field visit is necessary.

- a. The parameters for the field site Periodic Determination of Accuracy must be set up under the function prompt **ACC-CONFIG**.
- b. Insert the black access key into the appropriate receptacle on the back of the Draeger Alcotest 7110 MK III-C.
- c. Press the ESC key on the keyboard of the Draeger Alcotest 7110 MK III-C. At the function prompt, type in **ACC-CONFIG** and press enter. The prompt **Swipe Technician Card ? <Y/N>** shall appear. The technician must choose whether to swipe his technician card or enter his name manually (last name, first name, middle initial). After technician identification has been entered, the following shall appear on the display:

<1> # Tests <2> Inlet/Gas Type <3> Conc/Tol

Select each parameter one at a time and enter the appropriate information:

1. Type **1** to select **# of tests**, press **ENTER**.
At the prompt, **Number of Tests (1 . . . 20)**

Press ESC key to exit **ACC-CONFIG**.

- d. Press the ESC key on the keyboard of the Draeger Alcotest 7110 MK III-C. At the function prompt, type in **AUTO-ACC** and press enter. The prompt **Swipe Technician Card? <Y/N>** shall appear. The technician must choose whether to swipe his technician card or enter his name manually (last name, first name, middle initial). After technician identification has been entered, the following shall appear on the display:

<1> Set Inc <2> Set Next <3> En/Disable

Select each parameter one at a time and enter the appropriate information:

1. Type 1 to select **Set Inc**, press ENTER.
At the prompt, **<1> By Day <2> By Week <3> By Month**
Type 1 to select By Day and press ENTER.
Each day of the week shall appear with Y or N next to it (e.g. **Sunday [N]**).
Use the space bar to toggle between Y and N.
Select Y for the day of the week the automatic Periodic Determination of Accuracy shall be run.
Select N for all other days of the week.
Press ENTER to advance to the next day.
2. Type 2 to select **Set Next** and press ENTER.
Type the date and time of next accuracy check (e.g. 03/28/1999 11:17) and press ENTER.
Verify the entry is correct and press ENTER again.
The prompt, **Function Executed** shall appear on the display.
3. Type 3 to select **En/Disable** and press ENTER.
Use the space bar to toggle between Enabled and Disabled.
Select Enabled and press ENTER.
Verify the entry Enabled and press ENTER again.

Press the ESC key to exit **AUTO-ACC**

- e. The Draeger Alcotest 7110 MK III-C shall use the parameters and schedule set up under **ACC-CONFIG** and **AUTO-ACC** for all Automatic Periodic Determinations of Accuracy.
4. Interactive accuracy check shall be conducted when the instrument renders itself disabled and displays **UNIT DISABLED** on the host computer screen. This procedure does not require changing of the simulator reference solution. The purpose of the interactive accuracy check is a way to communicate with the instrument in the

3. Laboratory may choose to conduct an automatic accuracy check either at pre-determined times incorporated into the programming of the Draeger Alcotest 7110MKIII-C or every time data is retrieved from the instruments into the host computer at the laboratory. The purpose of the automatic accuracy check is to randomly check the accuracy of the instrument and status of the instrument while it is in the field and it is not to satisfy the Title 17 requirement of regulations. This procedure does not require changing of the simulator reference solution.
 - a. The parameters for the Automatic accuracy check must be set up in advance under the function prompts ACC-CONFIG and AUTO-ACC.
 - b. When an instrument is placed in the field, FAS, FAA, or FAAT inserts a black access key into the appropriate receptacle located on the back of the Draeger Alcotest 7110 MK III-C. This black access key allows Laboratory personnel to access the function prompts ACC-CONFIG and AUTO-ACC.
 - c. Press the ESC key on the keyboard of the Draeger Alcotest 7110 MK III-C. At the function prompt, type in ACC-CONFIG and press enter. The prompt **Swipe Technician Card? <Y/N>** will appear. The technician must choose whether to swipe his technician card or enter his name manually (last name, first name, middle initial). After technician identification has been entered, the following will appear on the display:

