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# Comparing the LifeSafer Portable Alcohol Monitoring Unit with other alcohol testing technologies

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## Executive Summary

This paper compares the LifeSafer Portable Alcohol Monitoring Unit with other forms of alcohol monitoring technologies in probationary supervision settings. The LifeSafer device is a compact, unobtrusive, portable fuel-cell based instrument that measures breath alcohol concentrations. Our research suggests that its ease of use, accuracy and low cost make it the most effective choice for probationary alcohol monitoring.

There are several technologies that are available to assist courts in testing for alcohol use. These include portable alcohol monitoring devices (PAM); ignition interlock devices (IID); portable breath testing devices (PBT); smartphone semiconductor alcohol monitoring devices (SSAM); urine ethyl glucuronide and ethyl sulfate tests (EtG/EtS); and, transdermal alcohol monitoring (TAM). Each of these technologies, except for SSAMs, has proven to be an important tool in monitoring alcohol use for individuals under supervision and all of these alcohol technologies can assist in court supervision of an individual who cannot drink alcohol as a condition of probation. Each has strengths and weaknesses, however, and it is clear that portable alcohol monitoring devices, such as the LifeSafer Portable Alcohol Monitoring Unit, is the technology that addresses all of the best practice criteria for alcohol testing.

The LifeSafer Portable Mobile Unit is one of the PAM devices that has both a camera and wireless capability. It is a compact and unobtrusive portable fuel-cell based device that is lightweight and it has a battery life of 72 hours. The design allows an individual to be tested throughout the day at their home or on the job. A GPS location tracking function verifies the device's location. The wide-angle, camera-equipped, photo-capture technology ensures photo facial detection. If the equipment does not recognize the individual's face, a retest can be required. Additional features include pre-programmed testing times as determined by monitoring authorities and anti-tampering technology. It also allows easy access by the monitoring authority to all photographs and testing data.

Unlike PBT testing, it is capable of testing at whatever frequency a court requires, up to 24 times a day, wherever the person is located. It does not have the built-in barriers to high frequency testing that IIDs do, nor does it create the discomfort or embarrassment wearing a TAM may cause. However, unlike TAMs, when the need for daily testing ends, it is capable of random testing. The LifeSafer device's camera also allows for witnessed testing unlike TAMs.

False positive results are not an issue for the LifeSafer Portable Monitor Unit unlike SSAMs, EtG/EtS and TAMs. As the LifeSafer Portable Monitor Unit's technology is National Highway Traffic Safety Administration (NHTSA) standards-compliant, it is capable of testing for alcohol for the duration of an individual's supervision and the science behind its use is well settled. That means its test results are admissible in a probation violation hearing, unlike SSAMs or the newer, cheaper smartphone fuel-cell instruments. The device can also test for low alcohol use unlike both TAMs and EtG/EtS and the results are available in real time unlike urine tests.

Finally, PAM testing is the least expensive, court admissible option for alcohol testing of all of the existing technologies.

This combination of factors suggests that the LifeSafer Portable Monitoring Unit should be considered the best option for alcohol testing technology by courts supervising individuals with probationary conditions that forbid the use of alcohol.

## I. Introduction

The abuse of alcohol and other drugs has become a long term national epidemic.[1] The well-established connection between alcohol and other drug misuse and crime combined with the costly failure of incarceration, has created a demand for more effective strategies.[2] In response, a national movement supporting criminal justice reform has increasingly turned to new sentencing approaches, a component of which is the use of technology to supervise individuals who are subject to court orders because of alcohol use.[3]

The best known of these new approaches are Hawaii's Opportunity Probation with Enforcement (HOPE)[4] program which originated in Hawaii; the 24/7 Sobriety program which originated in South Dakota;[5] and, most widely, the variety of specialty courts based on the Drug Treatment Court model. Each of these new sentencing and supervision approaches relies at least, in part, on intensive testing for alcohol and other drugs. As Drug Treatment Courts' Key Component Number 5 states: "Abstinence is monitored by frequent alcohol and other drug testing."[6] This monitoring can provide an accurate, timely and useful gage of substance use throughout an individual's court supervision period.[7] Testing holds probationers accountable and it is an indicator of whether the individual's treatment plan is working.[8]

