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FIGURES

TRAINING GOALS AND OBJECTIVES

Training Goal:

To certify Vermont law enforcement officers in the operation of the DataMaster DMT and enable them to obtain a valid evidential breath sample from a subject to determine the breath alcohol concentration.

Objectives:

As a result of this training, students will be able to:

A) Ensure that an adequate observation period is properly administered prior to obtaining a subject test.

B) Determine that the DataMaster DMT breath testing instrument is prepared to analyze a breath sample.

C) Operate the DataMaster DMT breath testing instrument in accordance with the specified procedure incorporated in this training.

D) Verify that the DataMaster DMT completes and passes all quality control checks prior to obtaining a subject test.

E) Inspect the test record (evidence report) to ensure that all case specific information is recorded accurately.

F) Make a log book entry of the subject test at the time the test is completed.

G) Ensure that the subject has a copy of the evidence report.

H) Be prepared to testify in court about the procedure followed in operating the DataMaster DMT.

SECTION I

SCIENTIFIC PRINCIPLES

The information provided in this section is for reference purposes only. An understanding of this material is not necessary for the effective operation of the DataMaster breath testing device.

SCIENTIFIC PRINCIPLES REGARDING BREATH TESTING

INTRODUCTION:

Breath alcohol testing devices are designed to identify and evaluate the amount of ethyl alcohol (ethanol) in breath samples. These devices can be used for clinical, diagnostic or forensic purposes. The concept of testing breath to evaluate the amount of alcohol present in a person's body has been put into practice for over sixty years. The equipment designed to perform this testing has undergone nearly constant development and refinement through out that time. These devices often incorporate optical, mechanical and electronic components to provide the user with a device that provides consistent and reliable testing for alcohol vapor in both simulated and authentic breath samples.

There are two major aspects of the testing that is done that must be addressed by such equipment. These include qualitative and quantitative analysis.

QUALITATIVE ANALYSIS:

Qualitative analysis in breath alcohol testing is simply the identification of ethanol in the breath sample. The DataMaster does this by considering the unique interaction of infrared energy with the alcohol molecule. Infrared energy is sensed by us as heat. It is a relatively narrow range of energies or wavelengths in the broadly defined electromagnetic spectrum, which includes gamma and x-rays at the high energy end and radio waves at the lower energy end. Infrared energies fall in the slightly lower energy region just beyond visible light. Due to this proximity it is not unusual to sense heat from sources of visible light that are seen as red by our eye and *vice versa.* Just as visible light can be separated into individual bands of color using a glass prism or grating, infrared energies can also be separated with similar devices.

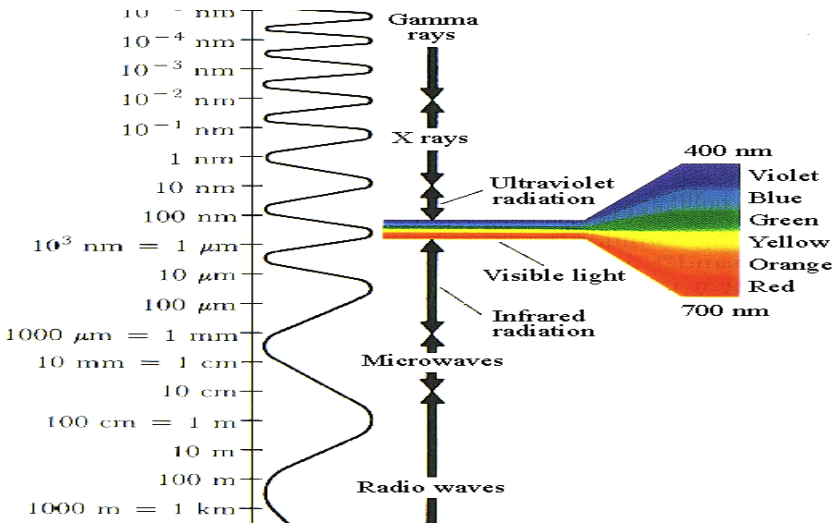


Figure 1: The Electromagnetic Spectrum

A widely used scientific test technology, infrared spectroscopy, uses the phenomenon of the unique pattern of absorption of infrared energy by chemical substances to identify when they are present in a sample. This pattern is referred to as the infrared spectrum or the infrared "fingerprint" of a substance. The DataMaster is designed to measure the absorbance of infrared energies at relatively specific areas of the ethanol spectrum. Energy filters are used which eliminate most of the energies in the beam emitted from the source. These filters are designed to allow only infrared energy with wavelengths in the 3 to 4 micrometer range to reach the detector. Specifically, in the DataMaster DMT, filters allow monitoring of energy absorption at 3.37, 3.44 and 3.5 micrometers because those wavelengths are characteristic for ethyl alcohol. More than one energy or wavelength is measured to be as specific as possible to identify the presence of ethyl alcohol and to minimize the measurement of other chemical substances that may be present in a breath specimen that could interfere with the accurate identification and quantitation of ethyl alcohol.

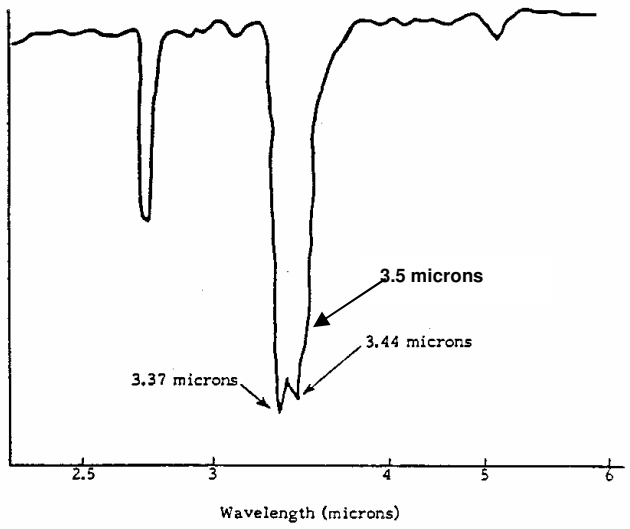


Figure 2: A Partial Infrared Spectrum of Ethanol

QUANTITATIVE ANALYSIS:

The Beer Lambert Law:

The second aspect of testing for alcohol in a breath specimen is the determination of how much ethyl alcohol is present. This is important when the amount present is related to one or more *per se* levels relating to legal sanctions. The ability of infrared breath testing devices, such as the DataMaster, to accomplish this is based on the well-defined scientific Beer-Lambert Law.

This phenomenon was first described by Lambert in the mid-1700's. It simply acknowledges that the absorption of light by substances is directly proportional to the amount of the substance present. An analogy to this as a fairly common experience is the

continuing loss of intensity of light from a source, such as a tail light on a vehicle, as fog forms and gets thicker. The more fog that is present between the source of light and the eye, the less light that reaches the eye. When using breath testing devices, within the range of normal breath alcohol vapor amounts, this relationship can be defined mathematically and is seen as a constant proportion.

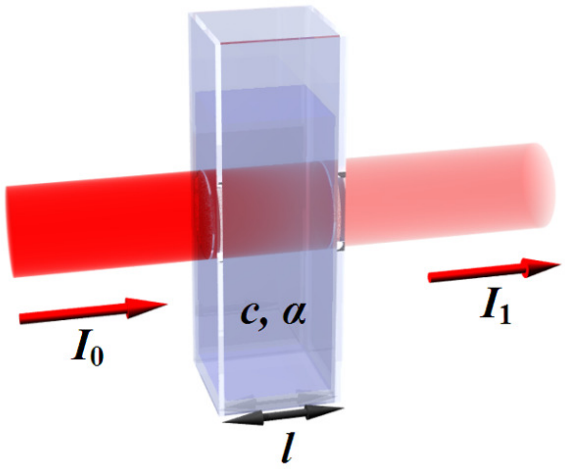


Figure 3: A graphical representation of the Beer-Lambert Law where I_0 is the infrared beam prior to absorption by a substance and I_1 is the infrared beam after absorption.

