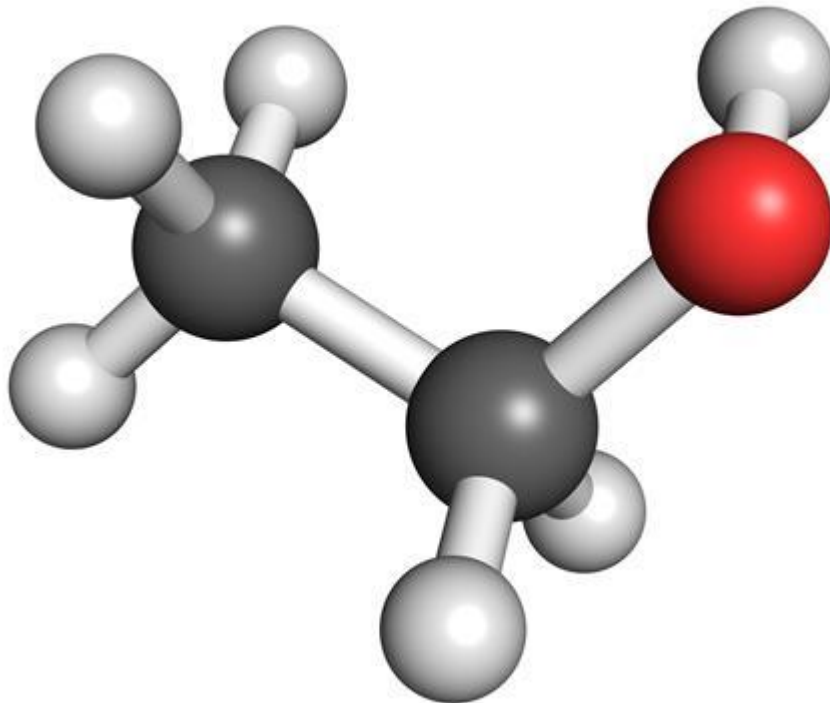

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	Document Number: 5122	Approved By: Theresa Suffecool, Kim Murga, Cassandra Robertson, Darby Lanz, Michael Stypa
	Revision Number: 9	Date Published: 05/23/2022



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Breath Alcohol Program Technical Manual




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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

0.0 Title: TABLE OF CONTENTS

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0.0	Table of Contents
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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.

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 the 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.

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

This software is utilized for Breath Alcohol as a 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) Bureau. The server is backed up on a schedule set by IT.

2.1.4 Intoxilyzer 8000 Instrument Software (version 8160.04)

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2.1.5 BrAD – Breath Alcohol Database


This is the software used to store subject test results that occurred on the Intoxilyzer 8000 instruments from 2013 to present. Tests downloaded using COBRA are synched to BrAD on a scheduled basis.

This software also houses:

1. Inventory, calibration dates and documentation for the Intoxilyzer 8000s
2. Maintenance and repair 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)
6. Documentation of items released under discovery subpoena

2.2 Definitions

- Maintenance – routine activities performed to keep an instrument operating properly. This can include, but is not limited to, changing o-rings, external batteries, breath hose, regulators, gas harness or keyboards. Maintenance does not involve exposing the internal components of the instrument and can be performed in the field or in the laboratory.
- Repair – activities that are more in-depth and are performed on an instrument that is removed from service for troubleshooting, or because it is not working properly. This can include, but is not limited to, work on the source of the instrument, the sample chamber, or changing of the internal battery. Repairs involve removing the top cover of the instrument and exposing the internal components. They may be performed in the laboratory, or by the manufacturer.
- Calibration – verification of the instrument’s ability to analyze known concentrations of ethanol.
- Adjustment - the process of re-setting the instrument’s calibration curve.
- Dedicated Instrument– an evidential instrument that is kept to an in-service calibration schedule and is used in the laboratory for verification of gas standards, proficiency tests, and other in-lab analyses.
 - If the assigned dedicated instrument is not available, any calibrated evidential instrument in the laboratory may serve the same purpose.

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2.3 Manuals

Operator and user manuals for instrumentation and measuring devices are kept in the Breath Alcohol section of the laboratory. If a FAA has a question while performing maintenance or repairs, these manuals should be referenced. If the FAA needs additional assistance, the manufacturer should be contacted.


