# BREATH ALCOHOL IGNITION INTERLOCK DEVICE BEST PRACTICE MANUAL

*A COMPLETE GUIDE TO ASSIST PROGRAM ADMINISTRATORS WITH THE IMPLEMENTATION AND OVERSIGHT OF IID PROGRAMS*

AIIPA

ASSOCIATION OF IGNITION INTERLOCK PROGRAM ADMINISTRATORS

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# About

The Association of Ignition Interlock Program Administrators (AIIPA) was formed in November, 2011 in Oklahoma City, Oklahoma. Led by Toby Taylor, the original planning committee included Harry Anderson, Angela Coleman, Brett Close, Thomas Liberatore, Steve Luce, Robert Maccarone, Susan McKinney, Jody Oscarson and Brenda Musgrove.

The National Highway Traffic Safety Administration (NHTSA) has been positively instrumental in not only providing funding, but also expertise and guidance to make AIIPA the strong network of resources for program administrators it is today.

Traffic Injury Research Foundation (TIRF), a steadfast partner to AIIPA, provides ongoing support and organization for the annual conference, training institutes and jurisdictional technical support meetings.

This manual is designed to offer general information. It is provided with the understanding AIIPA is not engaged in providing legal services. While it has been prepared by and in consultation with many professionals, it should not be utilized alone. Each user is encouraged to engage AIIPA board members, AIIPA general members, jurisdictional legal services and local experts when creating legislation and program rules. This version supersedes any other version previously published.

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Association of Ignition Interlock Program Administrators



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# Acknowledgements

The Board of Directors of the Association of Ignition Interlock Program Administrators (AIIPA), in consultation with representatives of the BAIID industry and other experts in science, technology, and traffic safety research have developed the following comprehensive best practices for BAIID program administrators to consider when developing or improving their programs. This best practice manual began in 2013 as a single chapter and has since been expanded over the years to focus on other important aspects of BAIID regulation and compliance. The AIIPA Board of Directors intends for these best practices to be utilized to strengthen laws, encourage compliance, discourage circumvention, and ultimately prevent the devastating tragedies alcohol impaired driving has on our society.

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# Glossary

The Department of Transportation (DOT), National Highway Traffic Safety Administration (NHTSA) issued revised Model Specifications for Breath Alcohol Ignition Interlock Devices (BAIIDs) on May 8, 2013, which became effective date on May 8, 2014. This chapter includes a list of terms intended for conformance across BAIID entities. First developed by both program and manufacturer stakeholders in 2013, this document will continue to evolve with different challenges and updates to technology. These should be adopted and utilized by all programs in the United States.

**Accepted Breath Sample ‡**

A breath sample fulfilling set requirements for volume, flow, exhalation time and other human breath sample characteristics. Note: The acceptance of a breath sample is independent from the alcohol concentration.

**Acceptance Criteria Conditions**

A BAIID must satisfy to be approved by the jurisdiction. Acceptance criteria should be derived from published documents such as contracts, specifications, technical standards, regulations or statutes.

**Accuracy**

The confirmation of a BAIID's calibration.

**Alcohol***

Ethanol or ethyl alcohol (C2H5OH).

**Alcohol Set Point***

Breath Alcohol Concentration (BrAC) at which a BAIID is set to prevent a vehicle from starting.

**Anti-Circumvention**

The means, either technological, mechanical or both, to prevent the bypass of the BAIID. Should be engaged and demonstrable during the life of the installation.

**Bench Test**

A test of a BAIID to determine its compliance and outputs with acceptance criteria in a laboratory setting.

**Blocking State ‡**

State in which the BAIID inhibits the starting and/or operation of the vehicle.

**Breath Alcohol Concentration (BrAC)***

The amount of alcohol in a given amount of breath, expressed in weight per volume (w/v) based upon grams of alcohol per 210 liters (L) of breath.

**Breath Alcohol Ignition Interlock Device (BAIID)***

A device that is designed to allow a driver to start a vehicle if the driver's BrAC is below the set point and to prevent the driver from starting the vehicle if the driver's BrAC is at or above the set point. Note: This device is commonly referred to as alcohol interlocks or ignition interlocks. In the case of hybrid or electric vehicles the device allows a driver to operate the vehicle.

**Breath Sample***

Normal expired human breath primarily containing air from the deep lung region.

**Breath Test ‡**

Providing a breath sample into a BAIID.

**Calibration**

The process of testing and adjusting a BAIID to ensure accuracy by using a breath alcohol simulator or dry gas standard as defined by the current NHTSA Model Specifications for Calibration Units.

**Calibration Interval ‡**

The time period between calibrations during which the BAIID fulfills the stability requirements for the measurement of the breath alcohol concentration.

**Calibration Set Point**

Reference value used to calibrate the BAIID

**Calibration Stability***

The ability of a BAIID to hold its accuracy and precision over a defined time period.

**Cell Site Location Information (CSLI)**

Information gathered by cellular receivers as it relates to nearby cellular towers. Through triangulation, cellular receivers then calculate the receiver's geolocation. These networks are privately owned, unlike GPS. In this case, the BAIID would have a cellular receiver component. Also see Global Positioning System.

**Circumvention**

Bypassing the correct operation of a BAIID by starting the vehicle, by any means without first providing a breath test. Note: Commonly referred to as bypass, illegal start, or untested motor run.

**Configuration Profile**

The Manufacturer or Manufacturer Representative's declaration regarding the setting of programmable features of the BAIID.

**Confirmatory Test**

A breath test in response to circumvention or a follow up to a breath sample registering over the jurisdiction's set point.

**Emergency Notification To Law Enforcement**

Emergency Notification to Law Enforcement is when a jurisdiction requires manufacturers to determine specific events as they occur and in certain sequences. Once detected, a procedure is set in motion for the manufacturers to notify local law enforcement, provide location updates, vehicle information and possible driver information.

**Field Test**

A test of the BAIID installed in a vehicle and conducted under actual usage conditions to determine the compliance of the BAIID and its outputs with acceptance criteria. This can also be referred to as compliance testing.

**Firmware (BAIID)**

A type of software program on the BAIID which provides essential instructions on how the device communicates with other BAIID hardware components. Firmware lives in the hardware and is not changed very often.

**Filtered Air Sample***

Any human breath sample that has intentionally been altered so as to remove alcohol from it.

**Functional Requirements**

Specifications of business needs such as process flows denoting all requirements which are considered business driven, including behavioral specifications.

**Global Positioning System (GPS)**

A locating system consisting of three parts: satellites, ground stations and receivers. Receivers typically look for at least four satellites to determine geographical location. There are other geolocation services developed by countries and regions outside of the United States, such as GLONASS, NavIC, and QZSS. GPS is owned and maintained by the US government for national use. BAIID usage falls under civil use of GPS. Also see Cell Site Location Information (CSLI).

**Global Positioning System (GPS) Recording**

GPS data collected and stored by manufacturers.

**Global Positioning System (GPS) Reporting**

GPS data the manufacturer and program officials determine should be included in data logs or monitoring information.

**Hardware (BAIID)**

Physical components of a BAIID, such as the camera, handset and relay.

**Initial Test ‡**

A breath test provided before the vehicle is started.

**Input Voltage**

The voltage obtained from the electric power source of the vehicle for operation of the BAIID.

**Instrument Modification**

The act or instance of altering any aspect of a BAIID model.

**Interlock Data Logger***

A device within a BAIID that records all events, dates, and times during the period of installation and use of a BAIID. Note: This includes all components of the BAIID: handset, relay, camera, etc.

**Manufacturer ‡**

A person or organization responsible for the design, construction, and/or production of the BAIID.

**Manufacturer Representative**

An individual designated by the manufacturer as a contact for the program administrator in a state or jurisdiction.

**Mouthpiece ‡**

A part through which the breath sample is delivered into the BAIID.

**Not-blocking State ‡**

State in which the vehicle can be started.

**Override Lockout**

Method of overriding a lockout condition by unlocking a BAIID so that a breath sample can be provided.

**Override Start**

Method of starting a vehicle without providing a breath sample.

**Permanent Lockout**

A condition where the BAIID will not accept a breath test until unlocked or serviced as defined by the state or jurisdiction.

**Preliminary Breath Testing**

Alcohol screening device as used in NHTSA and conforming products list

**Ready for Test ‡**

Indication that the operating parameters of the BAIID are met.

**Real-time Reporting**

Real-Time Reporting - The transmission of data between the device's relay unit and the manufacturer's server which is then immediately updated to the manufacturer's website for viewing by monitoring authorities provided there is adequate cellular network coverage in the operating area and assuming normal use of the BAIID.

**Recall**

Response of the BAIID due to a service requirement of the device or an action of the driver which requires service of the BAIID or downloading of the data memory.

**Residual Mouth Alcohol**

Alcohol found in the oral cavity which dissipates over a short period of time. This has been previously referred to as a false positive.

**Restart Period ‡**

The time interval after the car is switched off during which the vehicle may be started again without the delivery of another breath test. Note: Commonly known as stall protection.

**Retest***

A breath test which is required after the initial start-up breath test and while the motor is running. Note: Commonly referred to as a rolling, random, or running retest.

**Service Interval***

The time period established by the state or jurisdiction that a BAIID may be used without maintenance or data download. If the BAIID is not serviced within the period, warnings are provided, and the BAIID will prevent further operation.

**Service Center**

The entity designated by the manufacturer to provide services to include, but not be limited to, installation, monitoring, maintenance, and removal of the BAIID.

**Service Reminder ‡**

Notice by the BAIID to remind the driver of a service requirement.

**Simulator***

A device that produces an alcohol-in-air test sample of known concentration (e.g., a Breath Alcohol Sampling Simulator (BASS)) or a device that meets the NHTSA Model Specifications for Calibration Units (72 FR 34742).

**Software (BAIID)**

A collection of a set of programs, procedures, data, or instructions used by a computer to perform specific tasks and allows the user to interact with the computer. This includes the software package technicians use in order to perform device checks and complete the calibration workflow. Software is malleable and can be changed more easily than firmware.

**Start Period ‡**

Time interval after an accepted breath sample with an alcohol concentration below the breath alcohol concentration limit has been delivered, during which the vehicle may be started.

**Tampering***

An attempt to physically disable, disconnect, adjust, or otherwise alter the proper operations of a BAIID.

**Technician**

An individual authorized and trained by a BAIID manufacturer to perform services related to their BAIID and certified by the respective jurisdiction.

**Technician Certification**

The detailed process in which technicians are certified, licensed or granted permits to perform breath alcohol ignition interlock device related duties.

**Temporary Lockout**

A condition where the BAIID will not accept a breath test for a set amount of time as defined by the state or jurisdiction.

**Vendor**

An entity designated by the manufacturer to conduct business on behalf of the manufacturer in a state or jurisdiction.

**Violation**

A non-compliance with a law, regulation, or rule as defined by a state or jurisdiction.

**Violation Reset**

A feature of the BAIID in which a service reminder is activated in response to a violation.

‡ Definitions standardized by the European Committee for Electrotechnical Standardization (CENELEC)

***** Definitions standardized by the National Highway Traffic Safety Administration (NHTSA)

# Chapter 1 – Breath Alcohol Ignition Interlock Device Calibration Best Practices

These best practices are to be used as a guideline for both program administrators and industry professionals. AIIPA recognizes the uniqueness of every jurisdiction, and the difficult decisions program administrators encounter when framing calibration procedure rules. The document strives to define talking points for consideration to enable the administrators and industry professionals to make informed decisions. Program administrators are also encouraged to seek guidance from the most current NHTSA Breath Alcohol Ignition Interlock Device (BAIID) model specifications. AIIPA members are encouraged to actively discuss their programs and this document in order to drive technology forward. With that in mind, there are some practices AIIPA strongly encourages to be considered as written. The reader will be able to easily discern these points.

When changing rules or statutes, AIIPA supports a phased approach or at least several month's notice when a jurisdiction changes its calibration procedure. This allows manufacturers to properly research and develop new protocols, secure necessary equipment, and provide adequate training to those affected. Communication is key during any change and seeking input from all stakeholders ensures a successful transition or deployment of new procedures or equipment. Program administrators should also clearly state implementation timelines and goals.

AIIPA recognizes the definition of calibration is the act of verifying the result against a reference standard material. An adjustment is the procedure involved to come into a specific tolerance of a known reference standard material. In literature and many rules in the BAIID industry, calibration includes both the calibration and adjustment procedures and sometimes ensuing accuracy checks; therefore, AIIPA continues to define calibration to include the adjustment procedure.

While CENELEC, the European Committee for Electrochemical Standardization, uses the terminology "alcohol interlock" to describe ignition interlock devices, NHTSA and other United States-based organizations use Breath Alcohol Ignition Interlock Device (BAIID). Also, many state programs have written their rules and statutes using the term IID or Ignition Interlock Device. AIIPA will continue to utilize BAIID or device in this document.

## Section 1 – Evidential Instruments And Monitoring Devices

Breath Alcohol Ignition Interlock Devices (BAIIDs) are used as evidence in probation and court hearings but are not considered evidential breath alcohol instruments. The latter refers to instruments used in court proceedings for impaired driving and related crimes. BAIIDs are meant to be a behavior modification and public safety tool to separate drinking from driving. The line is blurred somewhat when results from BAIIDs are used to extend licensing restrictions or invoke probation conditions.

Other differences between evidential instruments and BAIIDs include testing by Volpe and NHTSA, quality assurance procedures conducted at more than one reference value and appearing on the Conforming Products List of the Federal Registry. BAIIDs are not subject to any of these items.

Due to the social and economic impact of results of the BAIID, it needs to function at the peak of its accuracy and precision for a device which is subjected to non-laboratory usage by minimally trained users and calibrated by persons who do not have extensive training in breath alcohol testing. Robust calibration protocols allow jurisdictions to have confidence in the results for use in legal proceedings, ensure public safety, and provide a usable device for participants.