<1> # Tests <2> Inlet/Gas Type <3> Conc/Tol

Select each parameter one at a time and enter the appropriate information:

1. Type 1 to select **# of tests**, press ENTER.
At the prompt, **Number of Tests (1 . . . 20)**
Type 2 as the # of tests to be run and press ENTER.
2. Type 2 to select **Inlet/Gas Type**, press ENTER.
At the prompt, **<1> Hose <2> Cuv. Inlet <3> Gas Port**
Type 2 for **Cuv. Inlet** and press ENTER.
At the prompt, **<1> Wet <2> Wet+CO2 <3> Dry <4> Dry+CO2**
Type 1 for **Wet** and press ENTER.
3. Type 3 to select **Conc/Tol**, press ENTER.
At the prompt, **Conc. enter value(e.g. 0.100)**
Verify entry is correct and press ENTER again.
At the prompt, **ABS-TOL (0.005 . . . 0.020 % BAC):**
Type absolute value (i.e. **0.010**) and press ENTER
Verify entry is correct and press ENTER again.

<u>Simulator Temperature</u>	<u>Factor</u>	<u>Simulator Temperature</u>	<u>Factor</u>
33.5° C	0.802	34.1° C	0.832
33.6	0.807	34.2	0.838
33.7	0.812	34.3	0.843
33.8	0.817	34.4	0.848
33.9	0.822	34.5	0.853
34.0	0.827		

(Data from Harger, Raney, Bridwell and Kitchell, J. Biol. Chem., 183, 203 - 204, 1950)

III. PERIODIC DETERMINATIONS OF ACCURACY
 [ref. Title 17 Section 1221.4.(a)(2)]

A. General Instructions

1. Given the alcohol concentration of a reference solution and the simulator solution temperature, it is possible to compute what blood alcohol equivalent (BAE) concentration should be reported by a properly calibrated, properly operating breath test instrument. Forensic alcohol laboratories are required to perform periodic determinations of accuracy by utilizing this principle. Laboratory personnel using approved breath simulators containing reference solutions perform periodic determination of accuracy.
2. Breath alcohol instruments used by the laboratory are maintained and given periodic determination of accuracy checks as required by Title 17.
3. Periodic determinations of accuracy will be conducted on all instruments:
 - a. Immediately after installation in the field
 - b. Immediately before removing the instrument from the field
 - c. After maintenance or repairs made in the field (to assure proper calibration).
 - d. Once every week (not more than 10 days) or following the testing of every 150 subjects, whichever comes sooner.

B. Instrument Testing and Evaluation of Results

1. Breath alcohol simulators (the devices used to introduce alcohol vapor into the breath test instrument) must maintain the reference solution at 34° C ± 0.2° C.
2. The Periodic determination of accuracy procedure requires a reference solution of known concentration. Immediately prior to the remote periodic determination of accuracy, the simulator is emptied, jar rinsed with a small amount of fresh "I" solution, emptied again, and then filled with fresh "I" solution. The simulator is then reassembled.

- c. With the appropriate volumetric pipets, add 10.0 mL potassium dichromate solution and 5.0 mL concentrated sulfuric acid to each labelled Erlenmeyer flask. Swirl to mix and allow to cool.
- d. Using the calibrated Eppendorf pipet, which is calibrated before each series of direct oxidimetric determination as described in Section II.C.2., add the calibrated volume of the pipette, (e.g. 500 uL ± 6 uL) of each solution being tested to the labeled flasks. Swirl, stopper, and let stand for three (3) hours at room temperature.
- e. To each flask, add one drop of ferroin-tris indicator.
- f. Titrate with the ferrous ammonium sulfate solution to a permanent salmon-pink endpoint. (Color will progress from dichromate orange to green to light blue and finally, within a half drop, to salmon-pink). The titration results are to be recorded on the TITRATION LOG SHEET (see Appendix B).
- g. Calculate the concentration as % (W/V):

$$\% \text{ alcohol} = \frac{(V_b - V_a) \times 10 \times 0.02171 \times 46.06 \times 100}{V_b \times 4 \times 1000 \times V_p} = \frac{0.24999 \times (V_b - V_a)}{V_b \times V_p}$$