*Drug Treatment Courts' Key Component Number 5 states: "Abstinence is monitored by frequent alcohol and other drug testing."*

There are several technologies that are available to assist the criminal justice system in testing for alcohol use. These include:

A. portable alcohol monitoring devices (PAM),[9] one of which is the LifeSafer Portable Monitoring Unit;

B. ignition interlock devices (IID);

C. portable breath testing devices (PBT);

D. smartphone semiconductor alcohol monitoring devices (SSAM);

E. transdermal alcohol monitoring (TAM); and,

F. urine ethyl glucuronide (EtG) and ethyl sulfate (EtS) tests.[10]

Each of these technologies, except for SSAMs, have proven to be useful in monitoring alcohol use for individuals under supervision.

According to the American Society for Addiction Medicine's (ASAM) 2013 White Paper, "Breath is the standard matrix[11] for alcohol testing because alcohol is volatile and substantially excreted through the lungs."[12] Given the dominance of breath alcohol testing, it is appropriate to start with devices that use that method before turning to other technologies.

## II. Testing Technologies

### A. Portable Alcohol Monitoring Devices

PAMs are handheld instruments that monitor users' breath alcohol concentration (BrAC).[13] They are commonly used as an alternative to remote site breath testing for probationers who lack a driver's license

and/or vehicle.[14] The majority of these devices use the same fuel-cell technology as IIDs, without the cost of mounting, or installation.[15]

Some PAMs are equipped with a camera and wireless capability.[16] These features are critical components to PAM functionality and success. A study of breath testing devices that were not equipped with a camera found that more than 20% were subjected to tampering attempts.[17] A subsequent study of devices that had cameras found that tampering attempts were reduced to 1.2%.[18]

*The LifeSafer Portable Monitor Unit's technology is National Highway Traffic Safety Administration (NHTSA) standards-compliant.*

The LifeSafer Portable Mobile Unit is one of the PAM devices that has both a camera and real time reporting capability. It is a compact and unobtrusive portable fuel-cell based device that is lightweight and has a battery life of 72 hours.[19] The design allows individuals to be tested throughout the day at home or on the job.[20] A GPS location tracking function verifies the device's location.[21] The wide-angle, camera-equipped, photo-capture technology developed for LifeSafer interlocks ensures facial detection that requires a retest if it does not identify the individual.[22]

Additional features include up to 24 daily, pre-programmed testing times as determined by monitoring authorities, along with anti-tampering technology.[23] It also is capable of real-time reporting of testing data.[24]

If a test registers a BrAC level required by the court, the LifeSafer device will require a retest.[25] The default setting for the unit initiates a retest request five minutes after the failure to ensure any environmental interference (for example, alcohol containing breath spray or mouthwash) to dissipate. This reduces the chances of false positives. Testing ends after a second retest with a pass, a skip,[26] or fail being reported.[27] Courts can request customized testing protocols which are designed to fit their probtaionary requirements.[28] The LifeSafer Portable Monitor Unit's technology is National Highway Traffic Safety Administration (NHTSA) standards-compliant[29] and it is capable of testing for alcohol for the duration of an individual's supervision.

The LifeSafer device reports data after each test.[30] All relevant information is uploaded, including test results, photographs, and GPS data via a cellular connection.[31] Data is stored in secured servers.[32] In the event of a skip or failure, the device provides an immediate real time violation notification by text or email to the supervising authority.[33]

PAM devices that use fuel-cell technology have results that are sufficiently reliable to be admissible in probation violation proceedings.[34]

### B. Ignition Interlocks Devices

An IID is a breath-testing device attached to a vehicle's ignition system that requires an individual to provide a breath sample free from alcohol before the vehicle will start.[35] Most states now require fuel cell interlocks.[36]

In some models, breath alcohol test results are downloaded when an individual reports to an installer to have the IID calibrated.[37]

All positive samples are recorded and the results are sent to the supervising authority.[38] Recently, some companies, like LifeSafer, have added real time reporting technology to IIDs.[39] These devices now have the capacity to report positive alcohol tests in real time instead of waiting until the vehicle is brought in for calibration.[40]

Most courts that order IIDs do so to prevent individuals from driving after they have consumed alcohol. Some also use these devices for daily or random breath testing when abstinence is a condition of probation or release from custody. IID test results have been held to be admissible in probation violation proceedings.[41]

