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	Document Number: 5122	Approved By: Theresa Suffecool, Kim Murga, Cassandra Robertson, Darby Lanz
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Breath Alcohol Program Technical Manual

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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

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Note: Hyperlinks were accurate at the time of manual publication.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

1.0 Title: **BREATH ALCOHOL TESTING**

1.1 Purpose

The purpose of this manual is to provide the Forensic Analyst of Alcohol (FAA) with useful procedures and references for the performance of assigned duties. This manual is not designed to be an all-inclusive collection of every possible procedure or variation of a procedure to be used in the field of forensic breath alcohol testing. It is, instead, a presentation of methods which have been found to be workable by practicing FAAs.

It is not the purpose of this manual to create policy. It is expected that deviations in methodology may occur at the discretion of the individual FAA.

1.2 Breath Alcohol Testing Regulations

Breath alcohol testing is thoroughly regulated by the Nevada Revised Statutes (NRS) and Nevada Administrative Code (NAC) overseen by Department of Public Safety's Committee on Testing for Intoxication (<http://ots.nv.gov/Programs/NCOTT/TestingForIntoxication/>). These regulations and guidelines must be followed to achieve legally defensible breath alcohol test results. With this in mind, at no time should individual analyst deviations be allowed to conflict with the regulations contained in the NRS and/or the NAC.

Breath regulations cover aspects of both Evidential Breath Testing (EBT) instruments, as well as Preliminary Breath Testing (PBT) devices.

1.2.1 Nevada Revised Statutes and Nevada Administrative Codes


Nevada Revised Statutes (NRS 484C) and Nevada Administrative Code (NAC 484C) are found at <https://www.leg.state.nv.us> with respect to Breath Alcohol Testing.

1.2.2 FAA Requirements

In order to teach classes, perform breath alcohol calibrations and maintenance, the scientist must have obtained a State of Nevada certification as a Forensic Analyst of Alcohol.

FAA requirements are statutorily regulated in:


- NAC 484C.020
- NAC 484C.030
- NRS 484C.620

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1.3 Validation

New instrument models and updates to instrument software will be subjected to a validation procedure before evidential use (see NRS 484C.610 and NAC 484C.090). New instruments on the Committee on Testing for Intoxication Approved Devices List received into the lab will be subjected to a new instrument set-up, performance evaluation and calibration prior to evidential use. Instrument software updates will be validated on one instrument, with a performance check and simulated breath test performed on each instrument updated. Method validation documentation is kept in Qualtrax.

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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

2.0 Title: SOFTWARE AND MANUALS

2.1 Software

The Breath Alcohol program utilizes several software programs to organize and store the calibration and maintenance information, instrument testing data and operator certification information.

2.1.1 LIMS – Laboratory Information Management System (version 18.1.5.131)

This software is utilized for Breath Alcohol as storage location for information regarding chemicals and reagents, as well as tracking of Quality Control checks and documentation (refrigerators, thermometers, etc.). The LIMS also houses the records for subpoenas, testimony and teaching.

2.1.2 Microsoft Access

There are two historical databases for Breath Alcohol in Microsoft Access. These databases must be maintained according to destruction guidelines.

1. Officer Certification Database
2. Breath Database
 - a. Historical database of subject test results from the previous Intoxilyzers (Model 5000-66 and EN series).

2.1.3 COBRA V5 – Computer Online Breath Archive Version 5 (version v5.5.36.0)


1. Used to connect to instruments (both directly and remotely) to download data.
2. Stores subject breath test results (starting January 1, 2017).
3. Allows for reprints of subject test results.
4. Stores operator certification data.
5. Other capabilities as needed.

COBRA desktop versions are synced and mirrored to a master version on a remote server that is managed by the Information Technologies (IT) dept. The server is backed up on a schedule set by IT.

2.1.4 Intoxilyzer 8000 Instrument Software (version 8160.04)

2.1.5 BrAD – Breath Alcohol Database (version 1.0.0.27)

This is the software used to store subject test results that occurred on the Intoxilyzer 8000 instruments from 2013 through December 31, 2016.

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This software also houses:

1. Inventory, calibration dates and documentation for the Intoxilyzer 8000s.
2. Maintenance records for the Evidential Breath Testing (EBT) instruments
3. Inventory list for 12V500 simulators
4. Records for compressed gas tanks (calibrators and standards)
5. Records for aqueous solutions (calibrators and standards)

2.2 Manuals

Operator and user manuals for instrumentation and measuring devices are kept in the Breath Alcohol section of the laboratory.


2.3 Using BrAD

BrAD utilizes service tickets to create and/or store technical and administrative records. When creating a service ticket to document a calibration or maintenance:

- The Serial Number, Entry Date, and Certification Date auto populates.
- The Service Date is the date and time that the calibration or maintenance was performed.
- The “Calibrated” checkbox is used when an adjustment is performed, and the “Certified” checkbox is used when a calibration is performed.
- The Remarks field is used to enter the calibration results or maintenance performed. The information entered in this field is not considered to be technical but is entered so the data can appear in the Instrument’s Maintenance History.


2.3.1 Limitations of BrAD

- Service Tickets
 - Remarks field has a limited number of characters. If a maintenance and/or calibration write-up exceeds the limit, a second service ticket may be created. Each service ticket must reference the other to tie the two together. Certificates of Calibration will be created using the main service ticket number.
- Version History
 - BrAD will track versions of documents within the object repositories associated with instruments or service tickets.
 - BrAD does not track version histories of service tickets.
 - If a service ticket is found to have an incorrect date or wrong checkbox selected, a new service ticket will be created, reflecting the correct information.
 - A note regarding the issue will be placed in the Remarks field of the incorrect service ticket, directing the reader to the corrected service ticket.

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- All documents will be stored in the object repository of the correct service ticket.
 - An incorrect time on a service ticket can be addressed in the Remarks field and does not require a new ticket being created.
 - Certificates of Calibration
 - Certificates are created in BrAD and completed in Microsoft Word. The final version is printed, signed, and scanned back into the instrument's object repository.
 - A certificate that includes an adjustment that shows "as found" and "as left" data, the service ticket number associated with the calibration will be the ticket that contains the "as left" calibration data.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

3.0 Title: PREPARATION AND/OR CERTIFICATION OF AQUEOUS SOLUTIONS

3.1 Purpose

This procedure describes the methodology for the preparation and certification of ethanol/water solutions.

3.2 Principle

NAC 484C.070 states that a Preliminary Breath Testing (PBT) device must be checked monthly using a certified alcohol standard. The certification process of the ethanol standard is discussed in NRS 484C.190 and NRS 488.510, stating that a FAA will examine the solution or gas, and prepare a declaration identifying its concentration.