- where V_a = volume of ferrous ammonium sulfate per solution
- V_b = volume of ferrous ammonium sulfate per mean blank value
- V_p = calibrated volume of Eppendorf pipet
- 10 = volume of potassium dichromate used
- 0.02171 = normality of potassium dichromate
- (46.06)/4 = milli-equivalent of ethanol (11.5 mg/meq)
- 100 = conversion factor to per cent
- 1000 = conversion factor (grams to milligrams)

- h. Calculate (to three decimal places) and record the mean concentration of each reference solution in the Simulator Reference Solution Log; discard any titration more than 80 uL from the mean and repeat the tests.
- i. Calculate the expected breath instrument reading by multiplying the alcohol concentration as % (W/V) times the appropriate distribution coefficient for 34° C simulator temperature. (see FACTOR, Table II for reference)

Example calculation:	Titration Result	0.225%
	Simulator Temperature	34 °C
	Distribution Coefficient	0.827 (see FACTOR, Table II for reference)

Expected breath instrument result (BAE) = 0.225 % x 0.827 = 0.186 %

43.75	0.35	0.289
45.0	0.36	0.298
46.25	0.37	0.306

Refer to Appendix A for instructions for weighing, quantitative transfer, and mixing operations.

3. Reagents

- a. Potassium dichromate, U. S. National Institute of Standards and Technology, Primary Standard
- b. Potassium dichromate solution, 0.0217 N
 1. Prepare fresh for each batch of tests.
 2. Place several grams of powder in a weighing vessel and heat at 200° C for two to sixteen hours. Cool in a dessicator.
 3. Weigh out 1.064 g of dried potassium dichromate . Quantitatively transfer the potassium dichromate to a 1 liter volumetric flask. Add about 500 mL distilled water and mix until dissolved. Dilute to the mark with distilled water. Mix thoroughly. Label with solution description, date prepared, and preparer's initials. This solution is to be stored in the dark and discarded after 5 calendar days.
- c. Ferrous ammonium sulfate, $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6 \text{H}_2\text{O}$, reagent grade.
- d. Ferrous ammonium sulfate solution, 0.0434 N

Weigh out 17.02 g of ferrous ammonium sulfate and quantitatively transfer the powder into a 1 liter volumetric flask. Add about 500 mL of distilled water, then, with a 25ml pipet, add 25 mL of concentrated sulfuric acid. Swirl to dissolve and allow to cool. Dilute to the mark with distilled water and mix thoroughly. (Prepare fresh for each batch of tests).
- e. Sulfuric acid, concentrated, ACS grade
- f. Ferroin-Tris (1,10 phenanthroline iron II), 0.025 M Indicator Solution (commercial preparation).

4. Procedure

- a. With each batch of tests, analyze two blanks (i.e., distilled water).
- b. Analyze each reference solution six (6) times.

- m. Magnetic stir bar
- n. Magnetic stirrer
- o. 2L graduate

2. Equipment Calibration

Calibration of the Eppendorf pipet before each series of direct oxidimetric determination of concentration of reference solution: Using the Eppendorf pipet, transfer 500 uL of cool boiled distilled water to a tared (nearest mg), empty, dry weighing bottle. Weigh on a analytical balance. Repeat at least five times. Compute net weight = total - tare. Multiply each by 1.0032, the NBS factor at 72° F(room temperature). Each calculated value must be 500 uL \pm 6 uL, the NBS Class A standard. If not, repeat. If still not acceptable, repair or replace the pipet and repeat the procedure. The mean of the six acceptable values is the pipet volume.