Devices without a camera have high rates of tampering attempts. In one study 21% of the devices without cameras had been subjected to a subversion attempt.[42] The drivers who tampered with their IIDs averaged 11.6 attempts to start their vehicle.[43] A subsequent study however, established that when IIDs are equipped with a camera, the attempted tampering rate was reduced to 1.2%.[44]

The biggest limitation for the use of IIDs for daily alcohol testing relates to its primary purpose of preventing the operation of a vehicle if the individual has consumed alcohol. Not all program participants own a vehicle. Using an IID for daily testing requires that probationers go to the vehicle and start it before they can take a breath test. This may create a barrier to the number of times an individual can be tested, as they may not have immediate access to a vehicle.

### C. Preliminary Breath Testing

PBT devices are easy to use and portable. While handheld, they are typically used by law enforcement officers or probation officers. They must be calibrated monthly by a certified technician to ensure accurate readings[45] and they generally have an LCD screen where the BrAC is displayed. There is a disposable mouthpiece which must be changed after each test.[46] Most of these devices have no printout capability.[47]

*PAM devices without a camera have high rates of tampering attempts.*

Some court officials, law enforcement agencies and private drug testing companies use PBTs[48] and many of these devices are NHTSA-standard compliant.[49] In such settings they are cost effective, provide observed tests and are generally admissible in probation violation hearings to determine the presence of alcohol.[50]

There are limitations on PBT devices, such as the requirement that an individual travel to a testing site or police station, which can creates difficulties for many participants as they often do not have drivers' licenses or a vehicle. This remote testing requirement also limits the number of times that an individual can be tested during the day and limits night and weekend testing. If the court staff is doing the testing, there is the additional cost of the staff time.

### D. Smartphone Semiconductor Alcohol Monitoring Devices

SSAMs combine the use of a participant's smartphone with a semiconductor breath-testing device. The semiconductor uses a coating of tin dioxide connected to a small metal heater.[51] The heater warms the coating so the device can detect the presence of alcohol.[52]

The breath-testing device wirelessly transmits the results to an application on the individual's smartphone.[53] That application is programed to transmit the data to the testing company.[54]

SSAMs have severe limitations. Semiconductor technology is widely recognized to be less accurate then fuel-cell technology.[55] If the heater fails, the device can give a false reading.[56] However, even when properly heated, the semiconductor reacts to more than the presence of alcohol including such substances as cigarette smoke, perfume, hairspray and breath fresheners.[57] This can cause a false positive reading and an unsupported accusation of alcohol use.[58]

In addition, SSAMs show wide variations in test readings, especially as the units become older or extensively used.[59] They also require calibration service on a more frequent basis than PAMs and IIDs with fuel cell technology, in some cases once a month.[60]

SSAMs also have difficulties taking consecutive samples in a short period of time.[61] The level of tin dioxide decreases with each test, so the device needs to be rested to allow atmospheric oxygen to oxidize the semiconductor again.[62]

*Given the lack of scientific studies, there is a serious question as to whether these new cheap fuel cell devices (SSAMs) can meet current court admissibility standards.*

A study of SSAMs found they exhibited an error rate of at least 25% concluding that none of the devices were sufficiently accurate.[63] Given this lack of scientific and technological supporting evidence, there are no published cases that support the admission of SSAMs into evidence in a probation violation hearing.

As the problems with semiconductor technology have been exposed, several smartphone alcohol monitoring companies have begun using low cost fuel-cell devices.

In one instance, a company using the new low cost fuel-cells claimed that it was a "law enforcement grade product, utilizing a next generation electrochemical fuel-cell sensor that has undergone rigorous government lab-grade testing to ensure its accuracy."[64] The Federal Communications Commission sued the company for false advertising claiming that the company was aware that ambient humidity and temperature affected results and that its sensors deteriorated significantly over time.[65] The company resolved the lawsuit[66] and the settlement terms included barring the company from making future claims of accuracy for its product unless rigorous testing supported such claims.[67] The company was also required to contact and pay full refunds to all of consumers who bought the device.[68]

As of this writing there are many corporate claims regarding these devices but a lack of scientific evidence about their effectiveness.[69] Given the lack of scientific studies, there is a serious question as to whether these new, cheap fuel-cell devices can meet court admissibility standards.[70]