2.4 Using BrAD


BrAD utilizes service tickets to create and/or store technical and administrative records. Service ticket entries will appear on the Instrument Maintenance History. When creating a service ticket to document a calibration, adjustment, repair, or maintenance:

- The Serial Number, Entry Date, and previous Calibration Date auto populates.
- The Service Date is the date and time that the calibration, maintenance, or repair was performed.
- The Comments/Remarks field is used to enter the calibration results, maintenance or repairs performed. The information entered in this field is not considered to be technical but is entered so that the data can appear in the Instrument's Maintenance History.

2.4.1 Limitations of BrAD

- Version History
 - BrAD does not track version histories of service tickets. However, neither the FAAs nor the reviewer have rights to delete service tickets.
 - If a service ticket is found to have an incorrect date, or a checkbox not 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.
 - The documents will be corrected with the new service ticket number and scanned into the object repository of the new service ticket.
 - An incorrect time, or incorrectly selected checkbox on a service ticket can be addressed in the Comments/Remarks field and does not require a new ticket being created.
- Calibration Certificate
 - 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 or repair will be associated with the service 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:

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

- 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)

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- 10 = conversion of volume in 100mL to Liters
- % 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.

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.
- 6) Any scientist authorized to perform blood alcohol testing may perform the analysis. Each sample shall be analyzed 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual - Ethanol Analysis by Dual Column GC Headspace procedure. A multiplier factor of 0.8264 should be applied when creating the sequence on the GC Headspace.
- 7) The FAA will verify that the QC Packet has been reviewed according to the process outlined in the Toxicology Technical Manual. A FAA does not need to be the one to review the QC Packet.
- 8) The FAA will examine the chromatograms and report results on the PBT Certified Standard form.
 - a. Ensure that the multiplier of 0.8264 was applied.
 - b. Determine the certified value of the solution.
 - c. Form should be signed by all current FAAs.
- 9) Bottle solution in 500mL Nalgene bottles, cap, seal and label bottle. Labels should include the identity of the solution (breath alcohol concentration), laboratory assigned lot number, initials of the preparer, and the expiration date.

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- a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 10) Store bottles in laboratory refrigerator and distribute to off-site locations as needed.


PBT Calibrators

These solutions are for PBT yearly calibrations, however, the ~0.08 g/210L solution can be used for the simulated breath test and to create the solution for the once yearly Acetone check 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.
- 6) Any scientist authorized to perform blood alcohol testing may perform the analysis. Each sample shall be analyzed 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual - Ethanol Analysis by Dual Column GC Headspace procedure. A multiplier factor of 0.8264 should be applied when creating the sequence on the GC Headspace.
- 7) The FAA will verify that the QC Packet has been reviewed according to the process outlined in the Toxicology Technical Manual. A FAA does not need to be the one to review the QC Packet.
- 8) The FAA will examine the chromatograms and report results on the PBT Breath Alcohol Calibrator form.
 - a. Ensure that the multiplier of 0.8264 was applied.
 - b. Determine the reported value of the solution.
 - c. Form should be signed by all current FAAs.
- 9) Bottle solutions in 500mL Nalgene bottles, cap, seal and label bottles. Labels should include the identity of the solution (breath alcohol concentration), laboratory assigned lot number, initials of the preparer, and the expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 10) 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.
- 6) Any scientist authorized to perform blood alcohol testing may perform the analysis. Each sample shall be analyzed 10 times using the LVMPD Forensic Laboratory Toxicology Technical Manual - Ethanol Analysis by Dual Column GC Headspace Procedure. A multiplier factor of 0.8264 should be applied when creating the sequence on the GC Headspace.
- 7) The FAA will verify that the QC Packet has been reviewed according to the process outlined in the Toxicology Technical Manual. A FAA does not need to be the one to review the QC Packet.
- 8) The FAA will examine the chromatograms and report results on the PBT Breath Alcohol Calibrator form.
 - a. Ensure that the multiplier of 0.8264 was applied.
 - b. Determine the reported value of the solution.
 - c. Form should be signed by all current FAAs.
- 9) Bottle solutions in 500mL Nalgene bottles, cap, seal and label bottles. Labels should include the identity of the solution (breath alcohol concentration), laboratory assigned lot number, initials of the preparer, and the expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 10) 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 Calibrator information (lot #, concentration, expiration date, etc.) and acceptable +/- 10% range.
- c. Solution should not be used for more than 20 performance checks.
 - i. A hash mark system will be used to track this on the simulator.

Interferent Check

- 1) Pour approximately 500 mL of ~0.08 g/210L PBT Calibrator into a simulator.
- 2) Add approximately 200uL of Acetone.