TABLE I

**Preparation of Simulator Solutions
For Target B.A.E. at 34° C**

mL 100 % Ethanol per 10 L Solution	Target Alcohol Concentration By Titration	Target B.A.E. By Alcotest 7110 (34° C) (g/210 L)
7.5	0.06 %	0.050
15.0	0.12	0.099
16.25	0.13	0.107
17.5	0.14	0.116
18.75	0.15	0.124
20.0	0.16	0.132
21.25	0.17	0.141
22.5	0.18	0.149
23.75	0.19	0.157
25.0	0.20	0.165
26.25	0.21	0.174
27.5	0.22	0.182
28.75	0.23	0.190
30.0	0.24	0.198
31.25	0.25	0.207
32.5	0.26	0.215
33.75	0.27	0.223
34.0	0.28	0.232
35.25	0.29	0.240
36.5	0.30	0.248
37.75	0.31	0.256
40.0	0.32	0.265
41.25	0.33	0.273
42.5	0.34	0.281

- a. Volumetric pipet, Class A, TD, 2 mL
- b. Volumetric pipet, Class A, TD, 5 mL
- c. Volumetric pipet, Class A, TD, 25 mL
- d. Volumetric flask, Class A, TC, 2 L
- e. Polypropylene bottle, with stopper, 10 L
- f. Pipet, 5 mL or 10 mL, graduated to 1/10 mL, TD
- g. Commercially available distilled bottled water, 19 L bottle or equivalent
- h. Ethyl alcohol, absolute, USP (Rossville Gold Shield 200 Proof or equivalent)
- i. Magnetic stirrer (Corning PC 351 or equivalent)
- j. Magnetic stir bar

2. Procedure

- a. "CI" Series (Calibration Solutions)
Using a graduated pipet, transfer the appropriate volume (see Table I) of absolute alcohol to a 10 L bottle. Using a 2 L volumetric flask, add 10 L of distilled water. Mix for at least 24 hours using a stir bar and magnetic stirrer. Label with a consecutive batch number(e.g. CI-50, CI-51), date prepared, and preparer's initials. Store at 4° C for no more than one year.
- b. "I" Series (Acceptable BAE Range: 0.100 to 0.107)
Measure out 19L of distilled water using 2L graduate to a commercially available water bottle. Using appropriate volumetric pipettes, add 30.2 ml of absolute alcohol to 19L of distilled water. Stir for at least twenty-four hours using a stir bar and magnetic stirrer. Label with consecutive batch number (e.g. I-350, I-351), date of preparation, and initials of the preparer. Store at 4° C for no more than one year.

C. Oxidimetric Determination of Concentration

1. Equipment

- a. Erlenmeyer flasks, 50 mL, glass stoppered
- b. Volumetric pipet, Class A, TD, 10 mL
- c. Volumetric pipet, Class A, TD, 25 mL
- d. Pipet, 5 mL, graduated 1/10 mL, TD
- e. Eppendorf pipet, fixed volume, 500 uL
- f. Buret, Class A, 5 mL, graduated 0.01 mL, TD
- g. Weighing bottle, 20 mL
- h. Weighing vessels, glass, 5 or 10 mL capacity
- i. Analytical balance with 0.1 mg resolution (annually serviced and calibrated by an independent licensed vendor in addition to regular checks by the laboratory personnel)
- j. Volumetric flask, Class A, 1000 mL
- k. Dessicator
- l. Laboratory oven

Section 23152 states that for its purposes “percent, by weight, of alcohol in a person’s blood is based upon grams of alcohol per 100 milliliters of blood or grams of alcohol per 210 liters of breath”. Test results from subjects are reported as negative when less than 0.01%.