In the DataMaster there is a source of infrared energy at one end of a chamber and a detector of infrared energy at the other end. When there is no alcohol vapor present in the chamber there is no absorption of the energy by alcohol. As the amount of alcohol vapor increases, the more infrared energy is absorbed by the molecules; therefore, the amount of energy reaching the detector is less. If simultaneous measurements of the amount of alcohol in the chamber and the amount of light being absorbed by the alcohol are made, a graph of that data will demonstrate that a straight line is defined.

This is performed each time a DataMaster is calibrated in the laboratory for use in the field by presenting the DataMaster with a vapor sample of a known alcohol concentration. While we can apply this information graphically, the DataMaster determines the mathematical expression of this relationship and uses it each time a sample of unknown concentration is evaluated.

We can now use the information about the amount of light reaching the detector when there is no alcohol present and the amount of light reaching the detector when a single known amount of alcohol is present to determine the amount of alcohol present in an unknown sample, such as a subject's breath test, based on how much light is absorbed.

Henry's Law:

One further principle in effect in breath alcohol testing involves the distribution of volatile (easily evaporated) substances between a liquid and a gas. In this setting, we are specifically concerned with the distribution of ethyl alcohol between blood and air. This phenomenon was described as a scientific law when it is observed in a closed system under controlled conditions by William Henry in 1803. His law simply states that, in a

closed, fixed system kept at a constant temperature, a volatile substance will come to a constant ratio of amounts between a liquid and in the air space above that liquid. For example, a jar is half-filled with water and a small amount of alcohol is added to the water, then the jar is closed with a lid. The alcohol will eventually appear in both the water and the air above the water. Under the same conditions, and after equilibrium has been reached, the measured amounts of alcohol in the air and in the water will always be the same. This can be defined numerically as a partition ratio.

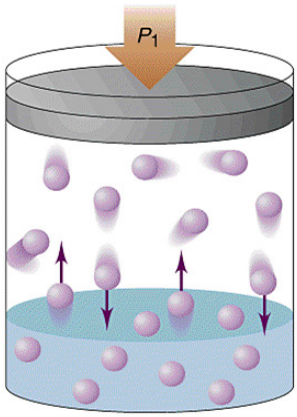


Figure 4: A graphical representation of Henry's Law. In a closed system, the alcohol in the water is in equilibrium with the alcohol in the air.

Although this law applies to closed systems with unchanging conditions, the basic process of a volatile substance being distributed between a liquid and a gas can be seen in humans. These substances pass to and from our blood very efficiently in our lungs. This occurs in a fairly uniform way when a substance such as ethanol is present in a person's blood stream. As the blood circulates through the tissues in the lung, a portion of that alcohol will pass through the membranes of the alveolar sacs and enter the air in the lower part of the lung. As someone exhales, that alcohol will be carried out of the body in the breath. This allows us to identify when there is alcohol in a person's blood.

When a breath from someone with alcohol in their blood is introduced into a DataMaster, the instrument can detect the presence of that alcohol and calculate how much alcohol is present. The ratio of the amount of alcohol in the breath to the amount in the blood is roughly 2100:1. That means that it takes 2100 times as much breath as blood to have the same amount of alcohol in it. Said another way, there is about 2100 times less alcohol in a volume of breath as there is in the same volume of blood if they are measured at about the same time.

The DataMaster is specifically designed to measure the amount of alcohol in the breath and reports a test value as grams of alcohol in 210 liters of exhaled air. This provides breath alcohol concentration values that are in a similar range to those that would be reported for a blood alcohol test that is reported in grams of alcohol per 100 milliliters of blood. However, the DataMaster result is the result for the breath sample delivered to the instrument and is not converted to a blood alcohol concentration.

The Simulator:

One additional association to Henry's Law in the use of a DataMaster for breath alcohol testing is seen when we use a breath simulator device to provide a reference sample during the breath testing sequence. The simulator is designed to contain a solution of water with a small amount of ethanol in it. The simulators in use with the DataMaster are not a part of the DataMaster but a separate device which is used to provide a simulated breath sample containing ethanol vapor to the DataMaster. This is tested and reported by the DataMaster before each subject breath sample is measured as a control check on the system. The instrument is not calibrated by this process.

Figure 5: A simulator used for breath alcohol testing devices, such as the DataMaster.

When the solution in the jar is held at a uniform temperature, the air above the liquid contains a portion of the alcohol as a vapor. When we consider Henry's Law, we can see that the amount of alcohol in the air will be proportional to the amount of alcohol in the water in a uniform way. When we remove a small sample of that vapor for analysis in a DataMaster and replace it with room air, it will re-establish the same liquid to air ratio of alcohol content as it previously had. By carefully preparing a solution of a specific amount of alcohol in water and controlling the temperature of the system we can repeatedly produce a vapor sample that has an amount of alcohol in the same range as what could be expected in a sample of breath from someone with alcohol in their blood. For the simulators attached to the DataMasters we provide simulator solutions that will provide reference vapor samples that contain about the same amount of alcohol as someone's breath that contains 0.10 grams of alcohol per 210 liters of breath.

SECTION II

OPERATIONAL PRINCIPLES

The information provided in this section is for reference purposes only. An understanding of this material is not necessary for the effective operation of the DataMaster DMT breath testing device.

BASIC COMPONENTS OF THE DATAMASTER DMT

THE DATAMASTER DMT OPTICAL BENCH

1) **IR Source**: A lamp which emits infrared energy.

2) **Sample Chamber**: The sample chamber consists of a 23 ml capacity folded light path through which the IR energy passes.

3) **Filters**: Infrared filters specific for wavelengths at 3.37, 3.44 and 3.50 microns.

4) **Calibration Check**: A quartz plate with known infrared absorption for verification of calibration.

5) **Chopper:** A device which breaks up the infrared beam into pulses before they reach the detector in order to provide a reference point on which to measure.

6) **Detector:** Converts the absorbed IR energy into a signal able to be read by the computer.

7) **Microprocessor:** The microprocessor controls the test sequence and all measurements.

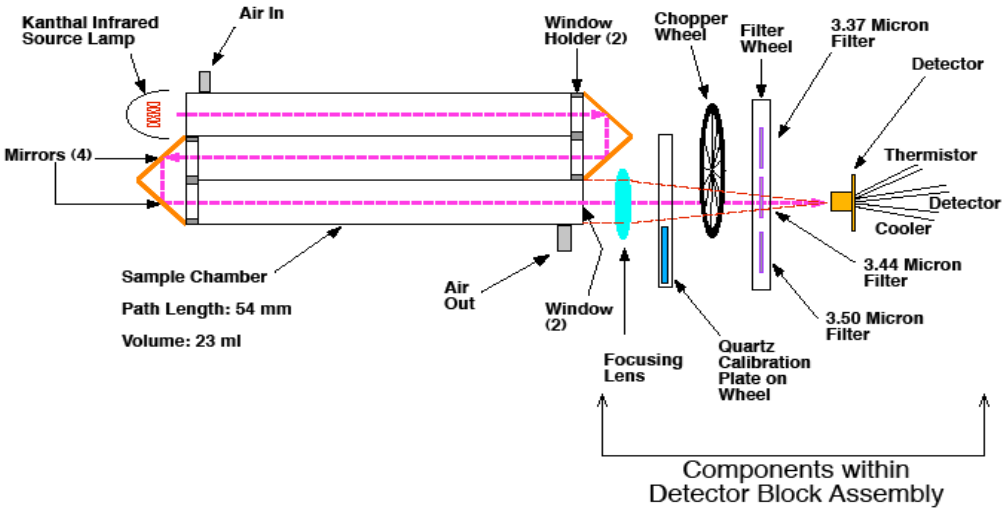


Figure 6: DataMaster DMT Optical Bench

EXTERNAL FEATURES OF THE DATAMASTER DMT

1) **LCD Touch screen**: Identifies each part of the test procedure as it occurs and provides information to the instrument operator to complete the test.