### E. Transdermal Alcohol Monitors

Unlike breath testing devices, TAMs do not test for BrAC levels; instead they detect alcohol that secrets through the pores of the skin.[71] This is known as transdermal alcohol concentration (TAC). Given the

body's absorption process, TACs suffer an inherent lag behind BrAC in testing for peak blood alcohol of approximately two hours.[72] The delay is created by measuring the time it takes for ethanol to go from a liquid state to a gaseous state once ingested by the body and then to be expelled as sweat.[73]

Researchers have concluded that low consumption of alcohol (less than two drinks) is less likely to be detected by TAMs.[74] In one study 39% of participants who consumed one beer had no positive TAC readings.[75] In a second study, 38% of participants did not register a positive TAC reading after one drink.[76] In a third study, researchers found that 188 of 690 (27%) drinking episodes were not detected by TAMs.[77] These results have led one researcher to state:

> "....[R]egardless of how reliable and accurate transdermal alcohol device hardware becomes at measuring TAC, the raw TAC data will never consistently map directly onto BrAC/BAC across individuals and drinking episodes."[78]

TAMs' difficulty detecting low level drinking appears to be related to the effort to avoid false positives.[79] A report sponsored by NHTSA determined that a TAM set to test at 0.02 g/dL TAC provided optimal discrimination for low level drinking, but that this sensitivity level resulted in a 12.34% false-positive test rate.[80] A subsequent study suggested that changing the sensitivity level could reduce this false positive rate.[81] However, the report noted that raising the cut off level decreased the likelihood of the TAM detecting low level drinking.[82]

At least one study suggests that except in circumstances of binge drinking, TAMs are also less likely to detect alcohol use in men than women.[83] A different study suggests that the explanation for this variance is the difference in the makeup of the outer skin of women and men; however, as the authors state, there has not been enough research to explain why this occurs.[84]

Several reports have discussed discomfort caused by wearing the TAM bracelets.[85] Participants have reported moderate physical discomfort with 61.5% of participants reporting marks on their skin.[86] This irritation appears to be related to the physical shape and size of the bracelet.[87]

Some studies have also reported that TAMs create a sense of stigma and embarrassment which can be a concern for those wearing them.[88]

Generally, TAM test results are stored for upload to computers for reporting and analysis and sent to the supervising authority daily.[89] Any attempt to remove or tamper with the TAM device is communicated to the vendor when the TAC data are uploaded.[90] Attempting to prevent a data upload would also be reported.[91] Some TAMs now include GPS functionality and can transmit the data wirelessly.[92]

Courts have held that transdermal technology is sufficiently reliable for the results to be admitted in probation violation hearings.[93]

### F. Urine Ethyl Glucuronide and Ethyl Sulfate Tests

EtG and EtS are direct, non-volatile, water-soluble, metabolites of ethanol (drinking alcohol) which can be detected in a urine test.[94] An EtG/EtS urine panel can be the sole element of a urine test or be used as part of a larger number of urine panels testing for other drugs.[95]

There is a general consensus that criminal justice EtG testing should have a 500 ng/

mL cutoff setting to reduce the possibility of false positives.[96] This cutoff level allows an EtG test to identify the presence of ethyl glucuronide in high levels of drinking for a period of up to 72 hours after alcohol consumption.[97] However, while it can detect low levels of alcohol consumption (one to two drinks) for an interval of 12 hours to 24 hours after drinking, after that time the test has difficulty detecting alcohol consumption.[98] After 48 hours, the test is unable to detect any consumption of less than six drinks.[99]

Reducing cutoff levels can improve detection. In one study, more than 80% of those who drank alcohol 24 hours prior to testing were identified using the 100 and 200 ng/mL cutoffs.[100] After 24 hours the detection rate fell below 40% for those with 100 and 200 ng/mL cutoffs while the 500 ng/mL level fell below 25%.[101] After 48 hours tests taken at 100 and 200 ng/mL cutoffs detected alcohol use only 21% of the time, while the 500 ng/mL level fell below 10%.[102] This rapidly diminishing effectiveness led the author of one leading study to conclude "commercially available EtG testing must be conducted every 24 hours…."[103]

*There is a general consensus that criminal justice EtG testing should have a 500 ng/mL cutoff to reduce the possibility of false positives.*