Ethanol / water solutions of varying ethanol concentrations are prepared and analyzed in the Forensic Laboratory utilizing headspace/gas chromatography techniques to determine/verify the ethanol concentration. One of these solutions is a certified standard used in the monthly accuracy check for PBT's. The remaining solutions (Calibrator Solutions) are used to calibrate a preliminary device (see [Chapter 10.0 – PBT Monthly Check and Annual Calibration](#)). These solutions can also be used as known values to simulate a breath test during the performance checks portion following an in-field calibration or used as the base for the interferent check ([Chapter 7.0 - EBT Calibration](#)). The following describes the preparation and/or certification of those solutions.


3.3 Reagent Preparation Procedures

Note: The lot number of the 200-proof ethanol used to make the approximately 0.10 g/210L Certified Aqueous Solution, must be different than the lot number used to make the PBT Calibrator Solutions.

The formula for solution preparation is as follows:

$$EtOH(g) \times \%EtOH = \text{Desired Conc.} \left(\frac{g}{210} L \text{ breath} \right) \times 1.21 \times \text{Total Vol. (L)} \times 10$$

- Desired Conc. = Final concentration of Ethanol (in g/210L of breath)
- 1.21 = Partition coefficient for Ethanol at 34.0°C
- Total Vol. = total amount of solution prepared (in Liters)
- 10 = conversion of volume in 100mL to Liters

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- % EtOH = percent concentration of Ethanol used to prepare solution (200 proof Ethanol)
- EtOH = Ethanol in grams needed to prepare the desired concentration at the desired volume

Any solution prepared will be documented on a Toxicology Reagent Prep Log form and stored in the Resource Manager in LIMS.

3.3.1 Aqueous Solutions


Certified PBT Standard

This solution is used for PBT monthly checks. However, it will also be used to create the solution for the once yearly Acetone check ([See Chapter 7.0 - EBT Calibration](#)).

Preparation of the approximate 0.10 g/210L Certified PBT Breath Alcohol Aqueous Standard:

Note: The amounts below are an example. A different volume or concentration of solution can be made using the formula above.

- 1) Weigh 60.5 g of 200 proof ethanol in a container using an analytical balance.
- 2) Pour ethanol into a 5.0-liter volumetric flask and bring to volume with water.
- 3) Pour 5.0-liter solution into a 50-liter carboy and continue to dilute to 50 liters total.
- 4) Mix solution.
- 5) Remove samples from the top and bottom of carboy and analyze each sample 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace procedure. Determine the breath alcohol concentration of the solution from data acquired by using a multiplier factor of 0.8264. Report results on the Aqueous Standard Template form.
 - a. This may be performed by any scientist authorized to perform blood alcohol analysis.
- 6) Bottle solution in 500mL Nalgene bottles, cap, seal and label bottle. Labels should include the identity of the preparation, breath alcohol certified value, lot number, preparer initials, safety/hazard information and expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 7) Store bottles in laboratory refrigerator and distribute to off-site locations as needed.

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Certified Standard use as an Interferent Check:

- a. Pour one bottle of Certified PBT Standard into a simulator.
- b. Add 200uL of Acetone
- c. Label Simulator as Standard (BRYMMDD-X) ⊕ Acetone, with the Acetone lot number, and expiration date.
- d. Solution will be used for no more than 20 interferent checks (each check consisting of running the solution three times through the calibration port).
 - i. A hash mark system will be used to track this on the simulator.


PBT Calibrators

These solutions are for PBT yearly calibrations, however, the ~0.08 g/210L solution can be used for the simulated breath test during the Performance Check portion of an EBT calibration ([See 7.0 - EBT Calibration](#)).

Approximate 0.05 g/210L PBT Breath Alcohol Calibrator:

Note: The amounts below are examples, but different volumes and concentrations of solution can be made using the formula above.

- 1) Weigh 4.84 g of 200 proof ethanol using an analytical balance.
- 2) Pour ethanol into a 2.0-liter volumetric flask and bring to volume with water.
- 3) Pour 2.0-liter solution into an 8.0-liter carboy and dilute to 8.0L total.
- 4) Mix solution.
- 5) Remove sample from carboy and analyze it 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace procedure. Determine the breath alcohol concentrations of the solution from data acquired by using a multiplier factor of 0.8264. Report results on the Calibrator Summary Template form.
 - a. This may be performed by any scientist authorized to perform blood alcohol analysis.
- 6) Bottle solutions in 500mL Nalgene bottles, cap, seal and label bottles. Labels should include the identity of the preparation, breath alcohol concentration, lot number, preparer initials and expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 7) Store bottles in refrigerator, use and distribute as needed for calibration of PBTs.

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Approximate 0.08 g/210L PBT Breath Alcohol Calibrator:

Note: The amounts below are examples, but different volumes and concentrations of solution can be made using the formula above.


- 1) Weigh 38.72 g of 200 proof ethanol using an analytical balance.
- 2) Pour ethanol into a 5.0-liter volumetric flask and bring to volume with water.
- 3) Pour 5.0-liter solution into a 40-liter carboy and dilute to 40 liters total.
- 4) Mix solution.
- 5) Remove samples from the top and bottom of the carboy and analyze each sample 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace Procedure. Determine the breath alcohol concentrations of the solution from data acquired by using a multiplier factor of 0.8264. Report results on the Calibrator Summary Template form.
 - a. This may be performed by any scientist authorized to perform blood alcohol analysis.
- 6) Bottle solutions in 500mL Nalgene bottles, cap, seal and label bottles. Labels should include the identity of the preparation, breath alcohol concentration, lot number, preparer initials and expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 7) Store bottles in refrigerator, use and distribute as needed for calibration of PBTs.

Using 0.08 PBT Calibrator for EBT Performance Checks:

- a. Pour one bottle of PBT Calibrator into a simulator.
- b. Label simulator with the PBT Standard information (lot #, concentration, expiration date, etc.) and acceptable +/- 10% range
- c. Solution will be used for no more than 20 performance checks.
 - a. A hash mark system will be used to track this on the simulator.

3.4 Interpretation of Results

Results of headspace / gas chromatography must meet the criteria outlined in the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace Procedure. Each solution is analyzed, and each replicate must be within ± 0.003 or 3% of the target value, whichever is greater. Outside of that range is considered an outlier and may be discarded. Dual column analysis provides two values for each sample injection, therefore, only two outliers are allowed per all compiled data, provided that those two values are from the same sample injection. Solutions with more than two outliers will be re-analyzed. If reanalysis does not yield acceptable results, a new solution will be prepared. The mean is calculated. The fourth digit is truncated.


