

SOUTH CAROLINA LAW ENFORCEMENT DIVISION



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The "Invalid Sample" message and the BAC DataMaster Infrared Breath Alcohol Measuring Instrument

Introduction and Purpose:

Occasional instances of the message "Invalid Sample" in conjunction with an evidential breath alcohol test or tests taken on the BAC DataMaster family of instruments has led to confusion when inadequate and often contradictory explanations are presented in court, most often by defense "experts" who tend to be both uninformed and unskilled regarding the operation and technology employed by the BAC DataMaster. This work will explain the purpose and function of the "Invalid Sample" system employed by the BAC DataMaster family of instruments, along with some of the more common considerations that should be assessed by the users, prosecutors, defense and courts when presented with this message. All opinions and observations in this work assume, of course, that normal and adequate pre-test protocol (minimum 15 minute deprivation period) has been observed.

Background:

The alcohol measurement of breath is taken from the latter portion of the exhaled breath sample that approximates deep lung air. In order for a subject to provide this sample, the first portion to be seen during any exhalation will be that of mouth air and by its nature will be of a lower alcohol concentration than that of deep lung air. As a person continues to blow, the concentration of alcohol in the breath increases as the air expelled becomes more representative of the deep lung air. At some point, the concentration of alcohol as seen by the measuring instrument achieves a relative uniformity indicating the approximation to deep lung air. If the breath sample is exhaled continuously, this reading can be expected to rise, quickly at first, then more slowly as the concentration becomes more uniform. Under no circumstances, should this reading ever decline during any continuous exhalation. Since the measurement made by the DataMaster is made in "real time" it is possible to evaluate this increasing reading electronically.

If the reading does decrease, for any reason, the assumption is made that this is not an appropriate sample. The test is terminated and the message "Invalid Sample" is displayed.

Operation of the BAC DataMaster:

The BAC DataMaster is designed to measure the alcohol in a breath sample by the introduction of a continuous exhalation of breath blown at a minimum flow rate of around 3 to 4 Liters per minute coupled to a minimum volume of about 1.5 Liters. The instruction we suggest be given to the subjects by the test administrator is to provide a continuous breath until told to stop or until the DataMaster accepts the sample. During this exhalation of breath, the DataMaster is measuring the alcohol level in real time at a rate of 4 times every second. It averages every two consecutive readings and compares each average to the last average. If, in the course of the test, any three sequential averages are determined to be decreasing when preceded by an upward reading, the sample is determined to be not as expected and the test is terminated as an "Invalid Sample."

Assessment of Possibilities and Opinions:

The only certain reason that we can give for any instance in which the "Invalid Sample" message appears is that the reading was going "down" instead of "up" as expected. There can be a number of reasons as to why it can go down. Some of these reasons and our position regarding the probability of each causing the "Invalid Sample" message are as follows:

1. "Invalid Samples" are seen most often on tests where the subject has not provided a continuous sample - as instructed and as the instrument is designed to measure. This can usually be substantiated by the officer's observation and/or the use of a video tape during the test. The starting and (premature) stopping of the blow by the subject, while taking a fresh breath between these blows, sucking backwards instead of blowing, and blowing so softly that the flow rate falls below the minimum are some of the more common tactics, among others. These blowing patterns are, at best, unpredictable, and, at worst, are conducive to conditions that will cause an "Invalid Sample" message to occur. The officer's notes and recollection of the test are of vital importance in substantiating this kind of uncooperative behavior.

Anytime there is a discontinuous blow by the person being tested, and that test results in an "Invalid Sample" message, it can be safely and reasonably assumed that the condition was triggered by the blowing pattern of the individual.

2. One of the symptoms of the presence of fresh "Mouth Alcohol" will be a rapid rise followed by a decline in the reading. However, the wealth of scientific test data that has been accumulated over the past 60 or so years regarding the dissipation of mouth alcohol convincingly supports the position that if the observation period has been satisfied, mouth alcohol is not the cause for any given "Invalid Sample". In the absence of any sign of visible regurgitation on the part of the subject, there is even less of a reason for this to be a consideration. Studies on the retention of alcohol by dental appliances as possibly causing this condition have been shown to not be a significant issue. (1)

One of the common defense claims is that the "burping" of raw alcohol from the stomach is a likely cause of "mouth alcohol" which, in turn, would have caused the "invalid sample." This is not at all likely since alcohol from the stomach would be of an unabsorbed nature and of an extremely high concentration. This being the case, one would expect to see a "detector overflow" condition since alcohol breath of that concentration would exceed the measuring range of the DataMaster.