Ultimately, a BAIID should not allow a vehicle to start at or above a given set point. Keeping this in mind, jurisdictions can maintain broad standards in order to allow manufacturers flexibility in determining how best to accomplish this based on the design of their device.

## Section 2 - Compressed Gas Standard And Breath Alcohol Simulator

There is more information regarding the inspection of both gas standard and breath alcohol simulators in the AIIPA Service Center Certification and Inspection Best Practices document.

It is not AIIPA's intent to dictate which technology of delivering a reference sample is better or should be used. Each has its merits as it relates to fuel cell calibration and certification. Regardless of the method, if a specific component is subject to being listed on NHTSA's Conforming Product List (CPL), then only CPL items should be used. Below is a list of considerations specific to each.

**Compressed Gas Standard**

Fuel cells need moisture to operate properly. Care should be taken in extra dry climates coupled with low use BAIIDs. Manufacturers should seek guidance from fuel cell manufacturers on the initial sampling of a fuel cell and how to accommodate its need for moisture in its first few samples off the production line.

Compressed gas standards require an adjustment to local barometric pressure by referring to an elevation chart, which is usually included on the gas cylinder. Elevation charts give a correction factor for each elevation range, which then is used to calculate the expected BrAC value. There are devices which complete this simple correction factor calculation, but the elevation chart is easy to use and readily available. Please see Appendix B for an elevation correction chart.

Barometric pressure is inherently determined by elevation and by a lesser degree, weather, so using either elevation or barometric pressure in this correction factor is acceptable. Elevation is the distance above sea level where altitude refers to the distance between two points; therefore, in legislation, the term elevation should be used since the gas standard is sensitive to elevation above sea level. AIIPA recommends the elevation be determined at the exact usage location and not a generalized location of a city. Methods to determine this could be as simple as using mapping software, a USB drive pressure sensor, a NIST traceable reference barometer or an application for a smart phone. Due diligence should be taken by the manufacturer to ensure the chosen method is accurate. If the manufacturer chooses barometric pressure, this measurement should be verified using a NIST traceable barometer at least once. It is not necessary for each location to have its own barometer on an ongoing basis. The measurement should be easily auditable by any program inspection staff as well as locked to prevent unauthorized or accidental changes.

For more information on gas tubing, please see Chapter 3 - Service Center Certification and Inspection Best Practices. Briefly, tubing pressurization negates the need for any purge prior to sampling. The kind of tubing and tubing length should be consistent with the gas standard manufacturer's recommendation. When used in a non-pressurized system, gas tubing usually needs to be kept as short as possible for adequate purging. Program officials should test the output of the calibration design to compare the results against the compressed gas reference value reflected on the standard's certificate of analysis. If the output in normal calibration function is consistent with the reference value, then the manufacturer's purging design should be deemed acceptable.

Gas standards should have a certificate of analysis denoting its characteristics such as lot number, manufacture date, expiration date, content type, reference value as well as other usual items.

Gas cylinders have a wide acceptable operating temperature, but generally should be maintained at normal room temperature. Again, BAIID manufacturers and program administrators should consult with gas standard manufacturers on what is acceptable.

Most gas standards can be set up to perform the calibration workflow with little human input. Despite this, a technician should initiate, observe, and conclude this process.

Tracking information in the software should be used so it can be determined which gas standard was used for specific device calibration for later reference. Typically, the lot number should be utilized for proper traceability.

When removing and installing regulators, gas manufacturers typically recommend a single purge before the first use to remove any moisture from the system.

Technicians should be educated to follow protocols for replacing and disposing of gas cylinders when they reach the lower limit of pressure based on the gas manufacturer's recommendations. If the gas standard manufacturer does not have a requirement, AIIPA recommends replacing the gas cylinder when it reaches 50 psi.

**Breath Alcohol Simulators**

Breath alcohol simulators are the delivery method for a water ethanol solution. Results are temperature dependent. A properly operating simulator functions at 34.0° C, ± .2° C. As noted in the AIIPA Service Center Certification and Inspection Best Practice document, the simulator and its thermometer, if applicable, should be checked per simulator manufacturer guidelines with a NIST traceable thermometer annually.

Program administrators should consult their local evidential breath test program, other AIIPA members and simulator manufacturers to determine what an acceptable temperature tolerance between the reference thermometer and the simulator thermometer reading. For example, whether it is jurisdictionally acceptable for a reference thermometer to read 34.2°C while the simulator thermometer reads 34.0°C. When the water ethanol solution's temperature in an operating simulator is found to be outside of its selected and specified range, manufacturers should have a plan and process in place to address the issue. Following the simulator manufacturer guidelines for maintenance and repair of the simulator or any components should be part of this plan. The simulator should be turned on for at least 45 minutes prior to use.

It is helpful to document and retain the readings of the simulator thermometer and the reference thermometer during the temperature verification procedure. Reference thermometers used to

verify simulators and their thermometers should be returned to their manufacturer for regular maintenance, inspection and obtain an updated calibration certificate.

BAIID technicians should be trained to spot problems with the simulator and know how to inspect it for serviceability. They need to know what an acceptable solution temperature is and be able to provide an environment for the simulator to function properly.

Degradation of solution concentration through evaporation is inherent, especially in the use of a single simulator system. Manufacturers are urged to provide a method for their technicians to track the number of tests pushed through the solution or days the solution has been in use. Jurisdictions should consult with their evidential breath test experts to determine the exact number of tests or days a solution should be changed. When not in use, the simulator tubing should be connected to form a closed loop system to guard against evaporation.

Alcohol reference solution bottles should have certificate of analysis (COA) sheets, but more commonly, have sufficient information printed, including but not limited to the reference value, expiration date and lot number, onto a label and affixed to each bottle. An empty bottle or certificate of analysis should be reserved while that specific solution is being used in the simulator. Tracking information in the calibration software should be used so it is known when a certain lot and bottle was used for a specific BAIID's calibration.

Length for the outbound, or connected to handset, tubing is crucial for accurate results. Shorter tubing alleviates condensation and the need for purging prior to sampling. Simulator manufacturer recommendations should be followed closely for length and type of tubing to be used.

The simulator needs to remain powered while being used for calibration or accuracy checks. This means mobile service applications may be limited. Practices such as cooling or heating it inside a service center and then taking it outside without power to perform calibrations is not only against simulator manufacturer protocols but also should not be tolerated by program officials.

Pressure delivery systems for pushing air through the solution can be provided by a human or a compressor. BAIID manufacturers should be allowed to utilize a method where they can successfully glean repeatable results while adhering to simulator manufacturer protocols. Simulator manufacturers have guidelines for flow rates to be used when an external pump or compressor is being used. If a human breath is used for pushing air through the solution, technicians should be educated to have their lungs and mouth clear of food, drink, or any substance which could contaminate the end sample.

In some cases, breath alcohol simulators may be used in series. This is the practice of having two or more simulators connected for calibration workflow. Using simulators connected in series delay ethanol depletion in the solution. It also helps the last simulator in line maintain a constant temperature. The air pressure needed is higher than what is needed for a single simulator and compressed air is most often used. Output tubing should still be as short as possible and temperature tolerances should be all the same as a solitary simulator. Jurisdictions are urged to consult evidential breath testing programs when creating rules and inspection procedures for daisy chained simulators.

## Section 3 – Calibration Interval

Calibration interval is defined as the time period between calibrations during which the BAIID fulfills the stability requirements for the measurement of the breath alcohol concentration. Service interval is defined as the time period established by the state or jurisdiction that a BAIID may be used without maintenance or data download. If the device is not serviced within the period, warnings are provided, and the BAIID will prevent further operation. Care should be taken when drafting legislation and rules to ensure there is no confusion between the two.

BAIID fuel cells can be very stable. AIIPA agrees with calibration intervals of 30 to 67 days. Program administrators should consider the ramifications, if any, when a BAIID does not meet the as found tolerance after calibration intervals greater than 60 days. Negating long periods of results would be detrimental to the BAIID's purpose. For example, a state which relies heavily on a BAIID for 24/7 monitoring may be faced with discounting results from the previous 60 days in a probation hearing. Additionally, technicians need to have adequate opportunities to recognize possible problems with mouth pieces, screen or light legibility, and wiring. More frequent visits also give participants more opportunities to ask questions and receive additional training.

There are programs who implement longer calibration intervals. AIIPA suggests consulting other programs when making the decision to implement service intervals between calibration intervals or longer than recommended calibration intervals.

## Section 4 - Calibration Set Point

A calibration set point is the reference value used to calibrate the BAIID. Alcohol set point, which is used in the federal registry and other AIIPA documents, is the breath alcohol concentration at which a BAIID is set to prevent a vehicle from starting.

It is important to consider the mathematics behind determining what a calibration set point and its related tolerance should be. At lower reference value levels, the tolerance becomes extremely small when using a percentage-based tolerance. It is desirable to have an absolute number and percentage with the tolerance being whichever is greater.

Some jurisdictions provide a range of gas standard values and allow the manufacturer to decide which to use based on the intricacies of their own BAIID. AIIPA supports this flexibility and further recommends the desirable gas standard value range of .020 g/210L to .050 g/210L, inclusive. Further, the reference standard value used to calibrate the BAIID will be known as the calibration set point. Based on the calibration set point, an acceptable inclusive tolerance would be ± 10% or .005 g/210L, whichever is greater for successful calibration. It should be noted this inclusive tolerance only applies to the reference standard value range of .020 g/210L to .050 g/210L.

- *Examples:*
  - *For a calibration set point of .030 g/210L, the acceptable tolerance is .025 to .035, inclusive (g/210L).*
  - *For a calibration set point of .050 g/210L, the acceptable tolerance is .045 to .055, inclusive (g/210L).*

Calibrating at one value and performing accuracy checks at another at the service center level is problematic and costly. Human error could be compounded. The cost of development of a dual reference value system and the doubling of supplies needed would place undue strain on keeping program pricing affordable. Further, if a proper calibration procedure is mandated, then it would be unnecessary to have two different reference values.

Manufacturers are likely to perform linearity checks at different levels on their BAIIDs prior to initial deployment. State program administrators should inquire about this sort of testing to be better informed and gain confidence in the production quality of a BAIID being considered for certification in their jurisdiction.

## Section 5 – As Found Procedure

An as found procedure is a check of the BAIID against a known reference standard upon arriving at the service center or calibration area directly after usage. Performed correctly, it is instrumental in determining any drift from the reference value which has occurred since the last accuracy check or calibration procedure.

Implementing an as found procedure is the first stop for jurisdictions on the path to standardizing calibration protocols. AIIPA recommends jurisdictions implement this as a first step in the calibration protocol. If the reading is within tolerance, it will allow the next step to be an accuracy check rather than an adjustment. An acceptable tolerance is ± 10% or .005 g/210L, whichever is greater. Please see Table A – BAIID Calibration Workflow Diagram or Appendix A for more information.

Before preparing rule or legislative changes, program administrators should discuss what plans and methods are in place to discern and repair troubled BAIIDs with the manufacturer. This discussion should be part of the BAIID application process with the realization some of this information is proprietary and should not be presented in a way which would be subject to public disclosure. It is strongly recommended manufacturers have a specified process in place to aid in the sorting of field ready BAIIDs compared to those in need of repair.

As found results and the process should be used by manufacturers to determine issues with individual BAIIDs. In fact, using a proprietary process to check fuel cell integrity is an important distinction between a manufacturer with appropriate resources to offer reliable devices and a company who is merely supplying a product. Further, the requirement of a process is crucial for program administrators and participants to have confidence in the BAIID and its readings.

The weakness of the as found procedure is in the person performing it. If variables such as a breath alcohol simulator not at a proper temperature are not considered, then BAIIDs may be culled in error or allowed to be placed back in service when the accuracy has not been validated.

Jurisdictions should formulate a matrix for mitigation when BAIIDs fail as found tests. This includes the actions to be taken based on the number of times it failed in a certain time period. Another consideration is the difference between the as found reference value and the BAIID's result. AIIPA is hesitant to recommend specific numbers for this matrix. Program administrators are urged to discuss this topic with all stakeholders before any rule or statute development. Research into device logs and participant complaints may indicate a need for this ruling or it may reveal the manufacturer's process for fuel cell issues is sufficiently and correctly culling BAIIDs.