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A Forensic Analyst of Alcohol will review and approve the QC Packet (following review process in Toxicology Technical Manual 6.18), the Template forms and the data. Acceptable results will be noted on the template forms and the Aqueous Standard will have a report created.

3.5 Reporting and Record Keeping

- A Report of Aqueous Standard is prepared to document the certification of the aqueous solution.
- Reporting Requirements are listed in [Chapter 12 – Quality Assurance](#).

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4.0 Title: **VERIFICATION AND/OR CERTIFICATION OF NITROGEN / ETHANOL DRY GAS SOLUTIONS**

4.1 Purpose

This procedure describes the methodology for the verification and certification process of Nitrogen/Ethanol Dry Gas solutions.

4.2 Principle

Per NAC 484C.120, evidential breath testing instruments must be calibrated at no less than three ethanol levels, with concentrations between 0.00 and 0.40 g/210L of breath at least every 90 days.

NAC 484C.130 also requires that a certified ethanol standard of either an aqueous solution or gas be tested prior to each subject breath test sequence to ensure accuracy of the breath testing instrument. The standard must be between 0.05 and 0.20 g/210L of breath. The certification process of the ethanol standard is discussed in NRS 484C.190 and NRS 488.510, stating that a FAA will examine the solution or gas, and prepare a declaration identifying its concentration.

4.3 Certification/Verification of the Ethanol Gases

Two types of dry gases are used, Reference Standards and Calibrators.


Dry gases are purchased from an external manufacturer, and each lot comes with a Certificate of Analysis. Breath alcohol concentrations are expressed in grams of ethanol per 210 liters of breath (g/210L). If a Certificate of Analysis is expressed in BrAC (**B**reath **A**lcohol **C**oncentration), this is assumed to be g/210L. If the concentration is expressed in parts per million (ppm), the breath alcohol concentration can be determined by the following:

$$ppm = concentration \times 2606$$

The full equation can be found in the following reference:

L.D. Silverman, K. Wong and S. Miller. Confirmation of Ethanol Compressed Gas Standard Concentrations by a NIST-Traceable, Absolute Chemical Method and Comparison with Wet Breath Alcohol Simulators. *Journal of Analytical Toxicology*. 21: 369-372 (1997).

For each lot number of ethanol dry gas received, the concentration of ethanol in the dry gas is verified with an evidentiary breath testing (EBT) device using

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infrared technology. This device will be dedicated for internal use only, which includes the verification of the gas concentrations, and would need to meet evidentiary calibration requirements prior to analysis.

Reference Standard


One tank from each lot of dry gas will be sampled a minimum of five times each by all FAAs with relevant duties. Note: If the program consists of only one FAA, the gas will be sampled a minimum of ten times.

- Each replicate must be within +/- 3% or 0.003, whichever is greater, of the expected value and within 0.003 of each other.
 - Any value outside of the range is considered an outlier and may be discarded.
 - Only one outlier is allowed per all compiled data.
- The mean of the experimentally verified concentration must agree within $\pm 3.0\%$ or 0.003, whichever is greater, of the manufacturer's certified concentration.
- Data will be tracked using a Dry Gas Concentration Verification form.
- A Report of Gas Standard certifying the manufacturer's concentration will be created for the lot numbers being used as Reference Standards. The Report will be prepared in the declaration format in accordance with NAC 50.035.
- The Data and Report will be technically and administratively reviewed.
 - Documentation of the review will be included with scans in appropriate object repository in BrAD.

Calibrators

Quality Control Check: One tank from each lot number will be sampled a minimum of five times by any one FAA.

- Each replicate must be within $\pm 10\%$ or 0.005, whichever is greater, of the expected value, and within 0.003 of each other.
 - Any value outside of the range is considered an outlier and may be discarded.
 - Only one outlier is allowed per lot number.
 - The mean of the experimentally verified concentration must agree within $\pm 10.0\%$ or 0.005, whichever is greater, of the manufacturer's certified concentration.
 - Record pass/fail results on paper with printout from Intoxilyzer.
 - Results will be technically reviewed. Reviewer must indicate agreement with pass/fail results.
 - Technical/Administrative Review form is not needed in a QC check.
 - Scan results in the object repository for the lot in BrAD.

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5.0 Title: **QUALITY CONTROL CHECK OF PURCHASED AQUEOUS SOLUTIONS**

5.1 Purpose

This procedure describes the methodology for the process of ensuring the quality and concentration of Ethanol/Water solutions purchased from an external source.

5.2 Principle

NIST traceable Ethanol/Water solutions are purchased from an external source and come with a Certificate of Analysis. Before they can be used in an adjustment procedure (see [Chapter 8.0 - EBT Calibration Adjustment](#)), a Quality Control check must be performed.


5.3 Procedure

One bottle in each lot will be analyzed 5 times using the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace Procedure.

- This may be performed by any scientist authorized to perform blood alcohol analysis.
- Determine the breath alcohol concentrations of the solution from data acquired by using a multiplier factor of 0.8264.
- Results will be technically reviewed by a FAA. Reviewer must indicate agreement with pass/fail results.
 - Breath Alcohol Technical/Administrative Review form is not needed in a QC check.
 - A Forensic Analyst of Alcohol will review and note approval on the QC Packet (following review process in Toxicology Technical Manual 6.18), and agreement with pass/fail results.
- Scan results and approved QC Packet into the object repository for the lot in BrAD.


5.4 Interpretation of Results

Results of headspace / gas chromatography must meet the criteria outlined in the LVMPD Forensic Laboratory Toxicology Technical Manual Section 5.0 Ethanol Analysis by Dual Column GC Headspace Procedure. Each solution is analyzed, and each replicate must be within ± 0.003 or 3% of the target value, whichever is greater. Outside of that range is considered an outlier and may be discarded. Dual column analysis provides two values for each sample injection, therefore, only two outliers are allowed per all compiled data, provided that those two values are from the same sample injection. Solutions with more than two outliers

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will be re-analyzed. If reanalysis does not yield acceptable results, a new solution must be purchased. The mean is calculated and reported to the fourth decimal place (standard rules of rounding apply). Record results and pass/fail on Summary Report from GCHS.

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6.0 Title: **EBT PERFORMANCE EVALUATION**

6.1 Purpose

This procedure is used to evaluate the performance of an EBT. This will be completed on any instrument that is new, has had maintenance, or has been repaired (either by a FAA, or the manufacturer).