An additional consideration when speaking of the possibility of a burp bringing up raw alcohol is that adsorption from the stomach is typically complete within 20 to 60 minutes after drinking, although it is possible alcohol consumed with moderate quantities of food can extend this period to up to 90 minutes. A 90 minute absorption period has been shown to be the exception and infrequent. (2) Generally, however, if the test was conducted over 60 minutes after last drinking, this is not a consideration.

3. A variation on the burping argument is the GERDS argument. Most of the same conditions apply here that apply to the "burp". Kechagias, in his study, concluded that the risk of alcohol erupting from the stomach was "highly improbable" (3), and the one case history that is available indicates that it triggers the "Invalid sample" message (4).

Interestingly, most of the "GERDS" defenses we have had occasion to be a party to in court proceedings were cases where the condition was diagnosed but never confirmed. In one instance, the diagnosis was made within 2 days of the start of the trial. This "GERDS" defense appears, at least in some instances, to be a "manufactured" defense.

4. It is possible that the "Invalid Sample" message can be seen as a result of maintenance issues. However, if this is the case, it should be seen repeatedly and on a disproportionate number of tests, including periodic simulator tests.

Opinions and Conclusions:

Should the deprivation period be restarted if the message "Invalid sample" is reported on the first test? We suggest in our manual that a "short waiting period" be observed, but this is only a suggestion and we defer any specific procedure to the state guidelines since they vary somewhat on what action to take. The reason why we only "suggest" a "short" waiting period is simply because if the mandatory waiting period has been observed, the probability of the "invalid sample" being caused by mouth alcohol is virtually nonexistent. All the test data supports this position and therefore there is no need to restart the observation period. The probability that it is being caused by an uncooperative subject is extremely high and will typically be substantiated by the observation of the test administrator. Waiting a few minutes will often result in an "attitude readjustment" on the part of the subject and, in turn, a better sample the second time around.

There is some indication that officer training may play a part since some officers seem better able to coach than others and fewer of the tests they conduct result in "Invalid Samples". Most typically, the aborted test will be followed by a valid test, usually after the subject was advised that if they did not cooperate they would be charged with a refusal. The best breath sample is produced by a continuous exhalation. It does not need to be a hard blow, nor does it necessarily need to continue until the person runs out of breath although it typically will. It needs to continue only to the point where the rise has stabilized and the minimum volume requirement has been satisfied.

A recent study, done by the Forensic Laboratory Services in Vancouver concluded the following: "Our experiment demonstrates that an "INVALID SAMPLE" status message can be generated by improper sample delivery into the BAC Datamaster C when mouth alcohol is not present. This underlines the role of the Qualified Technician to carefully monitor the subject while they are blowing into the instrument. It should also be noted that there were no "INVALID SAMPLE" status messages generated when the subjects were blowing properly. Although mouth alcohol may also trigger an "INVALID SAMPLE", using the standardized field testing protocol and allowing for alcohol's disappearance from the mouth, the results of this study indicate that the most likely cause of an "INVALID SAMPLE" status message is the discontinuous manner of breath sample delivery by the test subject." (5)

Modern breath instruments are designed to help preclude the "invalid samples" caused by the discontinuous blowing patterns of subjects, but there is no way to eliminate them completely. A correct breath exhalation will rarely result in an "invalid sample." The administration of a second complete test, with an appropriate agreement between the two complete tests, lends substantial additional confidence to the evidence. Further, "Invalid sample" messages are seen most often resulting from tests on subjects with higher BrAC levels. Usually over a .15 BrAC, although not always. The higher the alcohol level, the higher the probability that an "invalid sample" condition can be seen when the subject is blowing in a discontinuous manner. It is highly probable that the degree of impairment at these high alcohol levels is more conducive to both uncooperative behavior and to blowing patterns that are abnormal.

The re-initiation of a further observation period after the occurrence of an "Invalid Sample" message on the BAC DataMaster is typically not warranted when the delivery of the subject exhibits a discontinuous pattern of blowing and this pattern is substantiated by the observation of the test administrator. When proper instruction has been provided by the test administrator and the subject continues to exhibit this pattern of blowing contrary to these instructions and the results are additional "Invalid Samples" a charge of "Refusal" is typically justified.

Conversely, anytime the mandatory deprivation period has been observed, and the subject has delivered a continuous breath sample as evidenced by an unbroken audible signal, and the test terminates in an "Invalid Sample", a charge of refusal cannot be justified.

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