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- 3) The preparation will be documented on a Toxicology Reagent Prep Log form and stored in Resource Manager in LIMS.
- 4) The quality control check will be performed by analyzing the solution two times on the dedicated instrument. If the dedicated instrument detects acetone each time, the QC check passes.
- 5) The Toxicology Reagent Prep Log and QC scans shall be added to Resource Manager in LIMS and reviewed/approved before use.
- 6) Label Simulator with the identity of the solution (Interferent Check), laboratory assigned lot number, initials of the preparer, and the expiration date.
 - a. Expiration date is four years from preparation, or the expiration date of the earliest expiring component – whichever is sooner.
- 7) Check simulator seals by using hand pump.
- 8) Use of Interferent (acetone) detection:
 - a. Check at least once per calendar year on each in-service instrument.
 - b. If the Interferent Solution is to be used, a QC check must be performed at least once a week, prior to use.
 - i. Run the solution 2 times through the calibration port.
 - ii. All replicates must indicate an interferent.
 - iii. Record the results on the Interferent Weekly QC form.
 - iv. If not indicated a new solution must be created.
 - c. The solution does not need to be QC checked on weeks when it will not be used.


3.4 Interpretation of Results

Results of headspace / gas chromatography must meet the criteria outlined in the LVMPD Forensic Laboratory Toxicology Technical Manual - 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.

Interferent Check: The dedicated instrument must indicate an interferent on each replicate. If it does not, the QC check can be repeated. If the re-analysis does not yield acceptable results, a new solution will be prepared.

3.5 Reporting and Record Keeping

- A Report of Aqueous Standard is prepared to document the certification of the PBT Standard. A report is required for each current FAA.
- Reporting Requirements are listed in [Chapter 13 – Quality Assurance](#).

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

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 using the dedicated instrument.

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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 ± 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.
- If the results are not acceptable, the process will be repeated. If the QC check fails a second time, the tank will be tested on a second calibrated instrument. If the process fails on the second instrument, a second tank from the lot will be tested to verify that more than one tank from the lot has results that are not acceptable. Once two tanks have been tested, the manufacturer of the gas will be contacted to determine a resolution or replacement.
- 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.


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 ± 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 ± 10.0% or 0.005, whichever is greater, of the manufacturer's certified concentration.
 - Record pass/fail results on paper with printout from instrument.
 - If the results are not acceptable, the process will be repeated. If the QC check fails a second time, the tank will be tested on a second calibrated instrument. If the process fails on the second instrument, a second tank from the lot will be tested to verify that more than one tank from the lot has results that are not acceptable. Once two tanks have been tested, the manufacturer of the gas will be contacted to determine a resolution or replacement.

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- Results will be technically reviewed. Reviewer must indicate agreement with pass/fail results making a notation on the paperwork.
 - Technical/Administrative Review form is not needed in a QC check.
- Scan results in the object repository for the lot number in BrAD.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

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 - Ethanol Analysis by Dual Column GC Headspace Procedure.


- This may be performed by any scientist authorized to perform blood alcohol analysis. A multiplier factor of 0.8264 should be applied when creating the sequence on the GC Headspace.
- The FAA will ensure that the QC Packet has been reviewed according to the process outlined in the Toxicology Technical Manual.
 - The FAA does not need to be the one to review the QC Packet.
- The FAA will examine the chromatograms and record results and pass/fail on Summary Report from GCHS.
 - Verify that the multiplier of 0.8264 has been applied and determine the mean.
- Results will be technically reviewed. Reviewer must indicate agreement with pass/fail results by making a notation on the paperwork.
 - Breath Alcohol Technical/Administrative Review form is not needed for a QC check.
 - Scan results into the object repository for the lot in BrAD.
 - Approved QC Packet will remain in Qualtrax.

5.4 Interpretation of Results

Results of headspace / gas chromatography must meet the criteria outlined in the LVMPD Forensic Laboratory Toxicology Technical Manual - Ethanol Analysis by Dual Column GC Headspace Procedure. Each solution is analyzed, and each

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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. The mean is calculated and reported to the fourth decimal place (standard rules of rounding apply). The mean must be within $\pm 3\%$ or 0.003, whichever is greater, of the certified value. Solution may be reanalyzed if outside the acceptable range. If reanalysis does not yield acceptable results, a new solution must be purchased.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

6.0 Title: **EBT PERFORMANCE EVALUATION**

6.1 Purpose

This procedure is used to evaluate the performance of an Evidential Breath Testing instrument (EBT) to show that it can identify common errors that might be encountered by officers in the field. This will be completed on any instrument that is new, or has been repaired (either by a FAA, or the manufacturer).