A new instrument will also need an Instrument Initial Set-up prior to the EBT Performance Evaluation.

6.2 Procedure

Use Performance Evaluation form. This form also includes a calibration (see [Chapter 7.0 – EBT Calibration](#)).


6.2.1 Materials

- EBT with gas regulator attached
- Disposable mouthpieces
- Gas Standard
- Gas Calibrators
- Druck Digital Pressure Indicator
- Simulator containing Aqueous Solutions (suggested levels)
 - ~0.08 PBT Calibrator
 - Used for simulated breath test
 - ~0.100 Certified Aqueous Standard
 - With Acetone for interferent detection
- Sample driver's licenses
- Mouthwash/Mouthspray (containing alcohol)
- Walkie Talkie

6.2.2 Evaluation

Follow the Performance Evaluation Form. Keep all printouts and scan results into the service ticket OR for the evaluated instrument.

The second half of the performance evaluation is a Calibration. See [Chapter 7.0 - EBT Calibration](#), for full procedure.

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6.3 Interpretation of Results


The goal of a Performance Evaluation is to show that the instrument can identify common errors that might be encountered by officer use in the field.

Each error should be properly recognized, and the appropriate instrument response triggered.

If any error or response is not triggered, troubleshooting should occur to determine if maintenance or repair is necessary.

The Calibration portion must meet all requirements outlined in [Chapter 7.0 - EBT Calibration](#).

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7.0 Title: **EBT CALIBRATION**

7.1 Purpose

This procedure is used to perform a calibration of an Evidential Breath Testing instrument. A calibration verifies the instrument's ability to analyze known concentrations of ethanol.

7.2 Principle

Per NAC 484C.120, each evidential breath testing instrument must be calibrated at least once every 90 days. The calibration must consist of an appropriate response to no less than 3 levels of alcohol, within a range of 0.00 to 0.40 g/210L of breath.

All maintenance and calibration information performed in the field must be entered into a DUI Logbook that remains at the instrument's location (NAC 484C.140). It must also be maintained in a laboratory record (NAC 484C.150). The laboratory record contains administrative and technical information. Technical information is considered the calibration printouts and data that is scanned and attached in the Service Ticket Object Repository in BrAD. Administrative information is contained in the comment section of the Service Ticket record.

Maintenance is defined as a repair or replacement of parts on an instrument and does not require a review process. Replacement of external components (keyboards, O-rings, etc.) does not require performance checks or calibration. See [Chapter 8.0 - EBT Calibration Adjustment](#) for requirements regarding adjusting an instrument.

7.3 Procedures


7.3.1 Calibration Procedure

Calibrations must be performed at least once every 90 days or less for each instrument in service. The calibration procedure can be performed in a laboratory setting, as well as in off-site locations.

- Utilize three or more calibrator solutions to check the readings of the instrument, three times each, through the calibration port.

Note: NAC requires "no less than three" levels of alcohol. LVMPD procedure uses four levels, and in the event one level is not available, the NAC requirements can still be met.

- Examples of approximate values:


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- 0.04 g/210L
- 0.08 g/210L
- 0.20 g/210L
- 0.30 g/210L
- Document/record calibration and responses in the instrument's DUI Logbook.
- Record the calibration on the 90 Day Calibration Checklist
 - When calibration is being performed in conjunction with Chapter 6.0 - EBT Performance Evaluation, the Evaluation form is sufficient.
- Place calibration sticker on the Intoxilyzer.

7.3.2 Performance Checks Procedure

Additional performance checks should also be completed at the time of the calibration:

- Check ambient room temperature.
 - Use temperature setting on Druck Digital Pressure Indicator, in Fahrenheit.
- Print diagnostics and check DVM values.
- Verify atmospheric pressure using Druck Digital Pressure Indicator DPI 705, set in units of hectopascals (hPa). (Intoxilyzers measure using hPa as well.)
- Run any compressed gas tank, once, to verify that the regulator is in working order.
- Check and note the lot number, expiration date, and PSI of the attached gas standard.
- Simulate a breath test to ensure the instrument responds correctly to the following:
 - Instrument automatically samples standard test.
 - First Subject Sample: blow an aqueous solution, with a known concentration, through the breath tube.
 - Second Subject Sample: blow an alcohol-free air sample through the breath tube.
 - Refuse the third sample.
- Interferent (acetone) detection
 - Check at least once per calendar year.
 - Use a breath alcohol simulator containing an aqueous solution prepared to simulate approximately 0.10 g/210L (section 3.3.1) with approximately 200 µL of acetone added, through the calibration port, three times.
- Record the results of the simulated breath test and interferent detection in the DUI logbook and complete the 90 Day Calibration Checklist.

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7.4 Interpretation of Results

7.4.1 Calibration Results

- The three instrument results must agree within $\pm 10\%$ or 0.005 (whichever is greater) of known concentrations and all be within 0.003 g/210L of each other.


7.4.2 Performance Checks Results

- Ambient room temperature should be 50°F - 104°F.
- Diagnostics must pass, and results must print diagnostics.
- DVM values
 - Channels 3 and 9: values fall between 9000 and 14000
 - S: Span (noise): ≤ 9
 - C: Sample Cell Temperature: $47^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$
 - B: Breath Hose Temperature: $45^{\circ}\text{C} + 2^{\circ}\text{C}$ or -9°C
- Atmospheric pressure on Intoxilyzer must be within ± 15 hPa of Druck DPI 705.
- Regulator check – must allow for gas to be sampled.
- Gas Standard
 - Note PSI and expiration date. Replace tank if necessary.
- Simulated breath test
 - Standard test must be within $\pm 10\%$ of known concentration.
 - Solution blown through the breath tube must be within $\pm 10\%$ of known concentration.
 - Alcohol free air must be negative for volatiles.
 - Instrument must accept a refusal for the 3rd subject test.
- Interferent Detection
 - Instrument must detect acetone as an interferent on all replicates.
- If any part of the performance check was not completed, an explanation must be provided.

If these criteria are not met, attempt to determine the reason using previous experience, service manual or other procedures or information gathered from other sources and/or training. If a calibration result is outside of the accepted range, that level may be repeated. An unacceptable concentration can only be repeated twice (a total of three attempts). In situations where accurate results cannot be obtained, the instrument must be removed from service until repairs are made and calibration results are acceptable.