## Section 6 - Calibration Workflow

The workflow for the BAIID moving through the calibration process is shown in Table A – BAIID Calibration Workflow. It should be noted as found, adjustment and accuracy samples should be registered in proximity of each other. For example, the time between any two tests

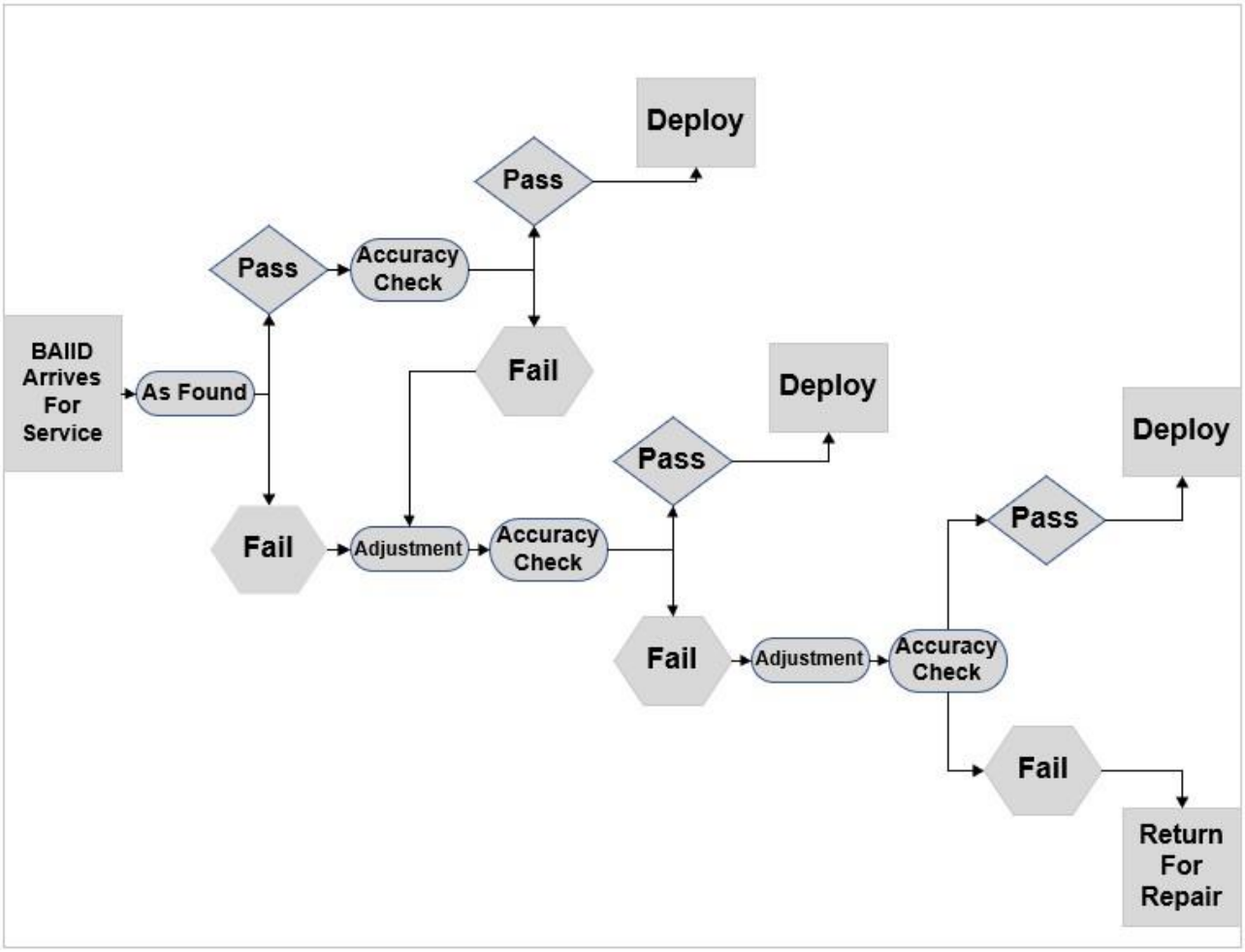
should not be longer than five minutes. This is opposed to an adjustment reading passing and waiting several hours before performing the accuracy check. The period should be reflective of jurisdiction rules regarding the normal cycling time for a user to retest after a failed test. The BAIID needs to perform accurately and in quick succession.

To be extremely precise, the term adjustment is used in this section and Table A – BAIID Calibration Workflow. Adjustment means the fine-tuning to get within the acceptable tolerance of ± 10% or .005 g/210L, whichever is greater, of the calibration set point. An accuracy check denotes when the BAIID result as compared to the calibration set point. The accuracy check should conform to the acceptable tolerance of ± 10% or .005, whichever is greater.

Below is assuming proper reference standard materials with accompanying protocols are being used by trained staff on appropriate equipment. If the BAIID passes the as found procedure, it moves on to an accuracy check without an adjustment. If it passes the accuracy check, then it is ready for deployment without any adjustment needed. If the device were to fail the accuracy check, the BAIID would move to an adjustment and ensuing accuracy check. If it passes, then it is deployed. If it fails, the BAIID goes through a second adjustment and ensuing accuracy check. If it passes, it is deployed. If it fails, then it needs to return to the manufacturer for repair.

Another possibility is when the as found reading does not pass. The BAIID moves onto an adjustment and ensuing accuracy check. If it passes the accuracy check, then it is ready to deploy. If it fails, then it goes to a second adjustment and accuracy check. If it passes at this point, then it is ready to deploy. If it fails, the BAIID needs to be returned to the manufacturer for repair. This means the BAIID is subjected to an adjustment twice. If the ensuing accuracy check does not pass after the second adjustment, then the device needs repair. In other words, the maximum times the BAIID is sampled is five.

**Table A – BAIID Calibration Workflow**




## Section 7 - BAIID Repair And Maintenance

Manufacturers should have a systematic plan for BAIIDs needing repair. This plan separates responsible manufacturers from other entities simply supplying a product. A discussion between program administrators and manufacturer representatives regarding repair and maintenance will highlight potential problems or increase confidence in the manufacturer's device.

Generally, technicians are usually responsible for light cleaning and mouthpiece removal. A defect concerning anything inside any of the components should be returned to a manufacturer location where there are specifically trained staff to handle the refurbishment and repair.

There is also a consideration of liability insurance and how it pertains to duties of anyone in the BAIID supply chain from service center technician to manufacturer employee. The responsibility to interpret liability is placed on the manufacturer.

## Section 8 - Service Center Inspection of Calibration Items

For a more in-depth discussion of this topic, please see Chapter 3 Service Center Certification and Inspection Best Practices. There are a few points worth mentioning here.

For verifying the reference value, a preliminary breath testing (PBT) device can be used. The program personnel should ensure the PBT has been certified and calibrated according to jurisdictional requirements, the operator has been trained in its usage and the device is being used under manufacturer guidelines. This would include the usage of an elevation chart and the PBT being on the Conforming Products List in the Federal Registry. The application of the same standard for the BAIID reference value tolerance should be in place for the acceptable tolerance when testing the gas standard or water ethanol solution using a PBT or similar device (for example, ± 10% or .005 g/210L, whichever is greater). Keep in mind the PBT has its own set of tolerances. Readings gleaned during inspection should be carefully reviewed before action is taken.

Gas standards are highly stable and usually a visual inspection of tubing, connections and the certificate of analysis is sufficient for inspection purposes.

To verify the breath alcohol simulator's operating temperature is being read correctly, the simulator thermometer needs to be checked for accuracy. This requires the use of a reference thermometer. While these can be quite expensive, there are some which have acceptable NIST traceability priced at under $200. When a simulator thermometer reading is found to be outside of the tolerance of what the simulator manufacturer guidelines permit, program administrators should have a recommended course of action.

To ensure elevation corrections are being made correctly for the exact location of the service center using compressed gas standards, program administrators should choose an acceptable method for accomplishing this task. Choices vary from smart phone applications, mapping software, USB pressure sensor, to NIST traceable barometers. In most cases, once the elevation is determined it can be stored for later comparison against calibration software to verify the setting has not changed. If the manufacturer uses equipment to determine barometric pressure at the time of each service, then it is recommended program personnel verify the reading using their own equipment at each inspection.

## Section 9 - Centralized Versus Decentralized Calibration Discussion

### Centralized Calibration

Calibrating at one centralized location and shipping BAIIDs to service centers for installation has a great advantage when calibrations are being performed by a few highly trained individuals under a very controlled environment. Below is a list of considerations for central location calibrations.

- If the calibration procedure has an error, then the error is compounded due to the number of BAIIDs handled.
- Supplying BAIIDs to the field in a timely manner can be challenging, especially in rural delivery areas.
- For court proceedings, relying on someone to testify who resides several states away can be problematic. It is also difficult to oversee a calibration process which does not occur within the program's jurisdiction.
- BAIIDs should never be sent directly to participants with the expectation they perform the installation of components or swapping of handsets.
- Timelines should be monitored for the correct installation dates. For example, if a BAIID is calibrated on Monday, shipped for two days and then installed on Thursday, the installation date would be Thursday and the one to use for monitoring purposes.
- When possible, centralized calibration should occur within the program's jurisdiction.
- Centralized calibration may be especially helpful in sparsely populated states.
- Centralized calibration may mean the jurisdiction does not have any manufacturer employee within their border.

### Decentralized Calibration

Calibrating at each service center is the current trend in the industry. Shipping expenses are lessened, calibration equipment has become more user friendly and program oversight is readily performed. In decentralized calibration, the manufacturer usually has a headquarters in or near the jurisdiction. Below are some considerations surrounding decentralized calibrations:

- Human error can be great due to more people needing proper training.

- Calibration happens outside of a jurisdiction's physical authority.
- This strategy can mean more service centers which will need to be inspected and certified to service BAIIDs.

AIIPA recommends seeking knowledge from other programs. Program administrators should make decisions based on their jurisdiction's own unique population and geography. Properly managed, either system will yield adequate results.

## Section 10 - Mobile Service

Mobile service is distinguished from remote service. The latter would be when employees travel to a service center in a remote area on a periodic basis and rent space to perform ignition interlock related work. Mobile service is when the location is largely unknown and can occur anywhere.

Mobile service is an evolving strategy to service participants. With the expansion of internet service areas, unique and small power sources and laptops, many manufacturers have been successful in providing mobile service. Mobile service should adhere to the same standards as fixed service centers. This is especially true in rural areas or during natural disasters. AIIPA's Service Center Certification and Inspection Best Practice document addresses mobile service.

Any service should be done in a public place, when possible. This is for both the participant's and the technician's safety. The other side of this issue is that businesses may take exception to the utilization of their parking lots and property by another business without compensation or proper insurance. A rule against service being performed at a private residence can be problematic if the vehicle is in permanent lockout condition and at the participant's residence.

AIIPA recommends initial installations be performed in a fixed site service center. This allows for proper participant education through videos, demonstration units and adequate practice before leaving the service center. After this initial visit, mobile service would suffice; especially if the participant is not experiencing difficulties and there is proper program oversight.

Mobile service providers should be sponsored by or associated with a fixed site service center. A fixed site assures participants the business meets zoning requirements, likely meets insurance requirements, and will be more likely remain open for business. Sponsoring also means there is usually more than one technician in order to assist a customer. Oversight of the mobile provider is eased due to having a determined location for inspection.

Using breath alcohol simulators during mobile service is recognized as being extremely difficult. This is due to not being able to control environmental conditions and reliably supplying a power source for the simulator.

Mobile service providers using compressed gas standards would need to determine and use the proper elevation correction factor for every service. The calibration software would need a feature to enable input for the elevation or barometric pressure for each service.

AIIPA recommends the usage of a marked or “branded” vehicle for mobile services. Again, this is for participant and technician safety.

As with the fixed site service center, any certificates of analysis for reference values being used as well as thermometer certifications need to be maintained.

# Chapter 2 - Bench and Field Testing Best Practices

Prior to and during a Breath Alcohol Ignition Interlock Device (BAIID) being certified by a program, devices should be tested through bench testing and field testing. Bench testing is defined as a test of a BAIID to determine its compliance and outputs with acceptance criteria in a laboratory setting. Field testing is defined as a test of the BAIID installed in a vehicle and conducted under actual usage conditions to determine the compliance of the device and its outputs with acceptance criteria. This can also be referred to as compliance testing.

While mandating compliance with current NHTSA model specifications is critical, bench and field testing establish the BAIID's configuration matches local jurisdiction's rules and requirements. Real world testing should be completed in order to verify many items including the BAIID's settings for alcohol set points, random retest timelines, camera quality, GPS accuracy, timing of photos and GPS point reporting, event log completeness, lockout times and even override protocols. Jurisdictional rules should allow for BAIID testing.

Program administrators are encouraged to discuss techniques for testing BAIIDs with AIIPA board members, BAIID manufacturers and amongst themselves. Caution should be taken to avoid using test results from another program in administrative action. The rules of each jurisdiction are so intricate and different, that using results outside of a program's jurisdiction is extremely problematic.

## Section 1 - NHTSA BAIID Model Specification Testing

NHTSA BAIID Model Specification testing should only be conducted by accredited laboratories to complete such testing. These laboratories have highly specialized equipment and employee training to conduct these tests. This would include being accredited for ISO/IEC 17025 testing. Further, manufacturers may have to allow the laboratory to change or override certain features in order to conduct the testing. Due to the proprietary business nature of BAIID programming and considering public disclosure rules, it is undesirable to have public agencies handle this information.

AIIPA recommends NHTSA BAIID Model Specification testing be just one piece of a program's certification of a BAIID. Program administrators should request a notarized letter from a laboratory official with sufficient knowledge of the compliance report as part of a BAIID certification application. Keep in mind the person who conducted the testing may not be a lab employee any longer, so any statute should be written in a generic manner in this regard.

## Section 2 - Cooperation Between Program Administrators and Manufacturers

The cooperation between the manufacturer and program administrators is key. Not only will manufacturers have to provide enough BAIIDs and components, but also technicians to perform BAIID installation, removal, download, personnel to answer programming questions and event log access. In some cases, manufacturers are willing to provide cars for field testing. Check with administrative needs for employee insurance driving non-program owned vehicles. Given these factors, testing should be scheduled with at least 30 days' notice. More notice is preferable; especially when manufacturers are sending out-of-state representatives.

It is helpful to share any testing checklist with manufacturers. This checklist shows how the program interprets BAIID requirements, which removes manufacturer interpretations of statute from the equation. BAIIDs are highly programmable and giving the manufacturers a clear outline of the specific jurisdictional rules translates into shorter and less testing sessions. Program managers should strive to enable manufacturers to get the configuration correct in the first testing session. Further, test results should be shared with the manufacturer following applicable public disclosure rules.

Be sure manufacturers know what equipment is being used. This will prevent BAIIDs being damaged from things such as highly pressurized air compressors or fuel cells from being overly saturated and needing lengthy recovery times.

Many manufacturers use pre-inspection checklists to conduct field tests. Manufacturers should be allowed to discuss or refuse installation if the supplied vehicle does not meet requirements

for installation. If this process results in a refusal to install, then details should be documented so both sides can work to remedy the issue.

## Section 3 - Education of Testing Personnel

With both bench and field testing, program personnel should be as experienced as possible in BAIID functionality, fuel cell operation and breath testing in general. Manufacturer's representatives should be great resources in explaining how their device functions, the installation protocols and how the BAIID interacts with the vehicle.

Attending AIIPA's Training Institute, Advanced Training Institute and annual conferences is a great way to become educated. In depth breath testing training could be received from the jurisdiction's evidential breath testing program or courses such as Indiana University's *Borkenstein Course on Alcohol and Traffic Safety*. Being certified to operate a preliminary breath test instrument will ensure accurate testing results. Training and certification can typically be obtained by contacting the state law enforcement agency or training academy.