A new instrument will also need an Instrument Initial Set-up (using the New Instrument Checklist – Initial Set-up form) 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
 - Interferent Check
- Sample driver's licenses
- Mouthwash/Mouthspray (containing alcohol)
- Handheld Transceiver

6.2.2 Evaluation

Follow the Performance Evaluation form. Keep all printouts and scan results into the service ticket Object Repository 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


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 a repair is necessary.

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

6.4 Reporting

If the performance evaluation was completed following a repair, a Calibration Certificate showing pre-and post-repair results will be created and uploaded into the instrument's Object Repository, even if the instrument is not installed for use in the field. If the pre data and post data are generated by different FAAs, this must be noted on the Calibration Certificate. The Calibration Certificate will be signed by the FAA who performed the "as left" calibration.

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LVMPD FORENSIC LABORATORY TECHNICAL PROCEDURES BREATH ALCOHOL

7.0 Title: **EBT CALIBRATION**

7.1 Purpose

This procedure is used to perform a calibration of an Evidential Breath Testing instrument.

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).


Maintenance (keyboards, O-rings, etc.) does not require performance evaluation or calibration.

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 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, but in the event one level is not available, the NAC requirements can still be met, and this procedure is still valid.
 - Examples of approximate values:
 - 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


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- When calibration is being performed in conjunction with Chapter 6.0 - EBT Performance Evaluation, the Evaluation form is sufficient.
- Place calibration sticker on the instrument.
- Note: If the calibration is not successful, the attempt should still be made to complete all calibration levels, if possible. This will provide the “as found” data required for a Calibration Adjustment (see Chapter 8.0 EBT Calibration Adjustment.)

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.
 - Subject Sample: blow an aqueous solution, with a known concentration, through the breath tube.
 - 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 on each in-service instrument.
 - Use a breath alcohol simulator containing the Interferent Check (section 3.3.1) through the calibration port, three times.
 - Solution should not be used for more than 40 interferent checks (each check consisting of running the solution three times through the calibration port or a weekly QC check).
 - A hash mark system will be used to track this on the simulator.
- 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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7.3.3 Procedure for Instruments Not Calibrated Within 90 Days

If an in-service instrument cannot be calibrated within 90 days, it must be removed from service.

- If a FAA cannot access the instrument due to extreme circumstances (e.g., road conditions, safety) a person at the instrument's location/agency can be instructed to remove it from service in the following manner:
 - The FAA will instruct the person on how to correctly turn the instrument off and unplug it.
 - The FAA will email a sign for the person to place on the instrument to indicate that the instrument is out of service.
 - Once the above steps have been completed, the FAA should ask for a picture to show that the process has been completed. The picture and other relevant documentation shall be entered in a service ticket in BrAD.
 - Once the instrument is accessible, a FAA shall go to the instrument's location to perform a calibration and ensure that the instrument is operating properly.
- If a FAA can access the instrument in order to remove it from service:
 - A calibration shall be performed following the calibration procedure in this chapter.
 - The FAA will turn the instrument off and unplug it.
 - Once it is time for the instrument to be back in-service, a FAA shall go to the instrument's location to install a calibrated instrument.


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 the results must print.
- 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 instrument must be within ± 15 hPa of Druck DPI 705.
- Regulator check – must allow for gas to be sampled.
- Gas Standard:

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- 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 show a result of 0.000 g/210L.
 - Instrument must accept a refusal for the 3rd subject test.
- Interferent Detection:
 - Instrument must detect 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 the instrument fails to detect an interferent on all replicates, the process can be repeated one time.
 - After a second failure, the instrument must be pulled from service.
- 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 a service ticket in BrAD. Scan and upload forms and data printouts into the associated Object Repository.
 - The time entered into the service ticket is from the first air blank on the first calibrator with an acceptable result.
 - 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
 - printout must include the date and initials of the FAA
 - document repeat in the service ticket (example: "0.04 repeated – see scans")
- If the calibration and performance checks were completed satisfactorily, a Calibration Certificate can be prepared.
 - A calibration performed in the laboratory may not have a Calibration Certificate created until it is installed for field use.
- If an instrument undergoes a repair as described in Section 2.2 – Definitions, a performance evaluation must be completed. See [Chapter 6.0 EBT Performance Evaluation](#). See [Chapter 13.0 - Quality Assurance](#) for Reporting Requirements, Distribution and Retention.