7.5 Reporting and Recording Results

- Record all maintenance and calibration results in the maintenance record in BrAD. Scan and upload forms and data printouts into the associated Object Repository,
 - If any portion of the calibration was repeated or failed:
 - the failed/repeated reason must be noted on the printout and kept with other results


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- printout must include the date and initials of the FAA
- document repeat in the maintenance record (example: "0.04 repeated – see scans")
- If the calibration and performance checks were completed satisfactorily, a Certificate of Calibration can be prepared.
 - A calibration performed in the laboratory will not have a Certificate of Calibration created until it is installed for field use.
- See [Chapter 13.0 - Quality Assurance](#) for Reporting Requirements, Distribution and Retention.

7.6 Measurement Uncertainty

- Measurement uncertainty is reported for calibration results at the level of calibrator. Standard rules of rounding are used to calculate measurement uncertainty results to the thousandth decimal place.
- Measurement uncertainty documents are located in Qualtrax at Documents\LVMPD\Forensic Lab\Toxicology\Measurement Uncertainty. The measurement uncertainty will be reviewed and/or recalculated every two years and will be recalculated if there are procedural changes to the method that affect the quantitative measurement. The measurement uncertainty may be reviewed and/or recalculated at any time at the discretion of the Toxicology Manager.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

8.0 Title: **EBT CALIBRATION ADJUSTMENT**

8.1 Purpose

This procedure is used to perform a calibration adjustment on an Evidential Breath Testing (EBT) Instrument. A calibration adjustment is the process of re-setting the instrument's calibration curve.

8.2 Principle

Adjustments will be performed on an "as needed" basis. If an evidential instrument is not passing calibration requirements (as described in [Chapter 7.0 - EBT Calibration](#)), or if a FAA deems it necessary using their training and experience, performing a calibration adjustment is a maintenance option.

Ethanol/Water solutions used for this procedure must meet requirements laid out in this manual, [Chapter 5.0 - Quality Control Check of Purchased Aqueous Solutions](#).

8.3 Procedure


When possible, a 90 Day Calibration will be performed (see [Chapter 7.0 - EBT Calibration](#)). This could be a calibration performed in the field before the EBT is removed from service. This calibration may not pass requirements listed in 7.0 EBT Calibration.

Solutions must be fresh and may not be used for more than 5 adjustment procedures and must be used within 14 days of putting into simulator.

8.3.1 Adjustment Procedure

Use Calibration Adjustment Form


- Materials and Supplies:
 - Digital NIST Thermometer
 - Hand pump / vacuum
 - Druck DPI 705 Pressure Indicator
 - Five wet-bath simulators
 - Label with associated concentration of solution (suggested values below)
 - Label with date solution was put into simulator
 - Water and Ethanol/Water Solutions
 - 0.000 g/210L (Distilled water. This concentration is required, not suggested)

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- 0.020 g/210L
 - 0.080 g/210L
 - 0.200 g/210L
 - 0.300 g/210L
 - Gas Cylinder
 - Current verified gas standard
- Procedure
 - Check simulator seals by using hand pump.
 - Allow solutions to come to temperature for at least 10 minutes
 - Verify simulator temperature using NIST thermometer
 - Temperatures must agree within +/- 0.20°C
 - Check DVMs
 - Check Atmospheric Pressure
 - Verify with Druck DPI 705
 - Bring Evidential Instrument to Ready Mode
 - Enter menu
 - Perform Tank Sensor Calibration
 - Perform Optical Bench Calibration
 - Number of solutions = 5
 - Water + 4 levels of Ethanol
 - Enter certified values
 - Calibrate Gas H2O Adjust
 - Enter atmospheric pressure reading from Druck
 - Enter certified gas value
 - Perform Internal Test Procedure Calibration
 - Target Value = 0.100

8.3.2 Interpretation of Results

- Auto Calibration
 - Max Power Res must be greater than the Auto Range Res Value
- Solution Stats Quadratic Fit
 - Chan 1
 - Actual to Fit: <0.0003 difference
 - Residual: ≥ 0.002
 - Chan 2
 - Actual to Fit: <0.0003 difference
 - Residual: ≥ 0.002
 - Chan 1 compared to Chan 2
 - Fit values within +/- 0.003 for each level
- Dry Gas H2O Results
 - Channel 1

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- Average Result + 3um H2O = total
 - 3um H2O must be <1500
 - Channel 2
 - Average Result + 9um H2O = total
 - 9um H2O must be <1500
 - Compare Channel 1 total to Channel 2 total.
 - Must be ≤ 5 counts apart
- Check DVMs
- Check Internal Test Procedure (ITP)

Evidential breath instrument must pass a 90 Day Calibration (see [Chapter 7.0 - EBT Calibration](#)) before being put into service in the field.

8.3.3 Recording Results

- Record adjustment in the maintenance record in BrAD
 - If adjustment failed, note reason, and repeat.
 - Adjustments may be repeated once, but if it fails again, contact manufacturer.
 - Scans of the Calibration Adjustment Form and the printouts will be uploaded in the Object Repository for the corresponding maintenance record entry.
 - If an adjustment or repair is performed due to a calibration that does not meet specifications, pre and post adjustment/repair data shall be retained.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

9.0 Title: **CERTIFICATION / RECERTIFICATION OF EBT OPERATORS**

9.1 Purpose

This procedure is intended to outline the certification and re-certification process of evidentiary breath test operators.

9.2 Principle

Operators of evidential breath testing instruments must be certified to operate each instrument by successfully completing an Initial Certification course on the operation of instruments for testing a person's breath to determine the concentration of alcohol.

Per NAC 484C.110, a person holding a current certification, or a certification which has been expired for less than six months, may take a Recertification class.

When available, those with current certification may take an "Additional Instrument" course.


Per NAC 484C.100 and 484C.110, the content of all courses must have been approved by the Committee on Testing for Intoxication. All certifications are valid for a period of three years. Courses for certification / re-certification must be taught by a FAA and must include instruction on and a determination of the applicant's proficiency in the operation of the specific instruments for which the certification is granted.

9.3 Paperwork

- Certification Application (available on the Nevada DPS – OTS website: <https://ots.nv.gov/Programs/NCOTT/TestingForIntoxication/>)
- Class Roster (Available from LVMPD Advanced Training)
- Instructor Evaluation (Available from LVMPD Advanced Training)
- Class hand-outs

9.4 Procedure

Classes are scheduled by a FAA as needed. Notification of agencies is made by e-mail. Class includes a lecture portion which consists of a discussion of alcohols in general, possible interferents, process by which ethanol is absorbed, distributed and eliminated, the theory of breath testing, relevant Nevada Revised Statutes and Nevada Administrative Codes, and the operation of the breath

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instrument. There is also a written exam and practical portion. The practical portion of the class is devoted to the students demonstrating proficiency in the operation of the breath instrument.