II. REFERENCE SOLUTIONS [Ref. Title 17 Section 1221.4.(a)(2)(A)]

A. General Instructions

1. Breath test reference solutions are aqueous solutions of known alcohol concentration, which produce an instrument response between 0.1% and 0.3%. The alcohol concentration is determined by performing six replicate analyses by a direct oxidimetric method, using U. S. National Institute of Standards and Technology formerly known as the National Bureau of Standards, as Primary Standard Potassium Dichromate. The determination is performed by FAS, FAA, or FAAT under the supervision of FAS or FAA.
2. Reference solutions, used in conjunction with breath alcohol simulators, are used to determine accuracy of breath test devices.
3. Each batch of reference solutions is assigned a consecutive identification number, which may be prefixed by either “I” or “CI”. “I” solutions shall be used for periodic determinations of accuracy or the QC reference run with each subject. “CI” solutions are used only to verify the manufacturer’s instrument calibration and linearity.
4. A small aliquot (approximately 60 mL) of reference solution is reserved in the Laboratory for potential referee requests.
5. Reference solutions in the “I” series are provided to the field stations as needed by laboratory personnel or are available for pick up at the laboratory by agency property officers, in 500 ml polypropylene bottles, which are labeled with solution batch number and date. Each solution must be changed prior to the laboratory conducted a remote periodic determination of accuracy. The solution may not be used for more than 10 days or 149 subject tests. Prior to the laboratory conducted periodic determination of accuracy the FAAT, FAA, or FAS conducting the periodic determination of accuracy will contact a trained operator to ensure that a new “I” reference solution has been changed or personally change the solution. A telephone log will be maintained in the laboratory records (see Appendix M). The telephone log shall contain information including the agency name, the name of the person who will be changing the solution, date and time of solution change, and the laboratory personnel who conducting the remote periodic determination of accuracy.

B. Preparation

1. Equipment and Materials:

I. GENERAL

BREATH ALCOHOL ANALYSIS is defined in Title 17 of the California Code of Regulations as the analysis of a sample of a person's expired breath, using a breath testing instrument designed for this purpose, in order to determine the concentration of ethyl alcohol in the person's blood. [Ref. Title 17 Section 1215.1.(c)].

Such instruments may be used for the analysis of breath samples in places other than the licensed forensic alcohol laboratory and by persons other than Forensic Alcohol Supervisors (FAS), Forensic Alcohol Analysts (FAA), and Forensic Alcohol Analyst Trainees (FAAT) only when such places and persons are under the jurisdiction of a governmental agency or forensic alcohol laboratory. [Ref. Title 17 Section 1221.1.(b)].

A. Instrumentation [Ref. Title 17 Section 1221.1.(a)]

Only instruments and accessories named in the "Conforming Products List" published in the Federal Register by the U. S. Department of Transportation shall be used for breath alcohol analysis in this State. [Ref. Title 17 Section 1221.3].

This procedure describes the breath alcohol analysis program as operated in compliance with Title 17 regulations by the Santa Clara County Crime Laboratory utilizing the Alcotest 7110 MKIII-C manufactured by Draeger Safety Inc. formerly National Draeger Inc., Draeger CU34 breath alcohol simulators, and an IBM compatible computer with remote access via a 28,800 (or greater) baud modem. The computer system shall be operated in a Windows environment and utilize the Alcotest 7110 MK III-C Data Retrieval and Archiving Program (Version 1.2 or greater) supplied by Draeger Safety Inc., formerly National Draeger Inc.

B. Breath Test Requirements [Ref. Title 17 Section 1221.4]

Persons who have been qualified as Operators shall perform breath tests or periodic determination of accuracy. Such qualified operators are FAS, FAA, FAAT or persons who have successfully completed this laboratory's approved Breath Test Operator Training program for the test instruments and procedures in use. The training program is described in this procedure, Section VIII. [Ref. Title 17 Section 1221.4.(a)(5)].

Breath tests on subjects or periodic determination of accuracy are performed as described in sections III and V of this procedure.

C. Expression of Results [Ref. Title 17 Section 1220.4]

Breath test concentrations shall be converted to an equivalent blood alcohol concentration based on the relationship: the amount of alcohol in 2100 milliliters of alveolar breath is equivalent to the amount of alcohol in 1 milliliter of blood. Results are reported to the second decimal place, truncating the third decimal place when present. Vehicle Code

CRIME LABORATORY

SANTA CLARA COUNTY

BREATH ALCOHOL ANALYSIS PROCEDURES

DRAEGER ALCOTEST 7110 MK III-C

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Santa Clara County Crime Laboratory Breath Alcohol Procedure -- Draeger Alcotest 7110 MK III-C
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