2) **Keyboard:** Used for data entry.

3) **Stylus:** Used to select options in the software.

4) **Power ON/OFF Switch**: Located on the back of the instrument and only to be used under special circumstances as the normal mode for the instrument is to have the power on.

5) **Heated Breath Tube:** The breath tube is electrically heated and provides a path for the breath sample from the mouth piece to the sample chamber. The breath tube also contains a radio frequency antenna.

6) **Simulator:** An external attachment used to simulate a breath alcohol sample containing a known amount of alcohol, used as a quality control check.

Figure 7: The DataMaster DMT

DATAMASTER DMT OVERVIEW

The DataMaster DMT breath testing instrument is designed to undergo a number of processing steps to ensure a fair and accurate analysis of a breath sample introduced to it. These steps include checking components for function, checking detector response, adjusting a measurement baseline to ambient air, introducing a simulated breath containing alcohol vapor, measuring the quality of breath and monitoring heated zones within the system.

The figure below is a general graphic example of the monitoring of a breath sample to ensure that what is measured meets the minimum criteria. As a sample is introduced into the instrument the flow rate is continually monitored. When the minimum flow rate is achieved it must remain at or above that rate for enough time to account for delivery of at least 1.5 liters of breath. Simultaneously the alcohol concentration in the sample is monitored four times per second. A valid breath sample is expected to show a sharp rise and eventual plateau in the alcohol curve as breath continues to flow. If these criteria are met the instrument will report a breath alcohol concentration.

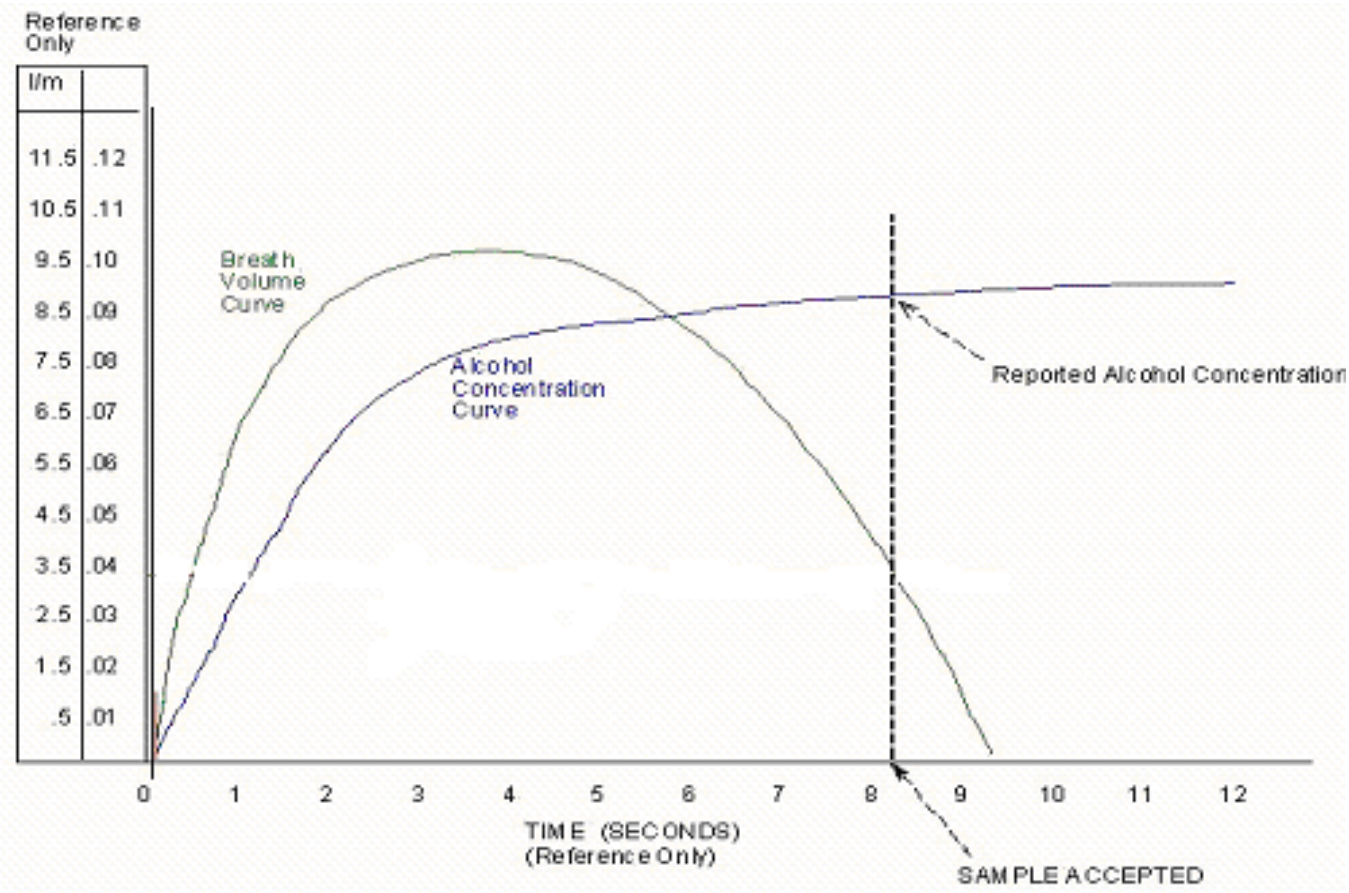


Figure 8: Typical Breath Profile

SECTION III

PROCESS FOR OBTAINING AN EVIDENTIAL SAMPLE

PROCESS FOR OBTAINING AN EVIDENTIAL DUI SUBJECT TEST

PREPARATION:

STEP 1: If the screen saver is active, touch the screen to remove the DataMaster DMT from standby mode.

STEP 2: Confirm that the DataMaster DMT displays "READY, PUSH RUN." If the instrument is turned off or if it displays "NOT IN SERVICE," proceed to a different DataMaster site.

STEP 3: Visually observe the subject for any evidence of food, gum, tobacco or any other foreign matter in the mouth. Ask the subject if he/she has anything in their mouth. Anything in the mouth must be removed prior to starting the next step. Tongue piercings and dentures may remain in the mouth.

STEP 4: The DataMaster DMT is programmed with a mandatory 15 minute timer for the observation period. The 15 minute timer must be satisfied before a subject test is allowed. Press the "START TIMER" button to start the timer.

STEP 5: Observe the subject for 15 uninterrupted minutes. The subject must be within visual and audio proximity for the entire 15 minutes preceding the test. If at any time the subject burps, belches or vomits, the observation period must be restarted. If at any time the subject puts something into or removes something from their mouth, the item must be removed and the observation period restarted.

OPERATING THE INSTRUMENT:

STEP 1: Push "RUN" to begin the test process.

STEP 2: From the "TYPE OF TEST? DUI or CHECK-IN" window select "DUI."

STEP 3: The DataMaster DMT will then display the data entry screen which pertains to the subject and circumstances of the incident. Fill in all required fields. The prompts are addressed in Section IV of this manual, *Data Entry and Review*.

STEP 4: Review the information entered for accuracy.

STEP 5: If the 15 minute timer was not started prior to pressing the "RUN" button, the DataMaster DMT will now prompt "START TIMER?" Press "OK" to start the timer. The test sequence will automatically begin once the 15 minute timer is satisfied.

STEP 6: The instrument will sequentially display the following.