9.5 Training Documentation

- Paperwork:
 - Certification applications
 - Original certification applications are maintained by the Nevada Department of Public Safety-DMV Hearings office.
 - Class Rosters and instructor evaluations (are processed by the Forensic Laboratory staff.
 - A copy of the completed roster is sent to LVMPD Advanced Training Office, along with the originals of all instructor evaluations and tests taken by any LVMPD personnel.
 - Grading the examination will take place in the classroom.
- Certification cards are prepared and sent to the applicants.
- See [Chapter 13.0– Quality Assurance for Distribution and Retention.](#)


9.6 Statutory References

Certification / Re-Certification of evidentiary operators is statutorily regulated in:

- NAC 484C.100
- NAC 484C.110
- NRS 484C.630

Duties of Operators are statutorily regulated in:

- NAC 484C.130
- NAC 484C.140
- NRS 484C.630

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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

10.0 Title: MONTHLY CHECK AND ANNUAL CALIBRATIONS OF PBTs

10.1 Purpose

The PBT device is a preliminary tool used by law enforcement personnel in the field to establish probable cause for DUI arrests. This procedure is intended to ensure that the PBT device is responding properly to ethanol solutions and an alcohol-free sample.

10.2 Principle

Per NAC 484C.070, each PBT device must be calibrated at least once a year by a FAA or the agency to whom the PBT belongs. The calibration must consist of an appropriate response to no less than 3 levels of alcohol, within a range of 0.00 to 0.40 g/210L of breath, and an alcohol-free air sample. Annual calibrations can only be done by a FAA or PBT Instructor.

In order for a PBT to be used in the field, monthly checks are required. These consist of a check at one level using a certified alcohol standard. This check can be performed by PBT operators, instructors, or a FAA.

10.3 Procedure

Gas tanks purchased for PBT use only (either calibration or adjustment processes) must come with a certificate of analysis from the manufacturer. This certification is all that is required. An in-house verification is not needed.


Monthly checks must be performed each month.

- Utilize one certified alcohol standard (aqueous or gas) to verify the readings of the device, two times.

Note: If using a gas standard, ensure appropriate altitude correction, if needed. The chart is located on the dry gas tank.

Calibration checks must be performed at least once per year.

- Utilize three breath alcohol calibrator concentrations within the range of 0.00 to 0.40 g/210L to verify the readings of the device, two times each.
- Examples of approximate values:
 - 0.040 g/210L gas
 - 0.050 g/210L aqueous
 - 0.077 g/210L gas
 - 0.080 g/210L aqueous
 - 0.100 g/210L aqueous or gas

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- Provide an alcohol-free air sample.

10.4 Interpretation of Results

- The two results must be within $\pm 10\%$ of known concentrations and within ± 0.005 g/210L of each other.
- Alcohol free air must be negative (<0.003 g/210L) for volatiles.


If these criteria are not met, PBTs are adjusted using the service manual or other procedures or information gathered from other sources and/or training. PBT Manuals are kept in the Breath Alcohol Section. In situations where appropriate results cannot be obtained, the instrument must be removed from service until repairs are made and calibration results are acceptable.

10.5 Reporting and Record Keeping

A monthly or annual form (such as Reference A and B) is retained by the owner of the PBT and must include the following (* as required by NAC 484C.080):

- whether it is a monthly or annual calibration*
- model
- serial number
- ownership
- date and time of calibration*
- standard lot numbers
- the two test results*
- the alcohol-free air result*
- identity of the person who performed the test*
- any repairs or maintenance*

Monthly and annual PBT forms are issued by the State of Nevada Committee on Testing for Intoxication.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

11.0 Title: **TRAINING PROCEDURES FOR PBT OPERATORS AND INSTRUCTORS**

11.1 Purpose

This procedure is intended to outline the training process of PBT operators and instructors.

11.2 Principle

Per NAC 484C.060, operators of PBT devices must be trained to operate each device by successfully completing a course which meets the manufacturer's requirements of instruction in the proper operation of the PBT device and be approved by the Committee on Testing for Intoxication. A person's proficiency is only good for the particular PBT model training was received on. The receipt of other models requires specific training on those models.

PBT Operator classes are taught by a FAA, a manufacturer's representative, or a person approved by a FAA (i.e., PBT Instructor) (NAC 484C.060).

The yearly calibration required by NAC 484C.070 must be done by either a FAA or a representative of the agency that owns the PBT. These procedures are covered in the PBT Instructor classes. PBT Instructor classes are taught by a FAA.


11.3 Equipment and Reagents

- PBT devices
- Mouthpieces
- Wet-bath simulators and/or gas standards
- Manufacturer Instruction Manual
- Class Roster
- Class hand-outs

11.4 Procedure

Classes are scheduled as needed.


- The PBT operator class may include:
 - lecture portion
 - principals/theories of breath testing
 - regulations
 - fuel-cell technology and its limitations
 - the manufacturer operational requirements
 - practical portion

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- how to operate the device, perform monthly checks and complete the forms.
- The PBT instructor class must meet the requirements of the PBT operator class listed above, and in addition include:
 - how to calibrate a PBT when it does not respond accurately to a known ethanol value
 - how to perform the annual calibration checks
 - training by either a FAA or manufacturer representative to instruct others on how to operate a particular device

Note: It is highly recommended that the officer receiving the training for PBT Instructor be a certified operator of the current evidential instrument.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL


12.0 Title: COMPRESSED GAS SAFETY

12.0 Compressed Gases

The Breath Alcohol Program has compressed Ethanol/Nitrogen tanks that contain approximately 34 or 105 liters and hold less than 1200 psi. The tanks are used as gas standards and calibrators for EBT, as well as for PBT checks and adjustments. These tanks do not follow the same guidelines as other tanks within the LVMPD Forensic Laboratory.


12.1 General Cylinder Handling Rules

- Check all cylinders upon receipt. Verify all labels, shipping paperwork and certificates of analysis.
- Do not place cylinders where they can be accidentally knocked over.
- Do not store cylinders near highly flammable solvents, combustible waste material, unprotected electrical connections, gas flames or other sources of ignition.
- Valves and regulators should be visually inspected for damage each time a cylinder is changed.
- Never tamper with the safety relief devices in valves or cylinders.
- Never attempt to repair or alter cylinders, valves or safety relief devices.
- Cylinders must be handled with extreme caution at all times to avoid dropping them or damaging the valves.
- Never attempt to use a cylinder without the correct regulator. The threads and fittings on regulators are designed to fit only compatible tanks.
- Do not force connections that do not fit.
- When a cylinder is empty the tank will be labeled "Empty."