Testers should have a basic understanding of how electricity moves through vehicle systems. It is helpful to know how the BAIID being tested detects motor runs. Manufacturer representatives should be able to answer questions related to device operation.

Program administrators may find themselves turning to people outside of the BAIID program to complete the testing. This can be problematic if the people do not understand BAIIDs and their legislative requirements. It is imperative to provide appropriate familiarization with BAIIDs and take any lack of education into consideration with test findings produced from such arrangements.

## Section 4 - Bench Testing

Bench testing is completed in a laboratory or office setting and should begin with a BAIID's initial application for certification as well as the renewal of certification. This testing should be one of the first steps for programs as it familiarizes administrators with basic BAIID functions and component quality. Just as with field testing, there should be a specific checklist to follow with acceptance criteria. Resources for both the program and manufacturers can be saved by conducting this testing first to verify component quality meets jurisdictional requirements.

It can be difficult to replicate input voltage from a vehicle in a laboratory or office setting. AIIPA suggests working with the manufacturer to determine if the program's solution to replicating input voltage is acceptable for their specific device. Manufacturers should be able

to temporarily loan a power source for program testing. BAIIDs are sensitive to power fluctuations and using hardware which does not supply what is needed may prematurely place the BAIID into a lockout condition or not function as it would in real world conditions. Bench testing is also the optimum setting when adding features as this may require other features or settings to be disabled.

It can be easier to produce specific alcohol results in a laboratory or office atmosphere due to having more space, and available electricity, for breath alcohol simulators and gas standards.

Bench testing can also be useful when testing lockout periods, but not having long term access to a vehicle. For example, refusing a random retest sample and then waiting five days to see if the BAIID locks out appropriately.

Bench testing should not strive to duplicate NHTSA BAIID Model Specification testing. This testing should only be completed by qualified laboratories with the necessary equipment.

**Suggested Bench Tests**

- Evaluating photo quality after ensuring the camera is placed in a logical manner given where the manufacturer usually places it inside the vehicle
    - Note: Administrators should consider the differences between interior artificial lighting and outdoor conditions
- Viewing event log events to ensure they capture mandated events
- Location accuracy to within acceptable tolerance of the jurisdiction's rules
    - Note: Location captures may be understandably hampered by being indoors
- Verifying the breath sampling procedure is not overly difficult for the general public to understand and submit
- Ease of interacting with the handset with appropriate display brightness
- Compliance with any ADA requirements such as a blinking display for those hard of hearing
- Sturdiness of design such as how components are attached to the vehicle
- Limit back-to-back positive alcohol samples to avoid unnecessary saturation of fuel cells
- Positive alcohol tests should surround the alcohol set point and other critical levels which could result in probation violations, further licensing restrictions or extensions

## Section 5 - Field Testing

Field testing is conducted using a vehicle with all BAIID components installed as they would be for any BAIID participant. AIIPA recommends this testing be performed prior to BAIID certification and at least annually. Program managers should develop rules for additional testing when there are certain new software or hardware changes, participant complaints or when program officials detect possible systemic issues. Not all firmware, software or hardware changes will require testing, so developing flexible rules on this is desirable.

Field testing could last a few hours or be performed over multiple days. In either case, a specific checklist should be used to test all requirements.

The point of this type of testing is to verify the BAIID's configuration in real life scenarios. While it is extremely important to thoroughly test the BAIID, the purpose should not be to fail the BAIID. It is beneficial for all program administrators to gain the experience of hands-on usage. This is critical in countless ways when speaking with participants, courts, probation managers and other stakeholders. For example, being able to describe to a judge why a BAIID would, or would not do, certain things based the witness's own real-world experience with the device is great evidence.

Testing of anti-circumvention protocols is another objective of field testing. AIIPA stresses such testing should be realistic and the results repeatable. Given enough time and creativity, any BAIID can be circumvented. This does not mean it should not be certified. Another element to be considered is whether the person can circumvent the BAIID by themselves or if the circumvention technique requires another person's assistance. This is outside the obvious second person providing a passing sample. Having two or more people involved in the circumvention process increases the unlikeliness of the circumvention to occur on a widespread basis. Event logs should be scrutinized to determine how the circumvention was recorded or flagged.

Program administrators should discuss protocols or special equipment manufacturers use to accommodate drivers with disabilities, such as blinking lights for hearing impaired people. Administrators should then make the decision on whether to have these accommodations be tested.

### Field Testing Logistics

Besides the obvious need for a vehicle, the type of car selected is notable. Manufacturers need to know the make and model well prior to testing so they can bring the appropriate gear. If the program has the luxury of using the same car over several tests, consideration should be given to using quick connect style wire connections. Such connectors do not interfere with the

operation of the BAIID but save wear and tear on the vehicle wiring. It is imperative the car has no electrical or mechanical defects. Encourage the manufacturer to perform a vehicle inspection prior to installation. It should also have adequate room for all intended passengers and gear.

Using a parking lot where horn honking will not cause undue stress to others should be planned. Several minutes of testing will be conducted while stationary. Recommended sight selection would include amendable shade and low vehicular use. The BAIID should be installed just as it would in the field, including any jurisdictional requirements for horn or light activation upon certain events.

A field testing kit should include a laptop, cups, a certified preliminary breath test unit, a long piece of tubing, extra mouthpieces, a portable air compressor, mouth contaminants, tools to disconnect the vehicle's battery, and electrical tape. Faraday bags should be considered for jurisdictions requiring location recording, to include real-time reporting and emergency notification to law enforcement. Devices to measure decibel and lighting levels are beneficial for a myriad of reasons from testing the visual and audible test requests to determining if add on sirens meet jurisdiction requirements.

Before embarking on a drive, the user should be comfortable operating the vehicle as well as providing a breath sample and otherwise interacting with the BAIID. This will aid in not having unplanned lockouts. Having a cell phone and remaining in a cell phone area as much as possible, is also desirable in case there are unplanned issues early in the testing. Depending on the program jurisdiction's cellular network, testing the re-engagement of the BAIID after losing cell site location information connectivity may be useful. Passengers are especially useful once the vehicle begins moving to record results and prepare equipment.

**Suggested Field Testing**

- Timeline of testing requirements
- Anti-circumvention protocols
- BAIID enhancement acceptability for quality and accuracy
- BAIID enhancement being captured at appropriate times
- Plausible circumvention techniques based on what has been discovered in the jurisdiction
- Participant complaints specific to the BAIID being tested
- Effects of select mouth contaminates seen in the jurisdiction with care not to have debris from contaminates enter the BAIID

**Discouraged Bench or Field Testing**

- Any test using acetone or other volatile substances
- Multiple runs in a short time with high alcohol samples; especially those provided through mouth contaminates such as mouth wash
- Any test using cigarette or vaping smoke
- Vibration testing
- Extreme temperature and humidity testing beyond what is naturally occurring during the testing
- Electromagnetic interference testing
- Any test supplying an unexpected source of voltage beyond what is normally experienced in a vehicle system
- Not the time to see how many times the BAIID will fail due to mouth contaminates
- Submitting samples with foreign substances still present in the mouth which could become lodged inside the BAIID

## Section 6 - Testing Failures

Program managers need to define failure for both types of testing. Given all the variables, this can be daunting.

AIIPA recommends the following guidelines:

- Make sure the results are repeatable. This is a basic scientific principle and a great reason to have a second person recording the exact sequence of events leading to any issues.
- Work with manufacturers before making the decision to fail a BAIID. Most programming issues can be addressed easily and expediently.
- Avoid writing what constitutes a failure into statute. Due to changing technology and the slow pace of most legislative processes, drawing hard lines in law may become future unworkable situations.
- Supply manufacturers with a list of what will be considered a failure. This is largely accomplished through the checklists program administrators will be using during testing.
- If a jurisdiction does not mandate an enhancement, such as a camera or GPS, but it is included in the BAIID being tested, then only test for how that enhancement could be detrimental to function within the parameters of jurisdictional rules.
- The same standards must be applied to all BAIIDs being tested.

- Be sensitive to the effects of introducing multiple alcohol failures on a fuel cell. BAIIDs will have a system in place to reduce the amount of test requests while the fuel cell recovers from high BrAC findings.
- Have a process in place if a BAIID experiences a fatal, unrecoverable error.

## Section 7 - Number of BAIIDs to Test

AIIPA recommends requesting the manufacturer have two BAIIDs on hand when conducting tests. This alleviates wasted time in case one BAIID experiences an unrecoverable malfunction. If the first device experiences an unrecoverable failure, a second device can easily be swapped into the vehicle so the testing can continue. For BAIIDs already certified, administrators should request BAIIDs which are "off the shelf" of a service center. This mitigates the use of a "gold standard" BAIID and more closely mirrors what participants are using.

BAIID testing; especially field testing is a time intensive process, and it can be difficult for jurisdictions to complete tests on one BAIID, let alone a second one to confirm the findings of the first. This is a limitation which needs to be considered when certifying BAIIDs. This limitation is mitigated by requiring NHTSA BAIID Model Specification testing, performing both bench and field testing and a robust application.

## Section 8 – Anti-Circumvention and Anti-Tamper Protocols

It is best to allow the industry to discover innovations in anti-circumvention and anti-tamper protocols. Statutes requiring BAIIDs with these protocols should be written broadly to establish the end goal of detecting and limiting these occurrences rather than requiring specific protocols to be implemented.

Such protocols should be tested as thoroughly as possible by program personnel before certification or implementation. Discussions with the manufacturer will be key to developing appropriate testing procedures.

It is difficult to identify systemic issues with anti-circumvention and anti-tamper protocols, let alone establish an acceptable failure rate. This is one of the benefits of conducting field testing of a field ready BAIID. Field testing, examining event logs, and speaking with participants will also allow program administrators to identify issues.

Program personnel may need additional training or find trusted consultants, such as AIIPA, to adequately understand complex BAIID and vehicle technologies.

# Chapter 3 - Service Center Certification and Inspection Best Practices

Breath Alcohol Ignition Interlock Device (BAIID) service centers are a key component to ensure the highest quality of product, installation and education are provided to participants. Jurisdictions should use this document to assist in the development of inspection practices within individual jurisdictional rules and regulations. Current inspection forms from AIIPA members can be sought through board members. Applicable inspection equipment should be from the NHTSA Conforming Products List.

Please see Chapter 1 – Breath Alcohol Ignition Interlock Device Calibration Best Practices in addition to this chapter for more in-depth information on BAIID calibration workflow.

Program administrators should avoid creating circumstances where service center inspections are mandatory by statute or rule, but there is insufficient staff to perform inspections in a timely manner. If an inspection cannot be performed in a timely manner, there should be a process in place where a service center can operate in a provisional status until inspected and fully certified. Manufacturers are encouraged to work with administrators to provide as much notice as possible for bringing new service centers online. Staggering openings will ease inspection efforts.

AIIPA recommends inspecting service centers prior to their certification and once annually accompanied by unscheduled drop in visits. Administrators should prioritize inspecting new service centers over annual inspections.

BAIID manufacturers must agree to allow access to a jurisdictional representative to conduct inspections at any time during operational hours to ensure compliance. If the owner is other than a BAIID manufacturer, the service center owner should be made aware of this requirement.

## Section 1 – Service Center Certification

Prior to any service center inspection, it is recommended the overseeing authority collect a service center application from the BAIID manufacturer. This form should be a guideline of standards for manufacturers. Checklists to ensure appropriate jurisdictional requirements for insurance, installation privacy, participant educational areas, and other aspects are helpful. Other information requested should be as follows:

- BAIID brand and model which will be serviced at location
- Business name, physical address, email address and phone number
- Hours of BAIID service operation
- Name of individual submitting application
- Name and contact information of individual who will be the main contact at the business

In addition to the application, the documents below should accompany the application:

- Copy of business license or other document which provides proof of proper zoning for the type of business
- Written statement from manufacturer representative authorizing the service center to conduct BAIID services on their behalf
- Copy of all fees or rates which may be charged to customers including those directly from the manufacturer or from the service center
- Anticipated calibration workflow processes
- Type of calibration equipment to be used and associated manuals

The manufacturer should have their own insurance covering their business operation and product liability within the jurisdiction. Proof of insurance should be provided for each service center with the application, as well as on an ongoing basis. Insurance requirements should be listed within rule or statute. Consult the jurisdiction's legal team when putting insurance requirements in place. AIIPA recommends the below coverages as a starting point:

- Garage Keepers insurance with minimum liability limits of $50,000
- Operations Insurance coverage with a minimum of $1,000,000 per occurrence

Once all documents have been received by the overseeing authority, they should be thoroughly reviewed and approved. If the documents are incomplete, ensure the corrections are submitted for approval prior to scheduling of the on-site inspection. Whenever possible, the certification of a service center should include both an application process and a physical inspection of the business.

Technician applications for the service center can be processed alongside service center applications, but this should not necessarily be a requirement. Manufacturers are encouraged to ensure service center employees meet eligibility requirements prior to submitting a service center application. If there is an anticipated delay for service center certification, then manufacturers may not wish to begin a technician's certification period; especially if there are application and

criminal history fees involved. It is highly recommended employees who are seeking certification be trained prior to a service center inspection, regardless of certification status. Please see AIIPA Best Practices for Technician Certification for more in depth information.

Sometimes manufacturers may not be certain a service center will meet jurisdictional requirements. In these cases, it is helpful for administrators to work with them prior to the service center application being submitted. This is especially the case in areas where it is difficult to find business owners willing to conduct BAIID work.

BAIID services should be at the will of the business. If a vehicle is too dirty or debris filled, too technologically advanced or if the participant becomes dangerous to deal with, then technicians should be able to turn them away. This allowance should be tempered with oversight in order to stem any malicious discrimination against any participant.

## Section 2 – Prior to Inspection

It is recommended the inspecting authority provide a list of expectations to the manufacturer's representative. In turn, the manufacturer can provide this list to the service center personnel along with their manufacturer specific items. Providing this information in advance prevents wasted time and lowers anxiety for service center employees.