"PURGING"	Room air is being pumped into the sample chamber through the breath tube.
"AMBIENT ZEROING"	Establishing zero reference based on room air in the sample chamber.
"BLANK TEST"	Reports the result of the ambient zeroing.
"CALIBRATION CHECK"	The quartz plate is analyzed to verify that the calibration performed in the laboratory is still valid.
"SIMULATOR VAPOR"	A simulated breath sample is analyzed as a quality control check.

The results of the simulator vapor test should be within +/- 5% of the certified solution concentration. After the simulator vapor is analyzed, the instrument will then display as before:

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

STEP 7: "SUBJECT TAKE TEST? YES or NO"

A) If the subject consents to provide a breath test select "YES"

B) If the subject refuses to provide a breath sample, select "NO". The instrument will then prompt "REFUSAL or INCAPABLE". If the subject is physically incapable of providing a sample, select "INCAPABLE". If the subject refuses to provide a sample, select "REFUSAL". In both instances another box will pop up asking for a reason. Type in a reason why the subject did not provide a sample. The breath testing sequence will automatically end and the evidence reports will print.

STEP 8: If the subject has consented to provide a breath test, the display will flash "PLEASE BLOW" and an intermittent tone will be heard.

A) Insert a new mouthpiece into the breath tube. For sanitary purposes, use the wrapper to avoid directly touching the mouthpiece.

B) Instruct the subject to provide a slow, continuous breath sample through the mouthpiece inserted into the breath tube of the instrument. The internal electronics of the instrument determine when an adequate sample has been obtained.

C) The test operator should hold the breath tube during delivery of the breath sample.

D) As the subject provides an adequate breath sample the words "PLEASE BLOW" will no longer flash, but remain steady on the screen and a constant tone will be heard. An individual should be allowed to deliver a sample for as long as they are able.

E) As the sample is being delivered, the screen will display the breath (blue line) and alcohol (black line) profiles.

F) After an adequate breath sample is obtained, the operator should immediately remove the mouthpiece and discard it.

G) The instrument will display the subject's alcohol result. The test operator should inform the subject of the result of the evidentiary test and ask the subject if they wish to have a second test.

STEP 9: The following displays will then appear on the screen:

"PURGING"

"SUBJECT TAKE SECOND TEST? YES or NO"

A) If the subject declines the second test, the operator should select "NO" and an evidence report will be printed. The evidence report will indicate the result of the evidentiary test and will show "SECOND TEST NOT REQUESTED".

B) If the subject requests a second test, the operator should select "YES". The instrument will then display:

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

"CALIBRATION CHECK"

"SIMULATOR VAPOR"

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

Following completion of the blank test the instrument will again display:

"SUBJECT TAKE SECOND TEST? YES or NO"

C) If the subject has decided not to take a second test, select "NO". The evidence report will show "SECOND TEST NOT REQUESTED".

D) If the subject again consents to a second test, the operator should select "YES". The instrument will display:

"PLEASE BLOW"

E) The operator should insert a new mouthpiece into the breath tube and instruct the subject to provide a breath sample as before.

F) Once the sample is accepted the operator should immediately remove the mouthpiece and discard it.

STEP 10: The evidence report is printed in triplicate at completion of the test sequence and will include all information entered in Step 3, the test sequence(s) and the simulator solution concentration information.

A) One copy of the report should go with the rest of the case paperwork.

B) One copy of the report is retained by the arresting officer.

C) One copy of the report should be given to the subject.

STEP 11: Make entries regarding the test in the DataMaster Operator Use logbook as well as your own personal infrared log, if one is maintained.

PROCESS FOR OBTAINING A CHECK-IN CONFIRMATION TEST

PREPARATION:

STEP 1: If the screen saver is active, touch the screen to remove the DataMaster DMT from standby mode.

STEP 2: Confirm that the DataMaster DMT displays "READY, PUSH RUN". If the instrument is turned off, or if it displays "NOT IN SERVICE," proceed to a different DataMaster site.

STEP 3: Visually observe the subject for any evidence of food, gum, tobacco or any other foreign matter in the mouth. Ask the subject if he/she has anything in their mouth. Anything in the mouth must be removed prior to starting the next step. Tongue piercings and dentures may remain in the mouth.

OPERATING THE INSTRUMENT:

STEP 1: Push "RUN" to begin the test process.

STEP 2: The instrument will then prompt "TYPE OF TEST? DUI or CHECK-IN". Select "CHECK-IN".

STEP 3: The DataMaster DMT will then prompt the operator to enter information which pertains to the subject. The questions are addressed in Section IV, *Data Entry and Review*.

STEP 4: Review the information entered for accuracy.

STEP 5: The instrument will sequentially display the following.

"PURGING"	Room air is being pumped into the sample chamber through the breath tube.
"AMBIENT ZEROING"	Establishing zero reference based on room air in the sample chamber.
"BLANK TEST"	Reports the result of the ambient zeroing.

"CALIBRATION CHECK"	The quartz plate is analyzed to verify that the calibration performed in the laboratory is still valid.
"SIMULATOR VAPOR"	A simulated breath sample is analyzed as a quality control check.

The results of the simulator vapor test should be within +/- 5% of the certified solution concentration. After the simulator vapor is analyzed, the instrument will then display as before:

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

STEP 6: The DataMaster DMT will then flash "PLEASE BLOW" and an intermittent tone will be heard.

A) Insert a new mouthpiece into the breath tube. For sanitary purposes, avoid directly touching the mouthpiece.

B) Instruct the subject to provide a slow, continuous breath sample through the mouthpiece inserted into the breath tube of the instrument. The internal electronics of the instrument determine when an adequate sample has been obtained.

C) The test operator should hold the breath tube during delivery of the breath sample.

D) As the subject provides an adequate breath sample the words "PLEASE BLOW" will no longer flash, but remain steady on the screen and a constant tone will be heard. An individual should be allowed to deliver a sample for as long as they are able.

E) While the subject is blowing the screen will display the breath (blue line) and alcohol (black line) profiles.

F) Once an adequate sample is accepted the operator should immediately remove the mouthpiece and discard it.

STEP 7: The evidence report is printed in triplicate at completion of the test sequence and will include all information entered in Step 3, the test sequence(s) and the simulator solution concentration information.

A) One copy of the report should go with the rest of the case paperwork.

B) One copy of the report is retained by the arresting officer.

C) One copy of the report should be given to the subject.

STEP 8: Make entries regarding the test in the DataMaster Operator Use logbook as well as your own personal infrared log, if one is maintained.

SECTION IV

DATA ENTRY AND REVIEW

INSTRUMENT QUESTION DISPLAYS AND FORMAT

DUI SUBJECT TEST:

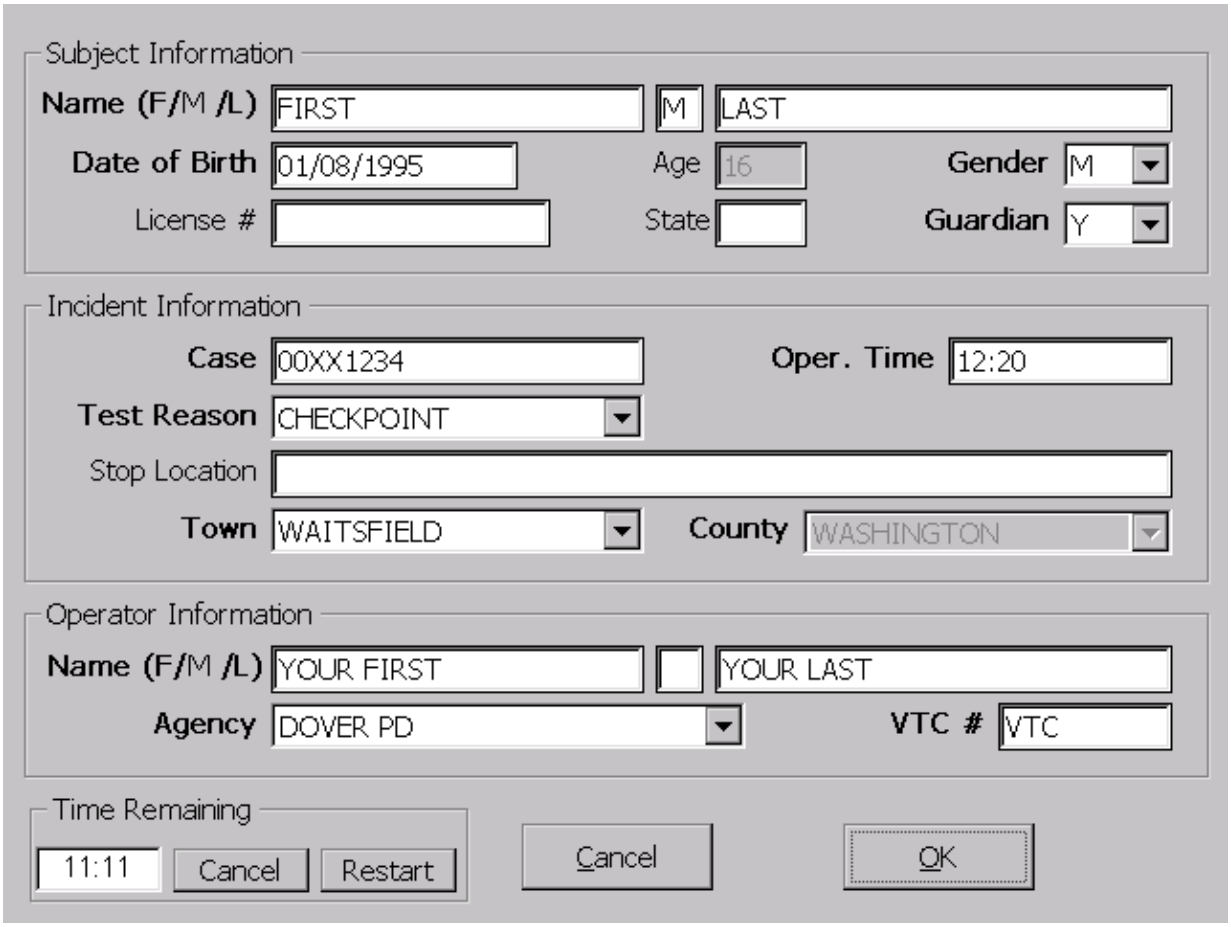


Figure 9: DUI Subject test data entry screen

A) Enter information in the boxes as requested.

B) All boxes in which the command is **bold** are required fields.

C) Use [TAB] on the keyboard to move between fields.

D) Subject Info

- **a. Name (F/M/L):** The suspected DUI subjects first, middle initial and last name (middle initial not required).
- **b. Date of Birth:** Once the date of birth has been entered the DataMaster DMT will automatically populate the age field.

c. **Guardian:** If the subject is under 18 years of age, the Guardian box will become active. If a guardian is present select "Y" if not select "N".

d. **Gender:** Select "M" for male and "F" for female.

e. **License # / State:** Enter the ID number and state of issue if available (not required).

E) Incident Info

a. **Case:** The case number assigned by the processing agency.

b. **Oper. Time:** The time the subject was operating, attempting to operate or in actual physical control of the motor vehicle.

c. **Test Reason:** Select either "CRASH," "STOP," "CHECKPOINT," or "OTHER".

d. **Stop Location:** The location where the incident occurred. Up to 40 characters may be entered (not required).

e. **Town:** The name of the town in which the incident occurred. To select a town, scroll through the alphabetical list or jump to the first letter of the town name by pressing the corresponding letter on the keyboard.

f. **County:** This field will automatically populate based on the town entered.

F) Operator Info:

a. **Name (F/M/L):** The processing officer who is operating the DataMaster DMT first, middle initial and last name (middle initial not required).

b. **Agency:** The name of the agency for which the processing officer works. To select an agency, scroll through the alphabetical list or jump to the first letter of the agency name by pressing the corresponding letter on the keyboard. Data entry is allowed if the agency is not listed.

c. **VTC #:** The test operator's Vermont Traffic Complaint (VTC) number used in traffic violation cases.

G) Once all of the information is entered select "OK" on the screen or press [ENTER].

H) A box will pop up prompting "Would you like to review your data? YES or NO". Select "YES".

I) Once all data is correct select "OK" or press [ENTER]. The box requesting data review will pop up again. Select "NO" once you have reviewed your data and you wish to proceed to the test sequence.

CHECK-IN CONFIRMATION TEST:

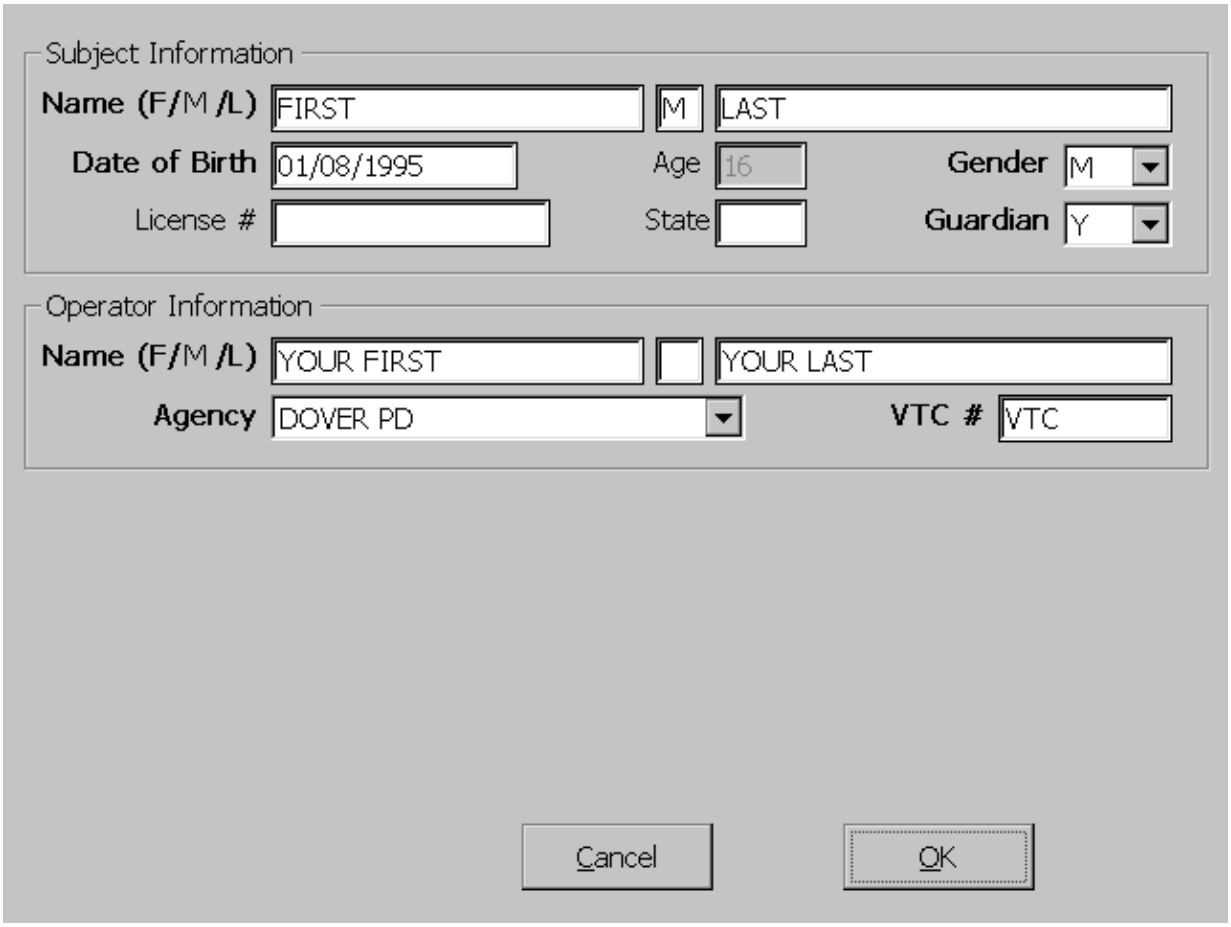


Figure 10: Check-In data entry screen

A) Enter information in the boxes as requested.