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- Empty tanks will be vented, and the valve will be punctured per manufacturer's instruction (using valve removal tool) before discarding.
- All cylinders must be labeled to indicate the contents. Labels must never be removed. If cylinder labeling is unclear, it should be marked "Contents Unknown" and the supplier should be contacted.
 - Exception: Proficiency tests utilizing gas cylinders will come labeled without the concentration of ethanol. All other safety information is present. After completion of the testing, labels with complete information are sent to amend the tanks and allow for lab use.
- Ensure that cylinders have proper labeling and are free from corrosion, bulges, cracks, dents, cuts, gouges, etc. before putting into service.
- Compressed gas cylinders must not be shipped through the mail by the LVMPD Forensic Laboratory
- Cylinders past their expiration date must not be used. Expired tanks may be used for training purposes only and must be labeled as such.
- Temperature Range for storage and use of cylinders
 - 10° - 40°C (50° - 104°F)

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

13.0 Title: **QUALITY ASSURANCE**

13.1 Proficiency Testing

The Breath Alcohol program utilizes proficiency tests provided from an external agency. Proficiency tests are performed using an evidential instrument that has been calibrated within the 90-day time frame, by the FAA taking the test. The dedicated laboratory instrument is preferred, but any calibrated EBT may be used if the dedicated is not available.

Pass/Fail criteria:

- The analyst's test results must be within +/- 10% or 0.005 (whichever is greater) of the manufacturer's determined result.


Any incorrect or failing test result will be evaluated and reviewed in order to determine the root cause. The appropriate corrective action will be determined by the Toxicology Laboratory Manager, in conjunction with the Quality Manager. If the analyst is required to repeat the analysis and the correct results are obtained, the test will be deemed satisfactory. Failure to successfully analyze the test a second time will warrant further investigation/action by Laboratory Management.

13.2 Records, Distribution and Retention

13.2.1 Instrument Printouts and Data

When performing troubleshooting, calibrations, or testing on an instrument, printouts can be obtained either from the internal printer on the instrument, or from an external printer attached to the instrument. All procedures performed in the field will produce a printout from the internal printer. An external printer may be used during in-house testing. In the event a printout on an external printer requires two pages, the analyst's discretion will be used to determine if retention of the second page is necessary. Any printout or page with test, calibration, or subject data must be retained. Printouts will be signed with the analyst's identification (initials, personnel number, or signature) and date.

Any maintenance, notes, emails, photos, calibration paperwork or related documents created during maintenance, calibrations and adjustments must be maintained. Documents are scanned into appropriate object

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repositories in BrAD. After confirming that the scan matches the original, the original may be disposed of.

13.2.2 Certificates of Calibration, Reports of Gas Standards, Reports of Aqueous Standards and Officer Certification Applications:

- Originals are sent to and maintained by the Nevada Department of Public Safety-DMV Hearings office.
- Copies will be distributed to pertinent parties by Forensic Laboratory Staff

13.2.3 PBT Records and Class Rosters

If an annual calibration, monthly check, or maintenance/repair is performed in the laboratory by a FAA or other designated personnel:

- The monthly or annual form must be completed and stored at H:\CB\Forensics\General\Breath\PBTs\PBT Records
- When the PBT is returned to the appropriate agency, the monthly or annual form should be returned with the device so the agency has a record of the maintenance or calibration performed
- If a device is sent out for repair, the packing slip or service work order should be scanned into the appropriate folder at H:\CB\Forensics\General\Breath\PBTs\Service Work Order Scans. A description of the work performed on the device should be included on the annual or monthly form.

PBT Class Roster Distribution

After PBT classes, a copy of the roster should be sent to the appropriate training contact for the agency.


13.3 Review Procedure

A technical and administrative review shall be performed on all calibrations, adjustments, performance evaluations, and certificates of calibration of evidential instruments. In addition, all certifications or verifications of solutions shall be reviewed.

13.3.1 Technical Review of Calibrations, Adjustments, and Performance Checks

Refer to the Forensic Laboratory Quality Manual section 7.7.1 I) Technical Review of Technical Records and section 7.5 Technical Records. The technical reviewer will verify that:

- All documentation (scans, notes) are imported and approved in Object Repository
- The service ticket record shows the correct service date/time
- The correct service category has been selected
- The correct FAA has been selected
- That the data supports the analyst's conclusions

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The reviewer will complete the Calibration - Tech Admin Review Form when reviewing all calibrations. The Form will then be uploaded into the Service Ticket's Object Repository.

13.3.2 Review of Certificates of Certification

If a certificate of calibration is not created at the time of calibration, a review of the certificate shall be completed before distribution. The Calibration – Tech Admin Review Form that pertains to the review of the certificate of calibration shall be completed.

13.3.3 Review of Gas Verification

The reviewer shall complete the Certified or Verified Solution Technical and Administrative Review Worksheet and upload it to the Gas Cylinder's Object Repository.

13.3.4 Review of Aqueous Standard

- The QC Packet, Data and Report will be technically and administratively reviewed by a FAA.
- The FAA shall complete the Certified or Verified Solution Technical and Administrative Review Worksheet and upload it to the Solution's Object Repository.

13.4 Safe Handling, Use, Transportation, and Storage of Equipment

The manufacturer's Operating or Instruction Manual should be referenced when there are concerns about the handling, usage, transportation, and storage of the following equipment:


- Gas Cylinders
- Druck
- Wet-Bath Simulator
- Simulator Solutions

Equipment must be secured in a carrying case or calibration bag during transportation. The equipment should not be left in non-temperature-controlled locations (vehicles) for extended periods of time. When not in use, equipment will be stored in the Breath Alcohol section.

13.5 Handling of Evidential Calibration Items

A. Transportation

- Out of service instruments may be shipped to the manufacturer or other service provider using appropriate protective packaging.
- In service instruments shall be secured in the vehicle during transportation. The FAA should be mindful of the temperature of the vehicle while transporting evidential breath instruments.

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B. Receipt

- New Instruments:
 - Upon receipt of a new instrument, the unique identifier (serial number) will be affixed to the instrument using a label.
 - The descriptive information will be added into both BrAD and Cobra.
 - Before being deemed as ready for evidential use, the Initial Set-up and the Performance Evaluation must be completed.
 - The calibration certificate and the warranty from the manufacturer must be uploaded to the Instrument's Object Repository in BrAD.
- Instruments Removed from Service:
 - Document that the instrument is removed from service along with the reason in BrAD, include any printouts and pictures (if applicable).
- Instruments Returned from Repair or After Maintenance:
 - Replacement or repair of internal components must be followed by a Performance Evaluation.