The information provided may include any of the following examples:

- Copy of administrative rules
- Types of questions which may be asked of the technicians or employees of the service center
- Documents which will be inspected at the facility
- Solution or dry gas certificates of analysis
- Simulator thermometer records
- Calibration directions/procedures
- Equipment which will be inspected at the facility
- Breath alcohol simulators
- Tamper proof seals
- BAIID equipment and replacement parts
- Calibration harnesses or docking stations
- Training devices and area used for participant education
- Length of time needed for the inspection
- Areas of the building which inspectors will need to access

No installation or services of BAIIDs should be performed until after the full inspection is completed and the service center has been certified. As stated previously, if there is a delay due to program insufficiencies, there should be a designated path for the service center to begin BAIID business on a provisional basis.

## Section 3 – Recommended Inspection Equipment

Some equipment will be necessary to properly complete the service center inspection process.

A device capable of photography is helpful. It is recommended a photograph of the exterior of the building as well as the installation facilities be kept on file. Upon future inspections, the jurisdictional authority should have the expectation that the facility be the same as when initially approved. Reference photographs will help ensure these conditions and establish consistency. Photographs will also document possible non-compliance issues.

The inspector should have a reliable means of checking the reference standard materials. A preliminary breath test (PBT) can be such a device. Both breath alcohol simulator solution and ethanol dry gas standards should be accompanied by a certificate of analysis (COA). The reference value for the standard can be found on the certificate. If there is no COA present, then the label on the cylinder or bottle must have sufficient information. Checking the reference standard with a PBT will ensure the value being used for BAIID calibration workflow meets the jurisdictional requirements. Appropriate mouthpieces will be needed to connect to breath alcohol simulators and gas standard bottles. AIIPA recommends using a device from the NHTSA Conforming Products List for alcohol screening devices. The user and device should both meet jurisdictional training, certification, and calibration requirements.

A portable dry gas regulator is another helpful piece of equipment. Not only can it be used to verify the service center's regulator, but also can reveal small leaks or even stuck regulator needles. An inspector's regulator can be used to troubleshoot any difference between the readings of a manufacturer's computerized reading and the actual gas cylinder reading.

A reference thermometer is recommended for checking the solution temperature of any breath alcohol simulator solution which is used for calibration or accuracy checks on any BAIID. Breath alcohol simulator devices rely on a specific temperature to produce the proper vapor concentration to be delivered to the BAIID. A thermometer should come with a National Institute of Standards and Technology (NIST) traceable document and should be designed for testing in the field. In addition, the reference thermometer should be sent in for regular maintenance and calibration certification at least once per year or on a schedule meeting jurisdictional requirement. Users should have appropriate training to test breath alcohol simulator solutions.

When ethanol dry gas is being used for calibration or accuracy checks, a device to determine either elevation or the ambient pressure is needed. There are various methods for determining elevation, but it is key to determine the elevation at the service center's location rather than relying on the vague elevation for an entire city. Whatever is used should be consistent and reproduceable.

Just as with elevation, ambient pressure can be determined by several devices. A reference barometer can be used as well. This device should come with a NIST traceable document and be sent in for regular maintenance and calibration certification at least once a year or on a schedule meeting jurisdictional requirement. Users should have appropriate training in its use. Once the

pressure or elevation is determined, inspectors can refer to a correction factor chart for the appropriate value. See such a chart in Appendix B.

## Section 4 – Service Center Inspection Points

The goal of a service center inspection should be to educate technicians and verify their processes meet legal standards. A large part of the inspection is having a conversation with service center staff. This should not be an adversarial visit. Inspectors should strive to put service center personnel at ease and open lines of communication to meet the end goal of providing participants with a quality product and consistent service. It is also a time for program administrators to identify weaknesses in their program and build solutions together with manufacturers. Programs who currently perform service center inspections have seen a benefit of having technicians assist them in identifying participants who may need further education, general assistance, or enforcement action.

### Service Center Physical Requirements

Restrictions on service center locations due to their proximity to businesses selling alcohol, marijuana or other drugs must be carefully designed. AIIPA recognizes participants may have addiction issues. Putting participants in a position to wait in or near service center locations with such temptations can have negative social impacts. Service centers have little to no control over the sort of business which may be conducted next door or down the block. Rules restricting service centers be a certain distance from businesses offering alcohol or other drugs is very problematic; especially in rural areas where there are already slim options for service centers. There may be service centers located in convenience store and vehicle maintenance combination businesses which may sell alcohol or drugs. Certifying these locations should be done with an abundance of caution and include additional education and oversight of the technicians and participants.

The service center should have an enclosed waiting area which is separate and shielded from the installation area with the goal that an unauthorized person cannot witness the installation or service of the BAIID.

Service center coverage requirements for each manufacturer is a complex issue and unique to each jurisdiction. Program administrators are urged to use AIIPA's broad contact network when designing rules and statutes on this topic. There are several creative solutions to provide service for all participants within a reasonable driving distance.

### Participant Education Area and Materials

There should be a designated space for participant education, but this does not mean it needs to be anything fancy. Educational materials should be the most up to date available and provided free to the participant. Methods should be in place to ensure participants are interacting with education and not able to skip it.

Educating the participant through hands-on training, reading materials, and watching educational videos supplied by both the program administrators and manufacturers is an important part of a successful program. Service centers must provide participants with an adequate location to ensure training is successful. If possible, a quieter area of the business should be designated as a training area. Manufacturers should have a method for tracking a participant's receipt of training as well as which materials the participant was provided. Administrators should be able to audit this information either during the service center inspection or directly with the manufacturer outside of the inspection.

BAIID manufacturers should post a list of all fees or rates which could possibly be charged to a participant. This includes any fees directly from the manufacturer or the service center. Fees should be covered at the time of installation.

Participants should be notified of the hours the business will be conducting BAIID business and what to do if they need service outside of these hours. This should include directions of where to park vehicles with locked out or nearly locked out BAIIDs. They should also be provided with the location of a backup service center in case their current service center experiences an issue and cannot perform services.

**BAIID Work Area**

Inspectors should view the installation area and any equipment technicians use for installations. Due to the equipment needs, there should be a designated area for calibration workflow. There may also be storage areas for spare parts, gas standards and simulator solutions. While these areas do not need to be extravagant, they should be clean and organized. Some service centers can house everything necessary in a rolling cabinet while others choose to designate a counter and cabinet specially for BAIID work.

**BAIID Service Equipment**

Inspectors should be familiar with what tools each manufacturer requires their technicians to use for installation, removal, and service of BAIIDs. This allows for tailoring the inspection to ensure service centers have the required tools and supplies. It is also helpful to ask technicians if they feel the need for any tools or processes which they are not being supplied. Inspectors should find some of the following items during an inspection:

- Electrical testing equipment for batteries and vehicle electrical systems
- Wire connectors to fit different gauge wiring
- Solder and associated supplies
- Shrink wrap tubing
- Anti-circumvention labels and tamper proof seals
    - *Note: These should be required for all BAIIDs*
- Basic mechanic tools
- Access to the manufacturer's installation, removal, and service procedures
- Technical support for technicians via a direct phone number, special email, or portal

**BAIID Calibration Workflow**

For more information on calibration workflow, please see Chapter 1- Breath Alcohol Ignition Interlock Calibration Best Practices. Service center inspections should view at least one calibration workflow. Calibrating a BAIID is an essential function of a service center. Technicians should be able to demonstrate their proficiency with the calibration of a BAIID. This workflow can be viewed using a participant's actual device or a BAIID in a training environment, such as a bench test. Being able to watch the technician manipulate the manufacturer's software program will give insight into their education and experience with BAIIDs.

Breath alcohol simulator and dry gas are two types of calibration methods.

**Breath Alcohol Simulator**

Breath alcohol simulators should only be used for BAIID calibration workflow after it has reached proper operating temperature of 34°C ± .2°C. For inspection purposes, the simulator should be operating for at least 45 minutes. This will ensure the motor housing and solution temperature has stabilized. It is helpful to ensure the simulator is on upon arrival at the service center so the inspector can perform other parts of the inspection while waiting for it to warm up.

Breath alcohol simulator inspection points are as follows:

- Be on NHTSA's conforming product list
- The jar should be clean with no algae, no chips or cracks
- The jar is the one designated by the manufacturer to be paired with the specific simulator body
- Have the breath alcohol simulator's thermometer certified by a reference thermometer within the past year
- Stored at room temperature
- Seals should be in good condition
- The agitator paddle should be turning
- The heating element and thermometer probe should be clean with no algae
- Nothing should be obscuring the jar

For simulators that have external thermometers, record the temperature of the simulator's thermometer. Slide the external thermometer and replace with the NIST reference thermometer temperature probe. A small wrench may be helpful to loosen the nut which holds the simulator's thermometer. Ensure the probe is submerged fully into the alcohol solution. Crosscheck the previously recorded external thermometer with the NIST thermometer. When finished analyzing the temperature, remove the reference thermometer probe and replace the simulator's thermometer.

If the simulator does not have an external thermometer and does not have a special port for the reference thermometer, run the simulator until the temperature has stabilized. Turn the simulator

off and remove the head and insert the probe into the solution to test. This is not a preferred method. Without the heating element in the solution, the temperature will decrease so it should be conducted with utmost expedience.

The easiest breath alcohol simulator to check is one with an internal thermometer and an inspection port. The process is as straightforward as opening the inspection port, inserting the reference thermometer probe, and comparing the thermometer readings.

AIIPA recommends the any difference in thermometer readings should be no more than ±0.10˚C. If the difference is greater, the BAIID may be subjected to improper calibration or accuracy. It is recommended program administrators consult evidential programs in their jurisdiction and mirror their requirements in this regard. The breath alcohol simulator should be removed from service and repaired before used for calibration workflow.

When inspecting the service center's solutions, they should be traceable to NIST and 500 ml in volume. There should be a label on each bottle with the lot or batch number, manufactured or expiration date and reference level. While solutions are usually accompanied by a COA, the label usually contains all the pertinent information needed for calibration workflow and inspection purposes. There may be a QR code on the label directing to a COA. Solutions must be stored in a climate-controlled environment of room temperature.

When properly maintained, solutions should be changed every 30 samples or 30 days. It is acceptable for manufacturers to recommend stricter protocols for solution changes. While inspecting the solution, determine the last date and time the solution was changed and how many tests have been submitted through the solution. While this information may be part of the calibration software or a manual process completed by the technician, AIIPA recommends an automated process to track solution changes with reminders for the technician for changing. Confirm the solution bottle lot number is same as what is entered into any software program.

Make sure to educate the BAIID technician on the importance of changing the breath alcohol solution per the program's or manufacturer's guidelines, whichever is more strict.

Breath alcohol simulator tubing should be compatible with alcohol testing. Simulator manufacturers should be consulted if there is any question to ensure the tubing being used is what they recommend. It is usually polyvinyl chloride tubing, which is easily manipulated and clear. The outbound tubing between the solution and the BAIID should be as short as possible and no longer than three inches. The short tubing will prevent condensation issues. Simulator manufacturers will also have a recommendation here and it should be followed. When the simulator is not in use, the input and output hoses should be connected or sealed to limit alcohol evaporation.

Examine the input tube for evidence of condensation. If there is a large quantity of condensation, ensure the technician removes this hose and utilizes an air compressor to remove any condensation prior to calibrating BAIIDs. If human breath is used to deliver the sample from the simulator to the BAIID, extreme amounts of condensation will build in the tubing. By having the condensation removed a more accurate result will be obtained.

If the technician must physically blow into the simulator for calibration, ensure they rinse their mouth thoroughly prior to providing the air supply. There should not be chewing tobacco, smoke, foods with high yeast content or similar foreign substances introduced into the breath alcohol simulator solution. Ensure technicians and inspectors are practicing good hygiene when manually submitting breath through the alcohol breath simulator.

The BAIID manufacturer should be involved in the process of selecting a compressor for introducing samples through the breath alcohol simulator to ensure the BAIID sampling parameters are being met. Technicians should be cautious about using oil inside the compressor's lines for lubrication and discuss the impacts of this practice on BAIIDs.

Verify the solutions alcohol concentration using a PBT device connected to the simulator's outlet hose as close as possible to where a BAIID is connected for the BAIID calibration workflow. Simply connect the PBT to the output hose and initiate a sample moving through the solution. If the readings differ from the bottle's label or Certificate of Analysis standard it is necessary to change the solution and retest. If they are still different, further investigation will be needed to determine the cause. When programs are determining acceptable tolerances, they should consult with their jurisdiction's evidential program. If there is no tolerance from the evidential program, then they should consult AIIPA board members to establish the tolerance. AIIPA board members will rely on current scientific practices associated with reference standard testing.

The simulator should be pressure checked. This is done by blocking the output hose and blowing air into the input hose. There may be some slight bubbling into the jar, but then it should stop. If bubbles persist, then inspectors should investigate the seals and tubing connections for leaks.

In rare cases, breath alcohol simulators may be in series. This is the practice of having two or more simulators connected for calibration workflow. Simulators in series are used to delay ethanol depletion in the solution. It also helps the last simulator in line maintain a constant temperature. The air pressure needed is very high and compressed air is most often used. Output tubing should still be as short as possible and temperature tolerances should be all the same as a solitary simulator. Jurisdictions are urged to consult evidential breath testing programs when creating rules and inspection procedures for daisy chained simulators.

**Compressed Gas Standard**

The dry gas method of calibration introduces a pressurized dry gas standard having a known concentration of alcohol through the BAIID. When conducting calibrations with dry gas, the correct elevation or pressure correction must be used. Service center technicians should not have the ability to change this correction factor. AIIPA recommends it be in the programming for the manufacturer's BAIID calibration workflow. Inspectors should be able to verify it either on site during BAIID calibration workflow viewing or directly with the manufacturer.