B) All boxes in which the command is **bold** are required fields.

C) Use [TAB] on the keyboard to move between fields.

D) Subject Info

- **a. Name (F/M/L):** The subjects first, middle initial and last name (middle initial not required).
- **b. Date of Birth:** Once the date of birth has been entered the DataMaster DMT will automatically populate the age field.

c. **Guardian:** If the subject is under 18 years of age, the Guardian box will become active. If a guardian is present select "Y" if not select "N."

d. **Gender:** Select "M" for male and "F" for female.

e. **License # / State:** Enter the identification number and state of issue if a license is available.

E) Operator Info:

a. **Name (F/M/L):** The processing officers first, middle initial and last name (middle initial not required).

b. **Agency:** The name of the agency for which the processing officer works. To select an agency, scroll through the alphabetical list or jump to the first letter of the agency name by pressing the corresponding letter on the keyboard. Data entry is allowed if the agency is not listed.

c. **VTC #:** The test operator's Vermont Traffic Complaint (VTC) number used in traffic violation cases.

F) Once all of the information is entered select "OK" on the screen or press [ENTER] on the keyboard.

G) A box will pop up prompting "Would you like to review your data? YES or NO." Select "YES" and review all data entered.

H) Once all data is correct select "OK" or press [ENTER]. The box requesting data review will pop up again. Select "NO" once you have reviewed your data and you wish to proceed to the test sequence.

TIME RESTRICTIONS ON DATA ENTRY AND PROCESSING

Once the 15 minute observation timer is satisfied, the DataMaster DMT Operator will have an additional ten (10) minutes to press the "RUN" button and begin data entry. If the "RUN" button is not pressed in this time, the 15 minute observation timer will need to be restarted.

When prompted to enter data five (5) minutes is allotted. If data entry is not finished within the five (5) minutes the instrument will return to "READY, PUSH RUN".

When prompted to make a decision such as "SUBJECT TAKE TEST? YES or NO" or "USE PREVIOUS DATA," one (1) minute is allotted.

When prompting "PLEASE BLOW" the subject will have two (2) minutes to provide an adequate breath sample. If at the end of this time an adequate breath sample has not been provided the instrument will prompt "SUBJECT TAKE TEST? YES or NO." After three failures to obtain an adequate breath sample the instrument will rerun its quality control checks. It will then allow the subject up to three more two minute opportunities to provide an adequate sample. All completed and/or attempted breath tests will be documented on the evidence report.

SECTION V

UNDERSTANDING TEST REPORTS

EXAMPLES OF BREATH AND ALCOHOL GRAPHS

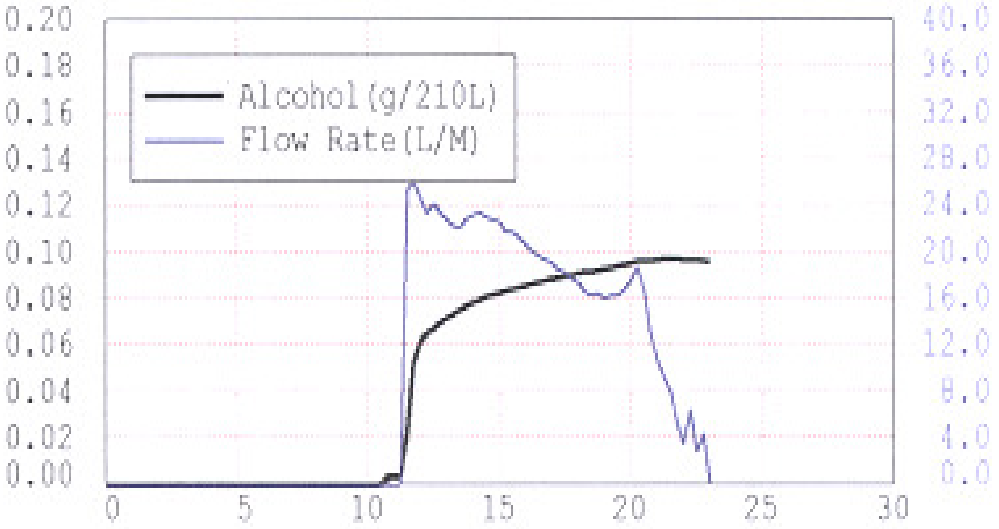


Figure 11: Normal breath pattern and alcohol curve.

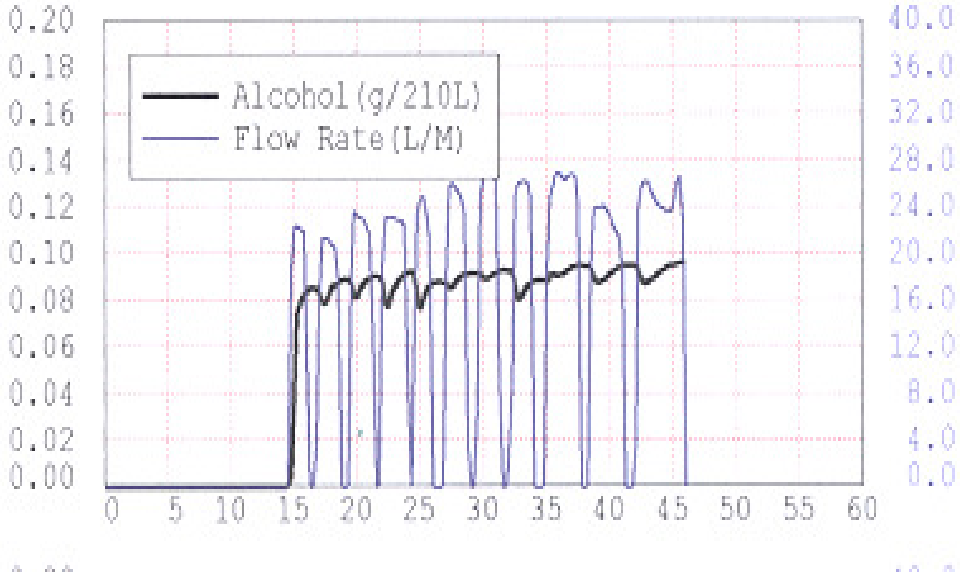


Figure 12: Huffing and puffing breath pattern

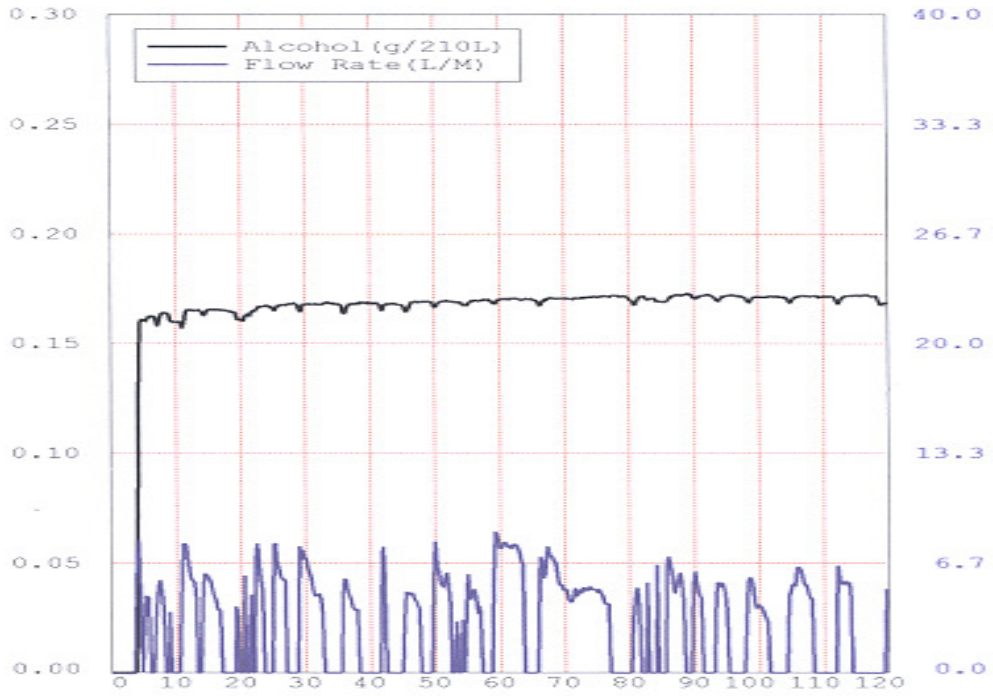


Figure 13: Incomplete breath sample with huffing and puffing.