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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 an option. If a repair involves work on the source of the instrument, an adjustment will be done. Instruments adjusted by the manufacturer do not need to be readjusted upon receipt of the laboratory.

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 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

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- Water and Ethanol/Water Solutions
 - 0.000 g/210L (Distilled water. This concentration is required, not suggested)
 - 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: <0.003 difference
 - Residual: ≤ 0.002
 - Chan 2
 - Actual to Fit: <0.003 difference
 - Residual: ≤ 0.002
 - Chan 1 compared to Chan 2


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- Fit values within +/- 0.003 for each level
 - Dry Gas H2O Results
 - Channel 1
 - 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
 - Channels 3 and 9: values fall between 9000 and 14000
 - S: Span (noise): ≤ 9
 - C: Sample Cell Temperature: 47°C ± 0.2°C
 - B: Breath Hose Temperature: 45°C + 2°C or -9°C
 -
 - Check Internal Test Procedure (ITP)
 - Measured value must be within +/- 0.005

Evidential breath alcohol instrument must pass a 90 Day Calibration (see [Chapter 7.0 - EBT Calibration](#)), and a Calibration Certificate showing pre- and post-adjustment results will be created and uploaded into the instrument's Object Repository, even if the instrument is not installed for use in the field. If the pre data and post data are generated by different FAAs, this must be noted on the Calibration Certificate. The Calibration Certificate will be signed by the FAA who performed the "as left" calibration.

8.3.3 Recording Results

- Record adjustment in a service ticket in BrAD
 - The time entered into the service ticket is from the first air blank on the first calibrator with an acceptable result from the post-adjustment calibration.
 - Scans of the Calibration Adjustment Checklist and the printouts will be uploaded in the Object Repository for the corresponding service ticket entry.
 - If adjustment failed, note reason, and repeat.
 - Adjustment may be repeated once, but if it fails again, contact manufacturer.
 - Pre and post adjustment/repair data shall be retained.

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**LVMPD FORENSIC LABORATORY
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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 expired within 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 to agencies is made by e-mail. Class includes a lecture portion which consists of a discussion of alcohols in general, possible interferences, 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 are processed by the Forensic Laboratory staff.
 - A copy of the completed roster is sent to LVMPD Advanced Training Office, and tests taken by any LVMPD personnel.
 - Instructor Evaluation forms
 - The originals of all instructor evaluation forms will be given to the Quality section for review.
 - After review, originals will be processed by Forensic Laboratory Staff and sent to the LVMPD Advanced Training Office.
 - 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 monthly check, 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

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- 0.080 g/210L aqueous
- 0.100 g/210L aqueous or gas
- Provide an alcohol-free air sample.

10.4 Interpretation of Results

- The two results must be within $\pm 10\%$ or 0.005 (whichever is greater) 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. These devices will be returned to the agency where repairs can be made if deemed necessary.

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 PBT Instructor. 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
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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 instrument is preferred, but any calibrated EBT may be used if the dedicated instrument 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 the 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.
- If a certificate is created for an instrument that is not put into the field (i.e. after a repair or adjustment) the original certificate does not get distributed to the DMV.
- 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 calibration certificates of evidential instruments. In addition, all certifications or verifications of solutions shall be reviewed.

13.3.1 Technical Review of Calibrations, Adjustments, and Performance Evaluations

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

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- The correct FAA has been selected
- That the data supports the analyst's conclusions

There might be instances when a reviewer notices that a checkbox has not been filled in on a Checklist. If it can be verified that the task was completed using the scans, the review can be completed without being returned for the FAA to fill in the checkbox.

The reviewer will complete the Calibration Tech & Admin Review form when reviewing all calibrations and performance evaluations. The form will then be uploaded into the Service Ticket's Object Repository.

13.3.2 Review of Calibration Certificates

If a calibration certificate is not created at the time of calibration, a review of the certificate shall be completed at the time of installation. Once a certificate has been created, the reviewer will complete an Installation Review Form and upload it to the service ticket related to the installation.

13.3.3 Review of Gas Reference Standard

The reviewer shall sign the Dry Gas Concentration Verification Worksheet and complete the Gas Standard Tech & Admin Review form. Both documents shall then be uploaded to the Gas Cylinder's Object Repository.

13.3.4 Review of Aqueous Standard and PBT Calibrators


The review shall not be completed by a FAA or an analyst involved in the analysis.