Dry gas must be a NIST traceable reference standard material for ethanol standards. They usually arrive with a certificate of analysis (COA), but most standards have labels with enough

information for inspection purposes. The label should contain the manufacturer's name, a lot or batch number and manufactured or expiration date. If there is no expiration date, the standard should be used within three years of it being manufactured. There may be a quick reference (QR) code with a link to a COA.

Gas cylinders should be taken out of service when the cylinder pressure drops below 50 PSI or when the gas manufacturer recommends, whichever is stricter. They should be protected from exposure to weather during transport; especially moisture which can cause surface rust and enter the valve stem resulting in contamination of the gas mixture during engagement of the regulator. They should be stored at room temperature for 24 hours prior to use to ensure stability. Long term storage temperatures can range from 50° to 104° Fahrenheit.

If the tubing between the gas standard and the BAIID sampling connection is pressurized, there should not be a need for purging the line. Gas standard manufacturers should be consulted for their recommendations on tubing length and type. When using a non-pressurized system, the tubing must be purged. Tubing length affects purging times; the longer the tubing, the more purge time is needed. Inspectors should know which system is in place prior to the inspection and look for signs the tubing is being purged. This would include hearing the regulator opening and closing, feeling air coming from the output tubing and possibly viewing it on calibration workflow software as it shows progression of the workflow.

While inspecting the gas cylinders, ensure they are secured appropriately. Larger, standalone tanks may need to be chained to a wall. There may also be a need for exterior labeling of the business so first responders know there is compressed gas on site. Checking with OSHA and local building inspection authorities is recommended to determine requirements.

There should not be any rust on any connection points.

Verify the alcohol concentration using a PBT device connected to the gas outlet hose as close as possible to the point where a BAIID is connected for the BAIID calibration workflow. If the readings differ from the label or COA and applied correction factor, investigations should begin with testing the reference standard material at the cylinder's regulator, then ensuring the line is being adequately purged and checking the system for leaks. If sampling directly from the cylinder is not within tolerance, the standard should be placed out of service. When programs are determining acceptable tolerances, they should consult with their jurisdiction's evidential program. If there is no tolerance from the evidential program, then administrators should consult AIIPA board members to establish the tolerance. AIIPA board members will rely on current scientific practices associated with reference standard testing.

**BAIID Models, Hardware and Firmware**

Inspectors should view the model of BAIID and the version of software being used by the service center. Technicians should be able to answer questions about the manufacturer's models of BAIID; especially in locations near jurisdictional borders which may have different equipment and software version needs. Technicians may also know about firmware and software changes; especially those requiring participant education or special installations. Software versions can

sometimes be viewed during calibration workflow processes. If not, inspectors should be able to verify versions in BAIID event logs.

**BAIID Record Storage**

Service centers may create and store a variety of records regarding installation, calibration, and removal of BAIIDs as well as confidential participant information. Inspection should verify the integrity and safety of these records. Records should be maintained according to the local jurisdiction's public disclosure requirements. Rather than having individual service centers be responsible for long term records, it is desirable for manufacturers to be the entity responsible for BAIID record retention and maintenance. While AIIPA generally recommends digital records, any physical records should be transferred to either the overseeing authority or manufacturer as soon as possible to limit exposure. Another option for physical records should be digitizing and destroying originals in a jurisdictionally approved manner, such as shredding or burning. Digital records should undergo a verification process to determine satisfactory legibility.

Inspectors should be familiar with the manufacturer's desired workflow for records and alert manufacturer representatives to possible deviations.

Printing documents for file storage as a matter of routine should be discouraged. Printing a few, specific documents for inspection purposes is satisfactory, but usually not necessary as manufacturers give access to program administrators to participant data and device logs electronically.

Inspectors should view routine transaction amounts, regardless of the means of payment. This ensures participants are paying what is listed on the service center's price list.

**Technician Education Points**

Technicians are extremely important for gathering evidence of circumvention. Inspectors should discuss and educate how the jurisdiction wants them to handle instances of circumvention. This could be contacting program personnel directly with photos and videos or going through a designated manufacturer representative. It is imperative all circumventions are reported to program authorities. Manufacturers should require reporting to them, as well. Technicians should be comfortable in making a report and not fear any consequences for reporting. It should be clear to them the circumvention is a crime and they need to be good witnesses.

Technicians should also be asked about lockout code usage. This ensures they are not violating program rules while meeting appropriate participant service requirements. Technicians may have knowledge of how to perform a mechanic bypass, but that does not mean they can legally be used in the jurisdiction. This is also a good time to discuss how they handle calls from other businesses who may have a locked out BAIID in a car and want to work or move the vehicle. Program personnel should provide education on how they want those instances handled. AIIPA recommends this sort of call should be forwarded to manufacturers to remedy.

There are occurrences of participants arriving impaired by alcohol or drugs for BAIID service, including installations. Technicians should know how to handle such events; especially if the participant leaves in the vehicle. A typical response should be to call local law enforcement with a description of the car and driver and direction of travel. Program administrators and manufacturers may also wish to be notified in order to follow up with the participant later.

If alcohol or drugs are being sold in or near the service center, technicians should be given additional education about the temptations these substances may have for participants. They should know the signs and symptoms of impairment, what to do to prevent impaired participants from driving and how to report it if the participant drives away.

Questions from technicians should be encouraged. Inspectors should provide their contact information to facilitate an open approach to communication.

## Section 5 – Mobile Service Center Certification and Inspection

It may be necessary for jurisdictions with rural, less populated areas or statewide coverage requirements for BAIID manufacturers to seek mobile service center certification.

In view of the uniqueness of mobile servicing, a best practice approach should include a definitive certification process specifically for mobile service providers. Jurisdictions should first clarify their definition of mobile servicing and distinctions should be made between full service versus temporary or emergency service. Regardless of how a jurisdiction defines mobile servicing, the goal is to have BAIID manufacturers maintain the same, high-quality standards with mobile servicing as they do at a fixed service center.

As with fixed service center locations, jurisdictions should require an application and approval process for all mobile servicing. Mobile servicing should maintain all necessary equipment for professional installation and servicing of BAIIDs. Insurance needs should be addressed jurisdictionally. Technicians should not be placed in a compromised position of driving without a valid driver's license or appropriate employee or vehicle insurance.

Mobile service technicians should be affiliated with a fixed service center location and held to all regulations outlined in the jurisdiction's administration rules for certified technicians.

Mobile service providers must comply with any municipal or county zoning regulations for commercial businesses. Defining the permitted operational location of mobile servicing is critical. As a best practice, AIIPA recommends that mobile installations are limited to a facility which can provide the same quality of the installation as a fixed site service center. This may be accomplished by conducting service in a garage bay but should include safeguards found in service center locations. This includes having a participant waiting area separated and shielded from the installation area in efforts that an unauthorized person cannot witness the installation, removal or service of the BAIID. There needs to be a designated area for the BAIID participant to review documents and training materials.

Jurisdictions should require BAIID manufacturers to have predetermined days and hours of operation for mobile servicing or follow an approved scheduling guideline to ensure proper oversight.

Mobile service must adhere to the same BAIID calibration workflow processes and equipment maintenance standards or storage as fixed service center locations. This includes being able to store reference standard materials, breath alcohol simulators and other temperature sensitive items appropriately. Specifically, breath alcohol simulators must remain powered during the BAIID calibration workflow process.

Because of the fluctuating environment of mobile servicing, safety and security concerns should be addressed within the mobile servicing certification process. Both participants and technicians should feel safe and meet applicable work safety standards during the BAIID service.

Jurisdictions should require a photo identification card or sheet to be provided for each mobile servicing technician which includes the information below. Alternatively, manufacturers may send this information electronically to the participant upon appointment confirmation.

- The name of the technician
- The name of the parent fixed site service center
- All pertinent contact information for the local service center and the BAIID manufacturer

Inspecting mobile service operations can be somewhat difficult; especially if they are occurring on a limited or emergency basis. Inspectors should ask to view vehicles and equipment used, examples of photo identification cards or sheets. Conversations with the technicians surrounding their protocols should be extensive.

## Section 6 – Handling of Non-Compliant Situations

During service center inspections, it is inevitable non-compliant issues will arise. Ultimately, it is the responsibility of the manufacturer to ensure the approved service centers providing their services are doing so in compliance with the jurisdictional rules and regulations.

Some non-compliant items found can be corrected immediately and others which may require a corrective action plan. In either case, the inspection form and findings should be provided to the designated manufacturer representative. This person should have the knowledge and understanding which will allow for the proper corrective action.

Proper documentation will allow the jurisdiction to take appropriate action such as fines, suspension, corrective action, or contract termination. AIIPA recommends handling problems at the lowest level possible and with believes most problems can be resolved through proper education. Unfortunately, this is not always the case, especially with repeat non-compliance issues.

When developing administrative rules and procedures relating to non-compliance, program officials should require the manufacturer to be the responsible party to ensure rule compliance. Communication should be through a designated manufacturer representative. For non-compliance of greater significance, the jurisdictional authority should allow for suspension of operations until compliance and re-inspection is complete. Also, a requirement for the manufacturer to submit a corrective action plan identifying specific dates that the nonconformance will be addressed.

For cases where non-compliance cannot be remedied, there should be an exit plan developed by the manufacturer for complete revocation of certification for a service center. The exit plan should address how the service center's current participant base will be serviced. This could include the immediate opening of a new service center in the region or where the participants will be sent to receive service temporarily. If participants must travel long distances for service, they should be provided with a list of other approved manufacturers and their respective local service centers.

If the jurisdiction allows for monetary fines, identify how and when those fines will be levied. Consider a rule which prohibits new installations for a defined period to provide incentive for future compliance. This is the least burdensome for participants as it allows service without having to change manufacturers.

Jurisdictions should develop rules and procedures for when calibration equipment or reference standard materials are found to be out of range. This goes beyond swapping out equipment or reference standard material. Investigation into how many BAIIDs are affected and the procedure for having them returned for service should be mapped out prior to this happening. It is imperative inspectors have appropriate training to test and deduce the outcomes of issues with the calibration equipment and reference standard materials in order to prevent inappropriately placing a service center out of service or recalling BAIIDs.

# Chapter 4 - Technician Certification Best Practices

Certification of technicians should follow best practices in order to reduce state liability, improve customer service, gain participant confidence, and establish a baseline for performance. This can be instituted through a strict application process, a review of the applicant's criminal history, completion of the required educational standards, comprehensive examination procedures, and detailed certification and revocation protocols.

AIIPA defines technician certification as the detailed process in which technicians are certified, licensed, or granted permits to perform breath alcohol ignition interlock device related duties.

Please contact AIIPA board members for current examples of applications, certificates and to discuss processes.

## Section 1 – Application Content

The application process should have easy to follow instructions which outline the steps for the applicants and manufacturers or vendors to follow. Any application materials should be easy to obtain and available in common electronic formats and applicable languages to allow ease of access. A review of state laws should be conducted to ensure compliance with accessibility.

Application instructional material should clearly state timelines and deadlines for application submission. This establishes expectations for all sides. It is recommended to have the following periods be 30 calendar days:

- Length of time between applicant signing the application and submission to the program administrator
- Allotted time for the program administrator to review the application
- Advance time an application should be submitted for re-certification
- Time between criminal history check and the signature on the application
- Time between criminal history check and submission to the program administrator

When developing an application, AIIPA recommends the following items be included on the application:

- Name of applicant as it appears on government-issued identification
- Applicant's date of birth
- Applicant's current address
- Manufacturer for which the applicant will be working
- Service center where the applicant will be assigned
- States or countries the individual has resided in for the past five years
- Applicant's government-issued identification number
- Declaration section for the applicant to swear under penalty of perjury to the following items:
    - Understand and will uphold applicable jurisdictional rules
    - Received BAIID training from the manufacturer or vendor
    - Will provide testimony in court or probation proceedings
    - Cooperate with any investigations of participant actions conducted by overseeing authorities
    - Acknowledgement of violations of jurisdictional rules could lead to suspension or revocation of technician certification
    - Have not been convicted of a disqualifying crime
        - It is encouraged to list every disqualifying crime to elicit responses for each one

AIIPA recommends against requesting an applicant's social security number. In many states, this information is considered protected.

A copy of the applicant's government-issued identification should be required upon application submission. This will aid in the criminal history check process as well as identity verification. This identification should be checked against the criminal history request to ensure an exact match. If an applicant will be operating a participant's vehicle, then this piece of information can also be used to determine the status of applicant's driving privilege.

Technicians without current driving privileges should not drive a participant's vehicle. Program administrators should review current state law pertaining to the verification of driving privileges. Most states have a free service for drivers to check their own license status. AIIPA recommends utilizing this type of service rather than performing a records check typically completed by law enforcement during citizen contacts. The latter may have severe restrictions regarding when it can and cannot be performed in order to protect individual privacy rights.

There should also be a section available on the application where program administrators can record pertinent information. This should include the following:

- Date application was received to the program office
- System for identifying which documents were included with the application
    - Criminal history
    - Driver privilege status
    - Copy of government-issued identification
- Applicable dates the technician will be certified to perform BAIID related duties
- Date of denial of application, if applicable
- The applicant's unique BAIID program identification number
- Examination information
    - Date of examination
    - This should be limited to a pass or fail designation rather than a raw score

## Section 2 – Application Process

Some states have innovative online technician application submission processes. This is viewed as an automated process. Many state program application processes are not automated but utilize electronic formats for documents which are submitted through electronic mail. AIIPA urges program administrators to research acceptable signature parameters for their specific jurisdiction.

If a non-automated process is being used for applications, it is highly recommended applications are routed through central points. This eases the burden on both the administrators and manufacturers or vendors for tracking. It also reduces the points of contact and eliminates duplication of effort. In a non-automated process, applications should not be accepted directly from the applicant. Routing applications through manufacturer or vendor representatives also

ensures they endorse the applicant. This is especially true in states where application fees are collected from manufacturers or vendors. This is largely due to the amount of information which must be gathered. Only complete applications should be accepted from the manufacturer or vendor representative.

In order to ensure the applicant is the person completing the information on the application, it is encouraged to include statements where the applicant initials each in acknowledgement. The comparing of signatures can be made between the application and the government-issued identification.