While reducing the EtG sensitivity level to 200 ng/mL improves detection, the reason that the 500 ng/mL cutoff is the suggested standard for criminal justice testing involves the issue of false positives.[104] According to the ASAM's White Paper on Drug Testing, "the EtG immunoassay test is prone to analytical false positives."[105] The white paper points out that many products including mouthwash, cough syrup, and hand sanitizers can produce positive EtG tests.[104] Setting a 500 ng/mL cutoff for EtG tests reduces, but does not eliminate, these false positive tests.[107]

For EtS the suggested standard for criminal justice testing is 100 ng/mL.[108] At that cutoff level the problems with alcohol detection in the short and long term are similar to those described for EtG tests.[109]

Given the possibly of false positives, absent an admission of drinking by the probationer, all positive EtG/EtS test results must be sent for a GC-MS or LC-MS/MS[110] confirmation test.[111]

Beyond the long term detection and false positive issues, the primary problem with urine testing is that the urine specimen can be tampered with.[112] These attempts can include such things as water loading, substituting negative specimens for their own sample, or using a cleaning product.[113] The risk of alteration can be lessened when staff observes all sample collections during testing.[114] Of course the increased staff time can add to the overall cost of the test.

## III. Comparison of Technologies Using Best Practices

The most objective manner for analyzing these alcohol detection technologies requires the application of best practice criteria for court ordered testing. The foremost existing standards were created for drug treatment courts.[115] These standards combine scientific research and case law to create sustainable proven procedures that can be replicated from one court to another.[116] Although there is nothing that requires a court to adopt

these best practices, they have been shown to produce the most reliable results.[117]

Best practices in the area of alcohol testing encompasses the following:[118]

A. Frequent testing

B. Random testing

C. Duration of testing

D. Witnessed collection

E. Valid specimens/accurate results

F. Rapid results

Applying these best practices to the different alcohol testing technologies allows for an objective comparison approach.

### A. Frequent Testing

For individuals suffering from an alcohol use disorder, multiple daily tests have been shown to be effective.[119] Each of the technologies listed are capable of several alcohol tests daily. However, for remote site PBT testing it can be difficult for individuals to report for testing for multiple reasons, including transportation difficulties, staffing requirements, and time commitments.

The LifeSafer unit can be programed to test up to 24 times in a day.[120] Current research suggests that testing that many times is excessive, as PAMs generally can detect alcohol use for three to five hours. Thus, there appears to be a consensus that testing four times per day is adequate for monitoring purposes.[121]

IIDs like PAMs can be used for multiple daily tests, with the caveat that there is a certain level of inconvenience that may create resistance by requiring an individual to go to their car for multiple daily tests.

TAMs, which test for TAC every 30 minutes, are designed to test frequently.

*Best practices for random testing also require the shortest possible time between the notification and the test.*

SSAMs may be programed to test multiple times a day, but the semiconductor technology has difficulty taking consecutive samples in a short period of time.[122] The sensor needs to be rested to allow it to oxidize prior to the next test.[123]

Finally, to accurately detect low-level alcohol use, EtG/EtS tests should be conducted every 12 to 24 hours.

### B. Random Testing

As a participant in a treatment court or in an intensive probationary setting progresses in the program, the number of alcohol and other drug tests should decline.[124] When not testing daily, existing research proves that random testing is more effective than routine testing.[125]

Except for TAMs, each of the listed technologies are capable of random alcohol tests.

Best practices for random testing also require the shortest possible time between the notification and the test.[126] The LifeSafer device, certain IIDs and SSAMs can send immediate test notifications wirelessly.[127] Both remote site PBTs and EtG/EtS must provide time for the individual to travel to the locale of the testing.

### C. Duration of Testing

All these technologies are capable of meeting the long-term probationary testing requirements set by a court.

Except for EtG/EtS, each of the technologies require regular service recalibration. All breath testing devices must be reset in order to ensure that an accurate BrAC result. The same is true of TAM devices. SSAMs however, have a shorter lifespan that may require an increased number of calibrations or replacing the device on longer-term probationary periods.

### D. Witnessed Collection

Individuals attempt to cheat alcohol and other drug tests.[128] Therefore some form of observation of the test is critical.