C. Handling

Appropriate care will be taken when handling instruments.

D. Protection

Menu functions are password protected to prevent anyone other than a FAA or person directed by a FAA to access the menu settings.

E. Storage

All instruments that are not installed for evidential use, or at the manufacturer for repair, will be stored in the Breath Alcohol section of the Forensic Laboratory.

F. Disposal or Retention


Evidential instruments will be retained until they no longer meets the needs of the Breath Alcohol program. Appropriate measures will be taken to ensure that instruments are properly disposed of. Instruments that belong to agencies other than LVMPD or Department of Public Safety will be returned to the agency for disposal or will be disposed of with written permission.

13.6 Critical Supplies

Information regarding critical supplies can be found in the Toxicology Technical Manual – 6.7 Critical Supplies.


13.7 Communication Log

Communications with attorneys regarding instruments, subject breath tests, or breath alcohol theories will be documented in a log. Each instrument will have an

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Excel spreadsheet that contains the contact name, date of the communication, the FAA, and a summary of the communication.

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14.0 Title: QUALITY CONTROL PLAN


Quality Control Plan

	Instrument	Frequency	Criteria	Corrective Action
Evidentiary Instrumentation	CMI, Inc. Intoxilyzer 8000s Instrument identifications and certification schedules are listed in BrAD and maintained by the Breath Alcohol Program.	Internal: Every 90 days or less per NAC 484C.120 (when in service).	Internal: Mandated by NAC 484C.120 specified in Breath Alcohol Technical Manual 2.0 Calibration Procedures for Evidentiary Breath Instruments.	If criteria fails, instrument is removed from service until repairs are made and criteria passes.


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Refrigerator	<p>Breath # 2</p> <p>Whirlpool Model: WRR56X18FW01 Serial: U72603971</p>	<p>Internal: Once every two weeks</p> <p>External: N/A</p>	<p>2 °C – 8 °C</p> <p>Use "Refrigerator/Freezer Temperature Log" Form found in Qualtrax</p> <p>Forms will be completed electronically in the Resource Manager in LIMS.</p>	<p>If refrigerator does not meet criteria:</p> <ol style="list-style-type: none"> 1. Check again within 2 hours. 2. Change thermometer battery and check temperature within 2 hours. 3. Check thermometer against a second NIST thermometer. Replace if needed, then go directly to step 5. If thermometer is accurate, proceed through remaining steps. 4. Adjust thermostat. Note the adjustment that was done. 5. Monitor the temperature within 24 and 48 hours to ensure stability. 6. If the above steps do not correct the problem, tag out of use and advise lab manager or supervisor (prepare a Corrective Action Report, if needed). If temperature deviates more than 3 degrees outside of the acceptable range after completing step 4, move contents to an operable unit. If refrigerator/freezer appears to be malfunctioning, immediately move contents to an operable unit.
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NIST Thermometers	Control Company Model No: 61161-364 SN: 192595388 (Breath # 2 Fridge)	External: N/A NIST Thermometers – Replace every two years or sooner per manufacturer’s guidelines.	N/A	N/A
	VWR Model 89094-756 Serial # 192539145 Digital Thermometer	External: Every two years	Must meet external vendor criteria for NIST traceability	No internal Calibration or maintenance is performed. If the thermometer appears to be damaged or exhibits any characteristics that may affect its accuracy: 1. Tag out of use. 2. Consult Forensic Lab Safety Liaison for proper disposal procedures. 3. Replace.
Digital Pressure Indicator	Druck Model DPI 705 Serial # 70592012 Digital Pressure Indicator	External: Yearly	Must meet external vendor criteria and results from calibration must be in tolerance.	No internal calibration or maintenance is performed. If the pressure indicator appears to be damaged, send to manufacturer for repair and calibration.


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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

15.0 Title: ABBREVIATIONS KEY

Abbreviations Key

- ⊕ - positive
- ∅ - negative
- + - plus
- % - Percent or Percentage
- ABT – Aborted Test
- AFB – Air Force Base
- AMB – Ambient Fail
- AQ STD – Aqueous Standard
- BrAC – Breath Alcohol Concentration
- BrAD – **B**reath **A**lcohol **D**atabase
- CAL – calibration
- Cert – Certification Number
- Cit – Citation Number
- CofA – Certificate of Analysis
- CMI – CMI, Inc. (manufacturer of Intoxilyzer EBTs and some PBTs)
- COBRA – **C**omputer **O**nline **B**reath **A**rchive
- Con't – continued
- DEF – Deficient Sample
- Dept. - Department
- DOB – Date of Birth
- DPS – Department of Public Safety
- DSP – Digital Signal Processor
- DUI – Driving Under the Influence
- DVM – Digital Volt Measurement
- DL / Driv Lic – Driver's License
- EBT – Evidentiary Breath Test or Evidentiary Breath Testing device
- EEPROM – Electronically Erasable Programmable Read Only Memory
- ECSO – Esmeralda County Sheriff's Office
- EtOH – Ethanol
- FAA – Forensic Analyst of Alcohol
- hPa – Hectopascal(s)
- IPS – Improper Sample

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INT – Interferent Detected
 Intox – Intoxilyzer
 ITP – Internal Test Procedure
 LCSO – Lincoln County Sheriff’s Office
 LIMS – Laboratory Information Management System
 Loc – Arrest Location
 Maint – Maintenance
 N/A – Not Applicable
 NAC – Nevada Administrative Code
 NCSO – Nye County Sheriff’s Office
 NDOW – Nevada Department of Wildlife
 NHP – Nevada Highway Patrol
 NIST – National Institute of Standards and Technology
 NPS – National Parks Services
 NRS – Nevada Revised Statutes
 NSG – No Sample Given
 Obsr. – Observation
 Oper – Operator
 OTS – Office of Traffic Safety
 PBT – Preliminary Breath Test or Preliminary Breath Testing device
 ppm – parts per million
 PSI – pounds per square inch / pressure remaining in a pressurized tank
 PUR – Purge fail
 RAM – Random Access Memory
 Rec’d – received
 REF – Subject Test Refused
 RFI – Radio Frequency Interference
 Rel Std Dev – Relative Standard Deviation
 RGE – Instrument Range Exceeded
 RTC – Real Time Clock
 SIM – simulator
 SN, S/N, – Serial Number
 SOL – solution
 STD – Standard
 Std Dev – Standard Deviation
 Sub – Subject
 Temp - Temperature
 USAF – United States Air Force
 XXX – Invalid Sample