In non-automated processes, it is recommended electronic signatures or initials not be accepted. In many cases, electronic signatures do not resemble the applicant's true signature. While this creates a burden on manufacturers or vendors, ensuring the applicant is the one making under penalty of perjury declarations and submitting other information is key to lessening liability. It also improves the ability to take administrative sanctions.

In automated application processes, each applicant should have their own account which is identified by their own unique username and password. Coupled with an upfront liability warning users regarding possible fraud violations if they are representing someone else will provide reasonable assurance the applicant completed the application materials.

## Section 3 – Criminal History

To provide protection for participants and lower program administrator liabilities, it is necessary to obtain current criminal histories before initial certification and annually at each renewal or recertification. It is recommended this check be performed in every state where the applicant has resided for the past five years. Jurisdictional requirements may differ, and program administrators should consider repercussions to both shorter and longer periods of time. Criminal history checks should be made within 30 days of when the application was signed by the applicant. This ensures the most up to date information and captures any recent convictions. The most comprehensive criminal history is one from a government agency. This is opposed to searches conducted by non-governmental agencies. The latter relies on an internet search of public records and often does not include a complete picture. They can also include incorrect information due to common names or dates of birth. Governmental criminal histories come directly from the source.

When considering background checks from outside the program's home state, be sure to evaluate and compare the classification of any crime listed in the history. For example, a listed crime may be a civil penalty in one state and criminalized in another.

Legal consultation should be sought by program administrators regarding requesting or reviewing criminal histories from outside the United States. Due process and crime classification vary greatly, and legal council should be able to assist program administrators in

deciding whether to request criminal histories from outside the US or substitute another method for history verification.

It should be noted it is not legal to obtain criminal histories in all states nor do all states have a centralized department for issuing these checks. In those cases, AIIPA urges program administrators to consult with regulatory officials to determine the best course of action. This may include legislating special classification of BAIID technicians in order to obtain criminal histories.

Over time, crime classifications change and some actions which were crimes are no longer considered criminal acts. Program administrators should adopt review policies with a clear process of how to respond when past crimes are decriminalized.

Administrators should research their jurisdiction's criminal code to determine how crimes are classified and which ones are criminal or civil penalties. This is important when writing rules or statutes for disqualifying crimes, as well as application materials. Also, it is helpful to know the lesser crimes in the case of plea agreements.

## Section 4 – Disqualifying Crimes

It is challenging to create a definitive list of every single crime which would make an applicant unsuitable for being a BAIID technician. Program administrators should strive to provide manufacturers with a list or guidance prior to the application process so unsuitable candidates can be removed at the earliest opportunity.

Disqualifying crimes should include, but not be limited to, the following:

- Impaired driving convictions which are recent or numerous
- Sexual Assault
- Any crimes related to exploiting children or vulnerable people
- Crimes of violence such as homicide
- Other felonies such as fraud and theft
- Other crimes which could indicate the applicant would overly sympathize with participants
- Other crimes which could indicate the applicant would commit crimes against participants

It is recommended any impaired driving convictions be more than three years from time of application. For multiple impaired driving convictions, this timeline should be extended to at least five years from the last conviction.

Minor felony convictions, such as a low value theft, should be more than three years from the time of application while major felony convictions should be more than five. Program administrators should consider designating some major felony convictions as complete

disqualifiers. Special attention should also be placed on convictions for assault committed by persons of authority, such as teachers, law enforcement, fire and aid personnel and hospital staff. These sorts of crimes could indicate the applicant's willingness, or lack thereof, to comply with program requirements. If including disqualifying crimes in statute or rule, it is helpful to add a blanket statement to identify any type of crime or conduct involving an inherent quality of baseness, vileness, or depravity with respect to a person's duty to another or to society in general which would compromise the program.

Program administrators should seek education regarding how to interpret criminal histories. Arrest dates and convictions dates are rarely the same. Program administrators will need to decide which date to use when considering a positive criminal history. Standardization of which date to use should be clearly detailed in program policy. AIIPA recommends only considering crimes of which the applicant was convicted as opposed to having charges filed, but later dropped.

Program policy should enable administrators to conduct further interviews with applicants as necessary to gain clarity regarding positive criminal histories.

## Section 5 – Educational Standards

Education is an essential piece to technician certification. Automotive Service Excellence (ASE) mechanic certification or other vehicle systems related certifications should not be relied upon as a replacement for state program and manufacturer training.

- State training should include
  - State-specific rules
    - Applicant acknowledgement of a rule review sheet
    - On site quizzes during service center inspections
  - Codes of conduct
  - Training for educating a participant for BAIID usage and fail prevention
  - What participant actions should be reported to authorities
  - Contact information for investigations or participant complaints
- Manufacturer training should include
  - Technical training for the BAIID and associated calibration processes
  - Technical training for device installation
  - Training for educating a participant for BAIID usage and fail prevention
  - Handling of participant records

For the state program conducted training, the frequency will vary based on the size of the state and number of officials available to conduct the training. It is desirable to have program officials conduct in person training annually with each technician. Ongoing training can be provided through web-based applications. An open book examination process could also serve as

additional training. Large legislative or program rule changes should include a plan for technician education. For example, the deployment of cameras or GPS units would necessitate additional educational needs in addition to the timelines provided above.

Training provided by the manufacturers and vendors should be more frequent than what is provided by program administrators. At a minimum, request manufacturers provide technician training in the following manner:

- Live training, such as in person or through computer applications, prior to certification and at least annually throughout certification
- Web-based or self-paced remote training at least semi-annually with quarterly training preferred

There will be a need to verify and track applicant and technician training. This can be handled on the application by including a section for the applicant to declare they have received training under the desired frequency. Additionally, technicians could be provided certificates or other completion of training documents to hold at the service center and be made available during inspection.

The technicians also need to have access to the manufacturer's installation manuals and telephone numbers for contemporaneous technical support. Major program updates, such as firmware or software changes, calibration procedure changes or new BAIID or equipment rollouts, should be handled with in person training.

When considering who should be allowed to conduct technician training, it is desirable to have individuals who have received specialized training to instruct on the appropriate topics. Instructors should have in-depth experience for installation and maintenance of the manufacturer's BAIIDs as well as their specific calibration process. The trainer should also be knowledgeable regarding state specific requirements.

There is always a cost associated with training requirements. Program managers need to be realistic when setting requirements. Ongoing training should be simple and easily received. It can range from a few tips to better use the manufacturer's software to reminding technicians how to use tamper proof seals.

## Section 6 – Applicant Examination

Applicant testing is used to ensure proper training has been conducted and the applicant has adequate knowledge prior to certification. Exams should be available in all common formats, including both electronic and written formats as well as applicable languages. Review state law regarding accessibility standards. It is helpful to administer the exam in the least obtrusive format and location as possible while still guaranteeing credible results.

If examinations are in a web-based format, a unique username and password should be issued to every applicant. If it is in paper format, efforts to avoid cheating should be made to ensure it is the applicant completing the exam. In person proctoring in most states would not prove to be cost effective. Remote exam procedures could include sending the test directly to the applicant's email or physical address and requiring a signature and copy of government-issued identification with the returned answer sheet. There are also several options for live, web-based testing. Using one of these, a state program could set up one or two days a month where an exam would be available live and online.

Test questions should cover material applicable to all manufacturers or vendors. Questions should not be focused on a certain technology not used by all manufacturers. Instead, questions should be focused specifically on technician's duties during their normal course of work. This would include how to answer participant questions and directing participants to program officials or manufacturers' call centers for information not remedied at the service center level.

With exams not being proctored in person, special consideration should be given to having the applicants use reference materials in order to answer the questions. If the state program has strong training and reference materials, the applicant would know how to use them and where to look to find answers once they are certified.

At least one state has an open book policy regarding testing. In this instance, the technicians are provided with a booklet of program rules, applicable laws and online resources. The applicants report this open book policy has generated great discussions with other technicians and a better general knowledge of the rules. They learn additional information as they search for answers which extend beyond the researched question. Open book examinations also potentially remove some test anxiety.

Testing should occur annually for re-certification. Program administrators should consider matching the acceptable passing level for the technician examination with other acceptable passing levels from similar programs within the state. It should be high enough to establish the applicant has adequate knowledge of BAIID work while still accounting for test anxiety and applicant educational level. Be sure to include enough questions to allow incorrect answers to occur without failure. An exam with 25 questions is more desirable than one with only 10.

Regardless of format used, creating a bank of test questions where the questions are randomly generated into a test for each applicant assists in discouraging having one applicant complete the exam and having others copy it. Test question banks facilitate the use of retests by generating different exams each time.

Establish retest protocols for applicants who fail. They should be allowed to retake the test immediately using an exam with questions in a different order than the one previously taken. If the applicant fails again, consider a wait period of 15 calendar days during which the applicant could receive follow up training from the manufacturer. Keeping this time period short will ensure the application material is still valid, such as a criminal history. It should be long enough to allow for manufacturers to conduct training as well as having the applicant forget the exam questions.

## Section 7 – Certification, Denial and Revocation

The final certification process should be formal to instill a sense of importance for the role of BAIID technicians. There should be a certification document which is provided by the state program which can be displayed in the service center. This lends confidence to the participants and let them know their technician is approved to do perform BAIID duties. Also, the document should have valuable information for the technician on its face. Having a physical certification document means it can be physically revoked. It should include the following items:

- Technician's name and unique traceable program identification number
- Expiration of technician's certification
- Fixed service center which will be their home base of operations
- Details or limitations for any other certification
    - Specific manufacturer or vendor
    - Specific region or service center, if desired

Just as there are clear rules for certification, there needs to be guidelines for denial, revocation or suspension. The rules should be broad enough to encompass any possible violation of program rules, while still being fair to applicants and manufacturers and maintaining transparency.

If an applicant is denied, AIIPA recommends official notification to them personally as well as the manufacturer or vendor. There should be contact information on the notification so any questions regarding the denial can be answered.

The concept of progressive discipline for minor violations provides fairness. Program rules often have an all or nothing approach; either the technician is completely suspended or not. Progressive discipline allows for small violations to be corrected before a complete revocation is necessary. Some conduct is so egregious it will require immediate suspension and rules should be written to support swift action in those cases.

Rules should include timelines to the suspension or revocation period. These need to be decided on a state-by-state basis with differentiation between never being able to apply again and serving a suspension of certification for a certain period of time. It should also detail the party or entity responsible for the determination of suspension or revocation. Applicants and manufacturers or vendors should be made aware of the existence of an appeals process, if applicable.

In the case of the suspension, a detailed process and clear timeline for re-certifying should be in place so technicians and manufacturers or vendors can immediately begin addressing the issue. Consideration should be given to written testing and additional criminal histories depending on the nature and length of the revocation.

Program personnel have identified various types of violations of program rules committed by BAIID technicians. These include the following:

- Illegally opening participant's locked cars to retrieve BAIIDs and associated equipment
- Entering participant's residences illegally
- Providing remote unlock codes when not allowed
- Not properly connecting BAIIDs accidentally and on purpose
- Not reporting circumventions when required
- Over-charging participants for services
- Accepting cash payments when manufacturer or vendor only accepts credit or debit cards and then charging their own personal credit card

With the variance seen, it is impossible for AIIPA to recommend which events should initiate a suspension versus complete revocation. Program administrators should work with legal counsel and manufacturer or vendor representatives to determine appropriate sanctions. In several cases, manufacturers or vendors will take appropriate actions without the state program needing to begin administrative processes.

## Section 8 – Multi-level Certifications

AIIPA recognizes not every technician performs every task in the spectrum of technician duties. Frequently, one employee will handle the paperwork and education portion of the participant's BAIID appointment while another employee installs or services the BAIID. Both of these employees should be certified technicians.
States need to consider repercussions of having differing levels of certification listed below:

- Tracking of additional certifications
- Process for someone changing their level of certification
- Tailoring educational needs for each level of certification
- Technician helpfulness resulting in performing duties outside their certification
- Robust oversight to discover if technicians are operating outside their respective certification
- Penalties for technicians operating outside their level of certification
- Acceptability for service centers to not have any technicians certified to handle BAIID failures requiring work inside the vehicle
    - For more discussion on this topic, please refer to AIIPA's Best Practice Guide for Service Centers

## Section 9 – Special Circumstances

Occasionally, certified technicians find themselves being charged with an impaired driving offense. It is important to note the presumption of innocence before conviction. Some states allow for installation of BAIIDs prior to an impaired driving conviction. This creates a time when the technician can still maintain their certification as they have not been convicted of a disqualifying impaired driving crime. AIIPA recommends the technician should not be allowed to service their own BAIID. These unique situations should receive special handling by program administrators to ensure both fairness to the technician and the public.

# Chapter 5 – Breath Alcohol Ignition Interlock Device Enhancements

This guidance document will assist state administrators in the evaluation of enhanced technological additions to the BAIID for their respective programs. It has been designed to be used as part of a toolbox when programs are considering changes to device technological capabilities.

There are many items to consider when contemplating any technological enhancements to BAIIDs. As is typical, all stakeholders in the decision-making process should be involved. AIIPA encourages gradual or extended timelines for implementations of new technologies to ensure a smooth transition and development of administration, education, and equipment installation. Another solution to ease implementation is providing an exemption of current units while new installations or new units are updated.

Enhancements covered in this document include camera units, geolocation reporting, real-time updating, real-time reporting, and emergency notification to law enforcement. It is important to note geolocation reporting differs from geolocation recording. Manufacturers may collect more data than what is shared with program officials and monitors. Program administrators should focus on the purpose of being able to develop jurisdictional authority for violations, circumventions, and tampering of BAIIDs.

Any BAIID enhancement translates to more program oversight being needed. Not only will new legislation or rulemaking need to occur, but there should also be a robust approval process. This is both at the onset when first certifying the acceptability and quality of the enhancement as well as ongoing reviews. As part of the program's BAIID certification process, testing and reviews should also include any enhancements. This would include images and location data being captured at mandated times while meeting acceptable accuracy and quality standards. Emergency notification to law enforcement should also be tested to reveal any issues or training needs. Since technology of any type can fail, it is important to have procedures in place to diminish the effects of failures. This may include setting a trigger point for manufacturers to report systemic technological issues to program administrators.