Remote site PBT tests are observed and meet this best practice. IIDs and PAMs with cameras, like the LifeSafer unit, offer a technological form of observation. These cameras have been shown to be effective in preventing tampering.[129]

Some SSAMs use the smartphone's camera in an attempt to capture the image of the person taking the test. However, the individual's ability to hold the phone and the direction of the camera limits their effectiveness.

Since TAMs are attached to the person, the tests are not "witnessed." As a result, they have been the subject of numerous tampering attempts.[130] One set of case studies in 2012 found over 16% of those wearing a TAM had a tampering incident.[131] In a report issued a year later, by the Virginia Department of Criminal Justice, the number of tampering attempts was almost 24%.[132]

As the technology that is most vulnerable to tampering, EtG/EtS requires observation while an individual is giving a urine specimen. This means the agency must have both male and female collectors.[133]

### E. Valid Sample/Accurate Results

Obtaining a valid sample is necessary to obtain a reliable test.[134] With EtG/EtS, once the procedures to avoid tampering have been established and followed, the only other requirement is an adequate amount of urine.

TAMs take a sample of the ethanol vapor exuding from the skin every 30 minutes.[135] However the delay in the testing period between peak BrAC and when the TAC peaks

*As the technology that is most vulnerable to tampering, EtG/EtS requires observation while an individual is giving a urine specimen.*

is significantly affected by the amount of alcohol ingested.[136] TAMS have difficulty detecting low alcohol use and if sensitivity levels are set too low they can experience a high percentages of false positives.

PAMs, IIDs, PBTs and SSAMs all take breath samples. Each requires an individual to blow into the device to obtain the sample. After alcohol is ingested, it goes into the stomach and small intestine to be absorbed in the blood.[137] The liver breaks down most of the alcohol that has been consumed.[138] Nearly all of the remaining alcohol in the blood is eliminated first through urine and then breath.[139] A sample is taken from breath and any alcohol present is as a result

of alcohol evaporating from the blood into the lungs.[140] When the level of ethanol in the breath is constant, the sample should be taken.[141] The accuracy of the test depends on obtaining alveolar (deep lung) air[142] and the device used. Breath requires a certain volume to obtain a good sample and not all these technologies are equal.

In order to obtain an accurate sample either the device or a person must ensure that a sample of deep lung breath is taken. PBTs are monitored by a person who controls the length of the breath and are very accurate.[143] Devices that meet NHTSA standards, like certain IIDs and the LifeSafer Portable Monitoring Unit's technology, ensure that the volume of breath is sufficient to obtain a valid breath sample.[144]

The LifeSafer Portable Monitoring Unit has a light and tone system to ensure that a sufficient volume of breath is taken.[145] When an appropriate breath sample has been provided, the device notifies the individual with a tone and light to indicate they may stop blowing.[146] If the volume is insufficient, the handset will sound a high-pitched triple-beep and the red abort light will come on.[147]

As far as may be determined, SSAMs do not have technology to ensure the volume of breath is sufficient to obtain an alveolar breath sample. Some of these devices have timers that require an individual to blow into the device for up to five seconds.[148] Others have timers that are set by the user.[149] Some SSAMs requires the individual to whistle or hum as they blow into the device. In one instance, a user was able to "… get a 0.0 reading simply by whistling rather than blowing into the mouthpiece while the test was underway."[150]

SSAMs, along with EtG/EtS and TAMs, can produce false positive readings. EtG/EtS tests are subject to independent confirmation tests; the other two are not. Thus, the problem posed by false positives is greater for SSAMs and TAMs.

### F. Rapid Results

Test results, including confirmation, which are conveyed to criminal justice staff within 48 hours of sample collection are 73% more effective in reducing crime than when results take longer.[151] Moreover, the sooner sanctions are imposed after a missed or positive test, the better the outcomes.[152] Equally, the faster positive rewards are given for negative tests, the more impactful on an individual's behavior.[153] The LifeSafer Portable Monitoring Unit and IIDs have similar abilities to upload the results to court staff in real time.[154] That means they are aware of violations almost as they happen. SSAMs also generally report in real time.