- The reviewer shall:
 - Verify that the QC Packet has been reviewed.
 - Perform a technical review of the chromatograms.
 - Review the Aqueous Standard and/or Calibrator Summary forms.
 - Review the Toxicology Reagent Preparation Log and enter your initials/P# and date in the Approved By/Date space.
 - Complete the Aqueous Standard Tech & Admin Review form and upload it to the Solution's Object Repository.

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

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

- Gas Cylinders
- Drucks

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- Simulator Solutions
- NIST Digital Thermometer

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 Verification of Digital Pressure Indicator

Before the Digital Pressure Indicator is placed or returned into service, it shall be verified using the following procedure:

- The calibration certificate must be reviewed to verify that the pressure indicator was calibrated and checked near 800 or 900 hectopascals or equivalent.
- The temperature will be verified against a NIST thermometer.
- To verify the pressure:
 - Choose three evidential instruments that have been recently calibrated (if possible, include the dedicated instrument).
 - Passing Criteria: All three evidential instruments read within +/- 15 hectopascals of the Digital Pressure Indicator.
 - Failing Criteria: Evidential instruments reading outside of +/- 15 hectopascals of the Digital Pressure Indicator. See the Digital Pressure Indicator verification log for the Corrective Action.
- Record results on the Digital Pressure Indicator verification log and scan to the Object Repository in Resource Manager in LIMS.


13.6 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.

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.

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- 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 and the instrument's logbook, include any printouts and pictures (if applicable).
- Instruments Returned from Repair or After Internal Maintenance:
 - When an instrument is returned from the manufacturer or the internal components have been exposed, a Performance Evaluation must be completed.

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 meet 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.

13.7 Critical Supplies

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

13.8 Communication Log

Communications with pertinent persons regarding instruments or breath alcohol theories will be documented in a log. Each instrument will have a Word document uploaded to the Object Repository that contains the contact name, date of the communication, the FAA, and a summary of the communication. Any communication that is related to specific breath tests/cases, will have a case communication log attached to the subject breath test's Object Repository.

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**LVMPD FORENSIC LABORATORY
TECHNICAL PROCEDURES
BREATH ALCOHOL**

14.0 Title: BREATH TESTS REQUIREMENTS

14.1 Purpose

This procedure is intended as a reference of the passing criteria for a successful breath test.

14.2 Principle

Both NRS 484C and NAC 484C have mandates that pertain to evidentiary breath tests. In addition, the LVMPD Forensic Laboratory has criteria pertaining to the breath test.

14.3 Procedure

To fulfill the requirement of NAC 484C.130, a certified gas standard is sampled immediately before sampling the person's breath. The concentration of the standard being used is 0.100 g/210L.

Per NRS 484C.200, a minimum of two samples must be taken. If the two tests do not agree within the required agreement, a third test is administered.


Note: NRS 484C.200 (2)

14.4 Interpretation

The acceptable range of the standard test is +/- 10% of the certified value.

The difference between two samples must be less than or equal to 0.020 g/210 L. If the difference is greater than the allowable difference, a third test will be administered. Out of the three tests, any two can be less than or equal to 0.020 g/210 L difference.

Measurement uncertainty is not applied to the person's breath tests. The Breath Alcohol Unit applies +/- 10% as a range that the measured test results can fall within based on the acceptable range of the gas standard.


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**LVMPD FORENSIC LABORATORY
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15.0 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: 210546776 (Breath # 2 Fridge)	External: N/A NIST Thermometers – Replace every two years or when calibration certificate expires, whichever is sooner.	N/A	N/A
	VWR Model 89094-756 Serial # 210635542 Digital Thermometer	External: N/A NIST Thermometers – Replace every two years or when calibration certificate expires, whichever is sooner.	N/A	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 #1 Model DPI 705 Serial # 70592012 Digital Pressure Indicator Druck #2 Model DPI 705 Serial # 70595378 Digital Pressure Indicator	External: Annually Critical Service Druck/Baker Hughes/NAM Services 1-281-542-3650 Option 3	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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16.0 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 – **B**reath **A**lcohol **C**oncentration
- BrAD – **B**reath **A**lcohol **D**atabase
- CAL/Cal – calibration
- Cert – Certification Number
- Cit – Citation Number (case number/event number/etc.)
- 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)

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IPS – Improper Sample
 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 Park Service
 NRS – Nevada Revised Statutes
 NSG – No Sample Given
 Obsr. – Observation
 Oper – Operator
 OR – Object Repository
 OTS – Office of Traffic Safety
 PBT – Preliminary Breath Test or Preliminary Breath Testing device
 PE – Performance Evaluation
 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

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XXX – Invalid Sample