Program administrators will need to ensure circumvention and tampering laws cover these enhancements.

## Section 1 – Camera Units

The main reason for camera incorporation into BAIIDs is to determine who or what is submitting the breath sample. Jurisdictions can use this data to begin circumvention or tampering investigations, determine probation violations, clear participants of failed or missed tests, and calculate compliance-based removal dates.

As technology has improved, concerns such as lack of data storage on the BAIID and increased download times are almost nonexistent. While some participants initially are hesitant to have a camera in their vehicle, education from manufacturers, technicians, and program administrators should put them at ease. This includes information regarding secure storage of images, as well as the fact images are frequently used to the participant's benefit in fails or empty seat missed tests.

Some manufacturers have included anti-circumvention features which rely on the camera and handset working together to determine the position of the person providing the sample. These should be encouraged and tested during the certification process.

AIIPA encourages the use of camera units with attention given to the placement, quality of the image produced, and timing of the images. Jurisdictions should develop criteria and test BAIIDs during the certification process and at least annually thereafter.

At each service appointment, the camera should be visually inspected by the technician and electronically via diagnostic testing. For example, the technician should be able to see either a live view of the camera feed or can review images taken since the last service. The BAIID should be able to discern if the camera is operating properly and alert manufacturers if there is an issue. Some manufacturers have developed technology to determine if the camera is being blocked. This sort of technology is to be encouraged.

### Camera Location and Field of View

Typical mounting locations include the windshield or A-pillars. The focus of any rule should be on the view of the camera rather than where it is placed; however, the camera should never obstruct the driver's view or safe operation of the vehicle and should follow jurisdictional rules about placement of items on or near the windshield. Cameras mounted on the handset do not offer a sufficient field of view to determine where the person providing the sample is located within the vehicle. When wording statutes to include cameras, be sure to avoid limiting the view to "the person submitting the sample", "capture the driver's seat" or similar language. Such wording has unintentional consequences.

**Camera Quality and Image Features**

It would be wise to seek a broad standard, rather than choosing a specific resolution. A reasonable person should be able to identify the person submitting the sample, relevant occupants, and items used to circumvent or tamper with, the BAIID.

Images should be reasonably clear in all lighting conditions.

While videos could prove useful, there are simply too many obstacles to overcome at this time.

Below are examples of well-placed cameras in varying lighting conditions:

### Timing of Images

Program administrators should determine what events are most important to oversight. The options are vast for mandated snapshots. Below are some commonly mandated image events:

- The initialization of each sample request
- The onset of sample submission
- Motor off and on
- The end of the sampling window when a viable sample is not submitted
- When the BAIID detects tampering or circumvention

As stated previously, program administrators may be able to offer leniency to participants for certain events when confirmed with images. This could include above set point tests provided by someone other than the participant, missed tests when the driver's seat is empty, and passing tests shortly after failed tests. The timing of images will be crucial for any possible clemency.

## Section 2 – Location Reporting

Geolocation information can be either through Cell Site Location Information (CSLI), Global Positioning System (GPS) or similar usage. The ability to determine location is critical for actionable oversight to develop the authority of the appropriate jurisdiction.

### Geolocation Accuracy

Program administrators should consult with jurisdictional legal advisors to determine how accurate geolocations should be to carry out oversight/enforcement. Rather than specifying use of a certain technology to determine position, program administrators are encouraged to look at the result to ensure it meets their requirements.

### Geolocation Reporting

It should be noted manufacturers may be capturing coordinates more frequently than what a jurisdiction would like to be reported. Again, consulting with legal advisors is prudent to ensure the program is within the boundaries of broader jurisdictional rules. Some manufacturers can provide speed and direction of travel. This data can be very helpful as evidence but is usually not necessary for most programs.

While manufacturers may provide maps or estimated locations, administrators should require the actual coordinates also be reported. This is referred to as being reported in latitude and longitude. An example would be the following: 47.742, -117.413.

Much like mandated image events, administrators should request coordinates to be collected during certain events. Below are some commonly mandated geolocation reported events:

- Initial startup
- Last location upon motor off
- Any test requested, regardless of outcome
- When the BAIID detects tampering or circumvention

## Section 3 – Real-Time Reporting

Real-time reporting is the transmission of data between the device's relay unit and the manufacturer's server which is then immediately updated to the manufacturer's website for viewing by monitoring authorities provided there is adequate cellular network coverage in the operating area and assuming normal use of the BAIID.

Program administrators will have to assess whether their programs will make use of real-time reporting before mandating manufacturers provide this convenience. Several manufacturers provide real-time reporting already as part of their standard operations. It should be part of the certification process to review the time delay between events and the ability for monitors to view them. To allow for dead zones, any governing language should include "as cellular service permits" rather than specific time periods for information to become available.

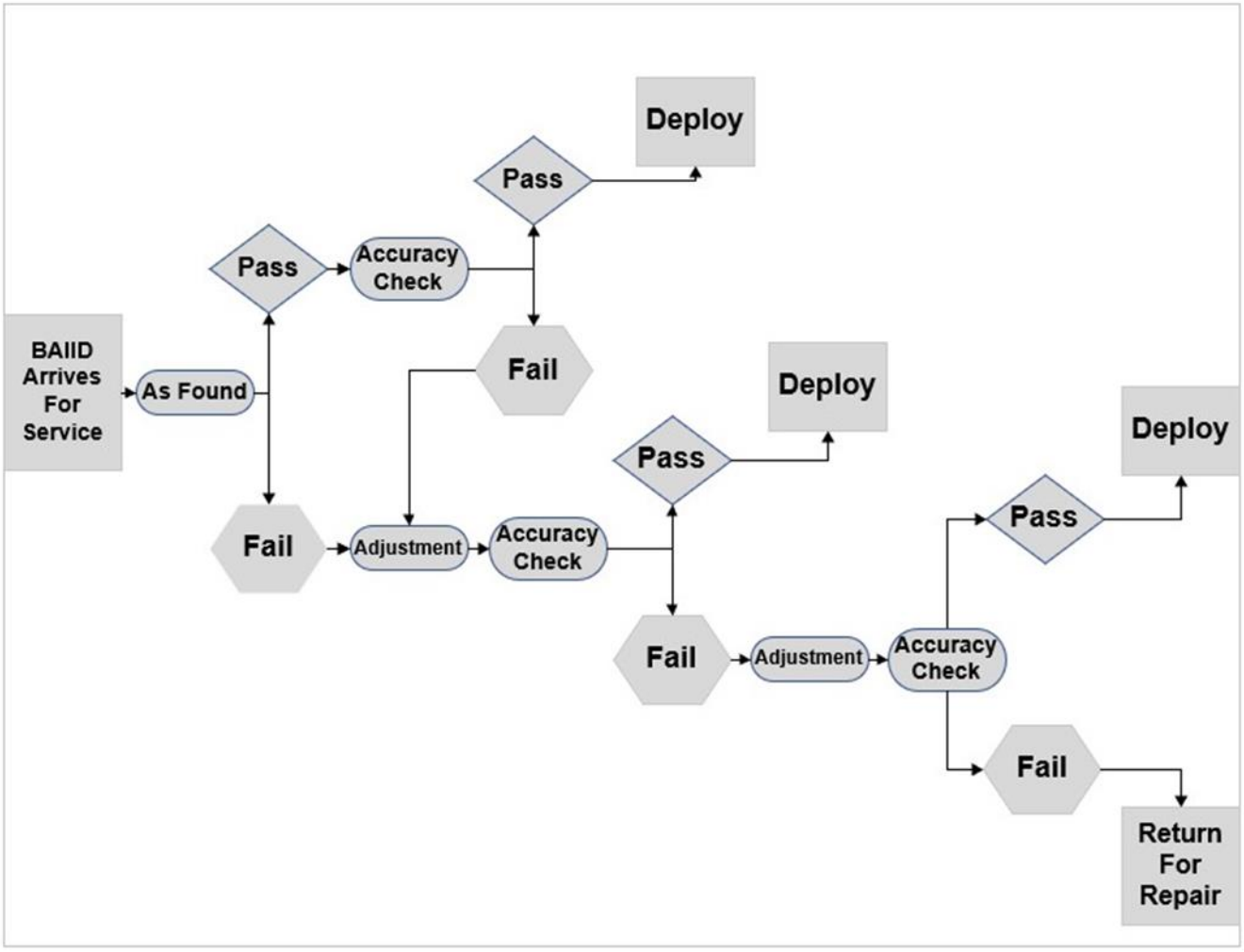
A feature of real-time reporting is BAIIDs are readily locatable by manufacturers. At least one program has requested manufacturers to flag BAIIDs which have not reported any data for 10 days. Manufacturers or monitors can then reach out to participants to determine the cause, which could range from simple nonuse to more nefarious reasons.

### Emergency Notification to Law Enforcement

Emergency notification to law enforcement refers to when specific violations are reported directly to law enforcement dispatchers contemporaneous to the event or as soon as cellular technology permits. For example, if the BAIID receives two samples over 0.08 BrAC on two consecutive retests with the motor being on, then the manufacturer is responsible for initiating a call to designated authorities. The technology requires the use of geolocation and data being sent between the BAIID and the manufacturer as it is happening.

It comes with the great benefit of possibly stopping an impaired driver. Unfortunately, it also opens liability avenues if police are not available to respond. Both the manufacturer and monitoring agency need inspections and processes to ensure the system is in working order. There is also a need for law enforcement training.

# Appendix A – BAIID Calibration Workflow Table



# Appendix B - Elevation Correction Chart For Alcohol Gas Standards

| Elevation (ft) | Pressure (mmHg) | .020 g/210L | .025 g/210L | .030 g/210L | .050 g/210L |
|---|---|---|---|---|---|
| 0 | 760 | 0.020 | 0.025 | 0.030 | 0.050 |
| 250 | 753 | 0.019 | 0.024 | 0.029 | 0.049 |
| 500 | 747 | 0.019 | 0.024 | 0.029 | 0.049 |
| 750 | 740 | 0.019 | 0.024 | 0.029 | 0.048 |
| 1000 | 734 | 0.019 | 0.024 | 0.028 | 0.048 |
| 1250 | 728 | 0.019 | 0.023 | 0.028 | 0.047 |
| 1500 | 722 | 0.019 | 0.023 | 0.028 | 0.047 |
| 1750 | 716 | 0.018 | 0.023 | 0.028 | 0.047 |
| 2000 | 709 | 0.018 | 0.023 | 0.027 | 0.046 |
| 2500 | 697 | 0.018 | 0.022 | 0.027 | 0.045 |
| 3000 | 685 | 0.018 | 0.022 | 0.027 | 0.045 |
| 3500 | 673 | 0.017 | 0.022 | 0.026 | 0.044 |
| 4000 | 662 | 0.017 | 0.021 | 0.026 | 0.043 |
| 4500 | 650 | 0.017 | 0.021 | 0.025 | 0.042 |
| 5000 | 639 | 0.016 | 0.021 | 0.025 | 0.042 |
| 5500 | 628 | 0.016 | 0.020 | 0.024 | 0.041 |
| 6000 | 617 | 0.016 | 0.020 | 0.024 | 0.040 |
| 6500 | 606 | 0.015 | 0.019 | 0.023 | 0.039 |
| 7000 | 595 | 0.015 | 0.019 | 0.023 | 0.039 |
| 7500 | 584 | 0.015 | 0.019 | 0.023 | 0.038 |
| 8000 | 574 | 0.015 | 0.018 | 0.022 | 0.037 |
| 8500 | 564 | 0.014 | 0.018 | 0.022 | 0.037 |
| 9000 | 554 | 0.014 | 0.018 | 0.021 | 0.036 |
| 9500 | 544 | 0.014 | 0.017 | 0.021 | 0.035 |
| 10000 | 534 | 0.014 | 0.017 | 0.021 | 0.035 |
| 10500 | 524 | 0.013 | 0.017 | 0.020 | 0.034 |
| 11000 | 514 | 0.013 | 0.016 | 0.020 | 0.033 |
| 11500 | 505 | 0.013 | 0.016 | 0.019 | 0.033 |
| 12000 | 496 | 0.013 | 0.016 | 0.019 | 0.032 |

**Results truncated to three digits

**Other atmospheric pressure units of measure can be substituted for mm/Hg

**Chart only applies to compressed gas and not to human breath samples

# Appendix C - Tolerance Quick Reference

Administrators are urged to consult jurisdiction's evidential program for guidance when determining tolerances. It is acceptable to be more restrictive but should not be less restrictive. An evidential program will be able to provide appropriate scientific references. Keep in mind the program may be wanting to change current tolerances, so exchanges with them are critical to future proof any BAIID statutes.

Certifying PBTs, digital reference thermometers and digital reference barometers should mirror jurisdictional and manufacturer requirements. Certifications should be at least performed annually.

| Measurement | Tolerance |
|---|---|
| Acceptable difference between reference thermometer and breath alcohol simulator thermometer's reading | ±0.10°C inclusive |
| Acceptable difference between calibration software and reference barometer | ±10 Hectopascals (hPA) |
| Acceptable operating breath alcohol simulator temperature range | 34° ± .2°C, checked after running for 45 minutes |
| Compressed gas standard temperature storage range | 50° to 104° F |
| Compressed gas standard lowest acceptable psi | 50 psi |
| Calibration interval | 30 to 67 days |
| Calibration set point tolerance | ±10% or .005 g/210L, whichever is greater |
| Acceptable tubing length for breath alcohol simulator | As short as possible, less than three inches |
| Acceptable pressurized tubing for compressed gas standard without needing a purge | As short as possible, test output to determine if purging is necessary |
| Purge time length needed for non-pressurized compressed gas tubing | Check with gas standard manufacturer and test output to determine compliance |

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