Some older versions of IIDs, PAMs and TAMs upload test information only when the device is calibrated. That means reports about drinking violations can take as long as three months to reach the court.[155]

*Devices that meet NHTSA standards, like certain IIDs and the LifeSafer Portable Monitoring Unit's technology, ensure that the volume of breath is sufficient to obtain a valid sample.*

TAMs can have a substantial delay in providing non-compliance reports to court staff.[156] Some TAM devices are preset to upload results once every 24 hours.[157] This preset has caused reporting problems

and should be changed to allow uploads several times a day.[158] Because of the TAM technology, TAC test results are typically reported to the company for review by company technicians. The company then forwards a report to court staff.[159] A 2012 Virginia report noted that court staff did not receive Friday drinking violations before Monday. The report also noted that internal TAM company's certification issues also added another 24 to 72 hours for test information being transmitted to the court.[160]

EtG/EtS test results can take up to 96 hours before they are available to court staff.[161]

## IV. Technology Testing Costs

In addition to the best practices criteria listed above, courts also consider the cost of the testing procedures when determining what types of devices to use.[162]

TAMs are the costliest of the technologies reviewed here. The installation cost ranges between $50.00–$100.00 with the daily monitoring fee ranging from $10.00–$12.00.[163]

EtG/EtS tests, if conducted daily, are also expensive. An EtG/EtS test costs approximately $8.50 per test.[164]

Remote PBT testing ranges from inexpensive to expensive depending on the location and the service offering the test. For instance, in Pennington County, South Dakota it is $1.00 a test[165] while in Ferndale, Michigan it costs $10.00 a test.[166]

IIDs are more moderate in their pricing. Installation costs range from $70.00 to $150.00 with daily fees of between $2.50 to $3.50.[167]

SSAMs are cheap. The semiconductor devices themselves generally cost less than $200.00.[168] A company can charge a fee of as little as a $1.00 a day.[169]

The newer inexpensive smart phone fuel-cell options have costs that are like IIDs, making them moderately priced from about $2.50 a day to $4.50 a day.[170]

**Technology Testing Costs**

| Device | Cost | Frequency |
|---|---|---|
| TAM | $10–$12 | Daily |
| EtG/EtS | $8.50 | Daily |
| PBT | $1–$10 | Per Test |
| IID | $2.50–$3.50 | Daily |
| SSAM | $1–$4.50 | Daily |
| PAM—LifeSafer | $2--$3 | Daily |

The LifeSafer Portable Alcohol Monitoring Unit is inexpensive with a cost of $2 to $3 a day making it the least expensive of the court admissible technologies to use.[171]

It should be noted that some devices are provided to the supervising authorities on a sliding scale basis or at no cost to the person on probation.

## V. Summary

Except for SSAMs, all these alcohol technologies can assist in the supervision of an individual who has been ordered to refrain from consuming alcohol. Each has their strengths and weaknesses but it is clear that the LifeSafer Portable Alcohol Monitoring Unit is the technology that effectively addresses all of the best practice

criteria and it is cost effective.

Additionally, unlike remote PBT testing, it is capable of testing at any frequency level that a court requires. It does not have the built-in barriers to high frequency testing that IIDs face. Nor does it create the discomfort or potential embarrassment of wearing a TAM. Unlike TAMs, when the need for daily testing ends, the LifeSafer Portable Alcohol Monitoring unit is capable of random testing.

As the LifeSafer Portable Monitor Unit technology is NHTSA-standards compliant, it is capable of testing for alcohol for the duration of an individual's supervision. The camera allows for witnessed testing unlike some other devices. False positives are not an issue for it, unlike SSAMs, EtG/EtS and TAMs. The technology is NHTSA-standards compliant so the science behind its use is well settled. That means the results of its tests are admissible in a probation violation hearing, unlike SSAMs, or the newer, cheaper smartphone fuel-cell versions. It can test for low alcohol use unlike both TAMs and EtG/EtS. The results are available in real time unlike EtG/EtS. Finally, it is the least expensive, court admissible option for alcohol testing of all the existing technologies, due to its lower manufacturing price.

*The LifeSafer Portable Monitoring Unit should be considered the most effective alcohol testing technology for courts supervising probationers with conditions that forbid the use of alcohol.*

This combination of factors suggests that the LifeSafer Portable Monitoring Unit should be considered the most effective alcohol testing technology for courts supervising individuals with probationary conditions that forbid the use of alcohol.

## VI. Endnotes


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