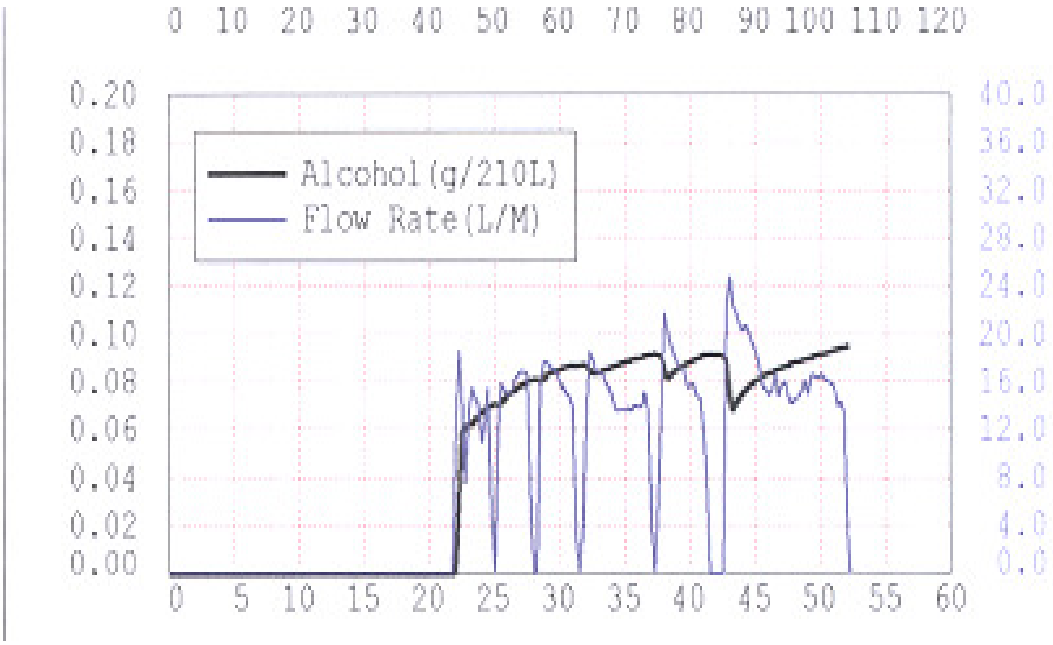


Figure 14: Starting and stopping, attempting to deliver a complete sample

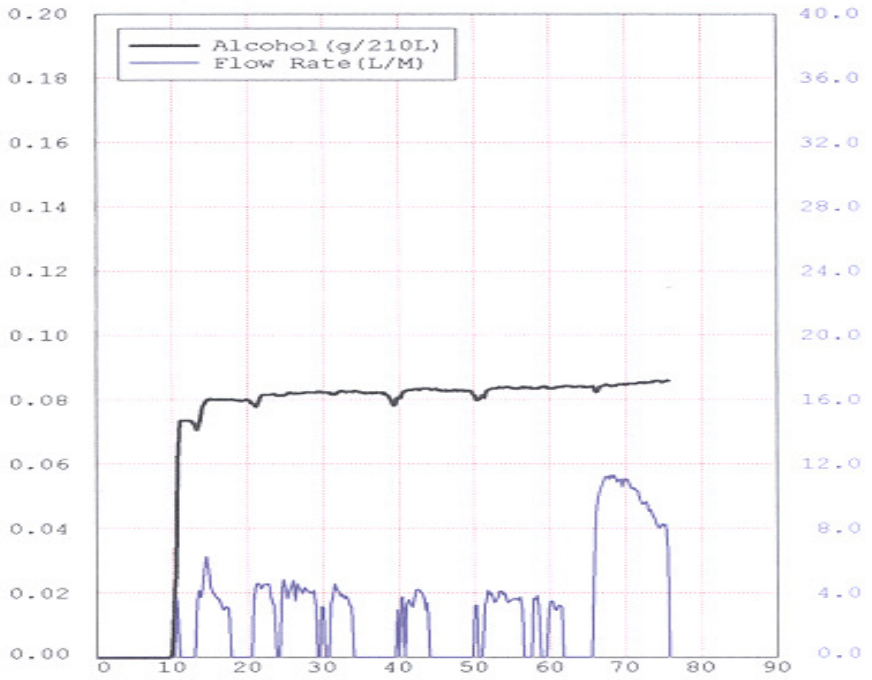


Figure 15: Low breath flow followed by a full breath

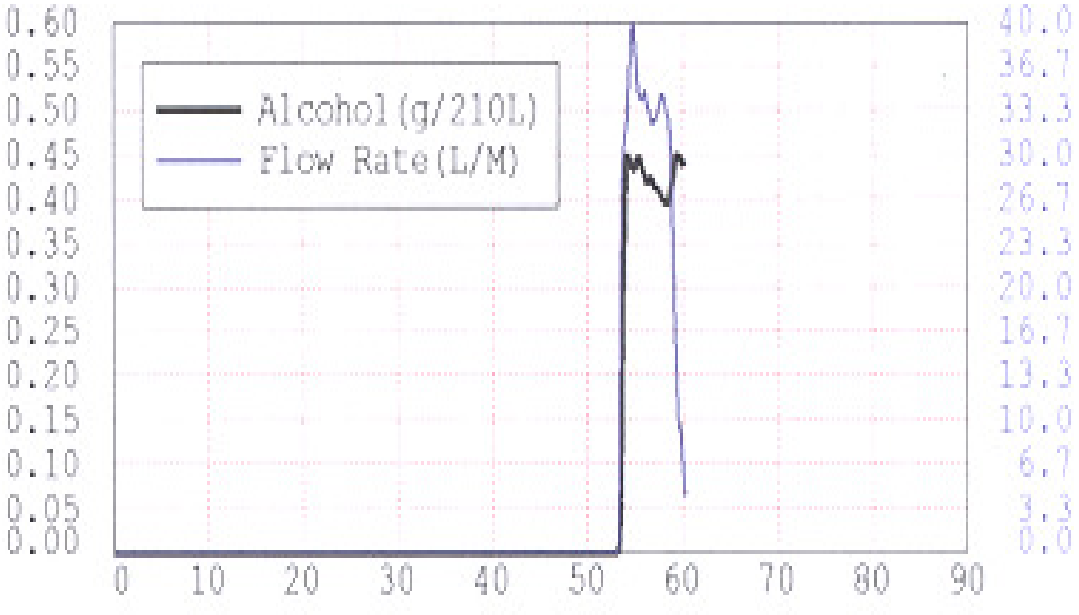


Figure 16: Mouth Alcohol

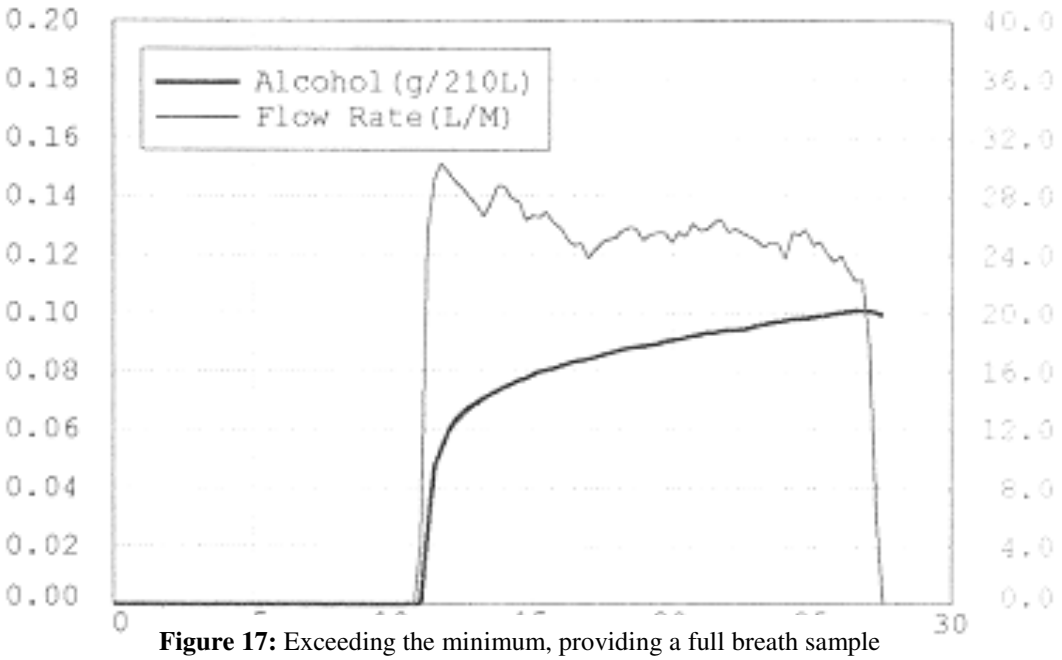


Figure 17: Exceeding the minimum, providing a full breath sample

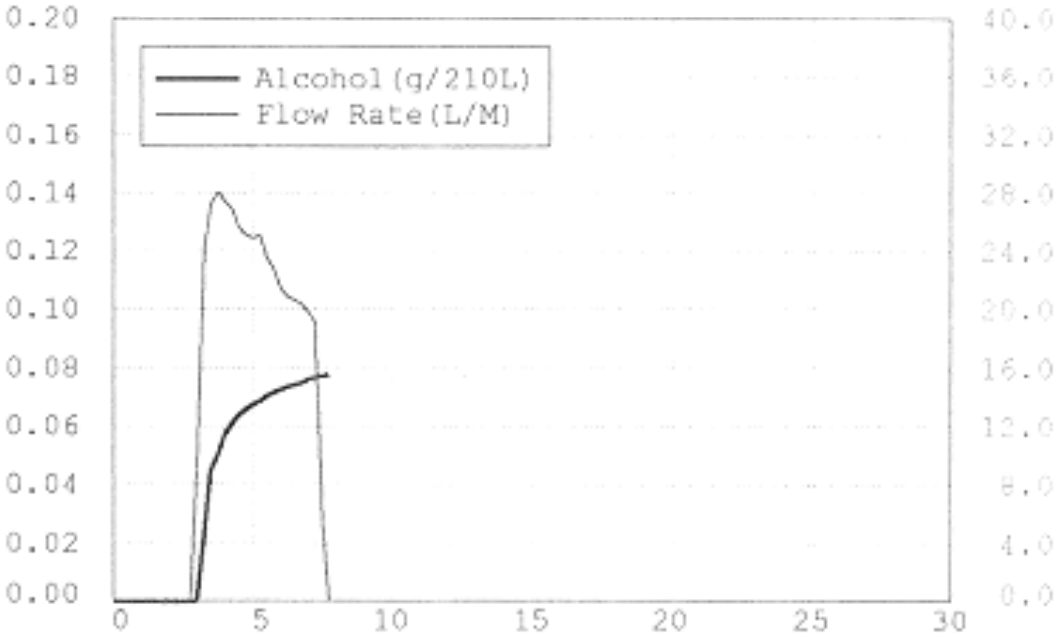
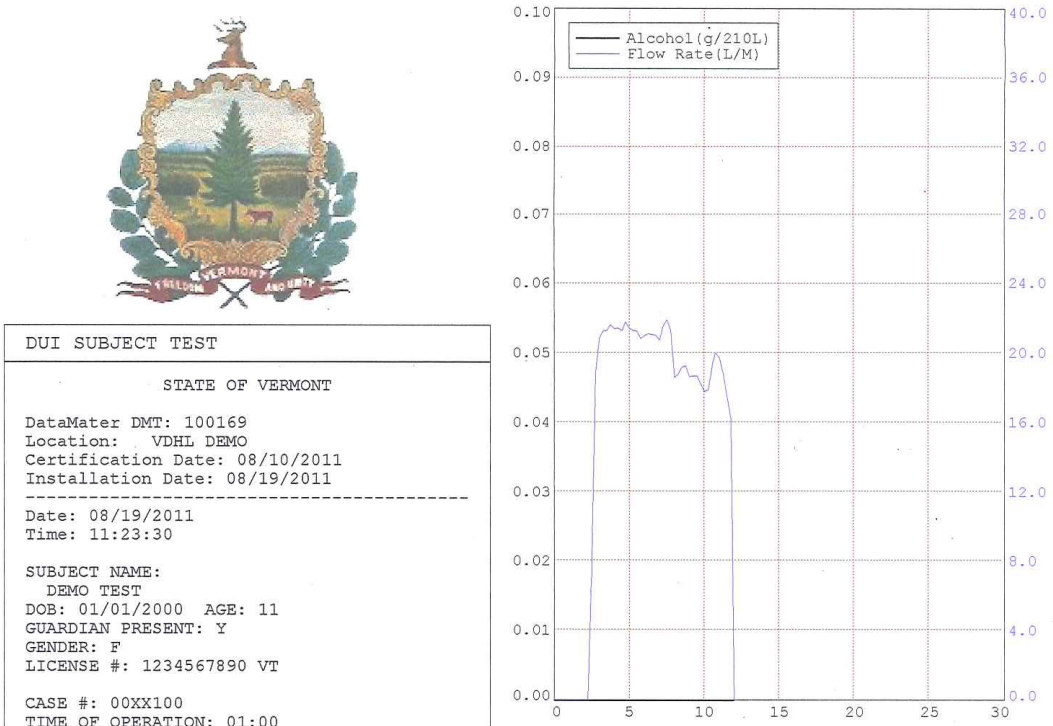


Figure 18: Meeting the minimum breath volume criteria

Figures 17 and 18 are consecutive breath samples from the same individual. In figure 17, the subject provided a full breath sample until they could no longer blow out. In this sample the breath volume measured approximately 6.8L and the alcohol result was 0.099g/210L. In figure 18 the same subject only provided a partial breath sample. While they met the minimum volume requirement, the individual did not blow out to their full capacity. In this sample, the breath volume measured approximately 1.7L and the alcohol result was 0.077g/210L.

EXAMPLES OF SUBJECT TEST REPORTS



DUI SUBJECT TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/19/2011
Time: 11:23:30

SUBJECT NAME:
DEMO TEST
DOB: 01/01/2000 AGE: 11
GUARDIAN PRESENT: Y
GENDER: F
LICENSE #: 1234567890 VT

CASE #: 00XX100
TIME OF OPERATION: 01:00
LOCATION OF INCIDENT:
LOCATION
TOWN: ADDISON
COUNTY: ADDISON

TEST OPERATOR NAME:
AMANDA BOLDUC
AGENCY: VDHL

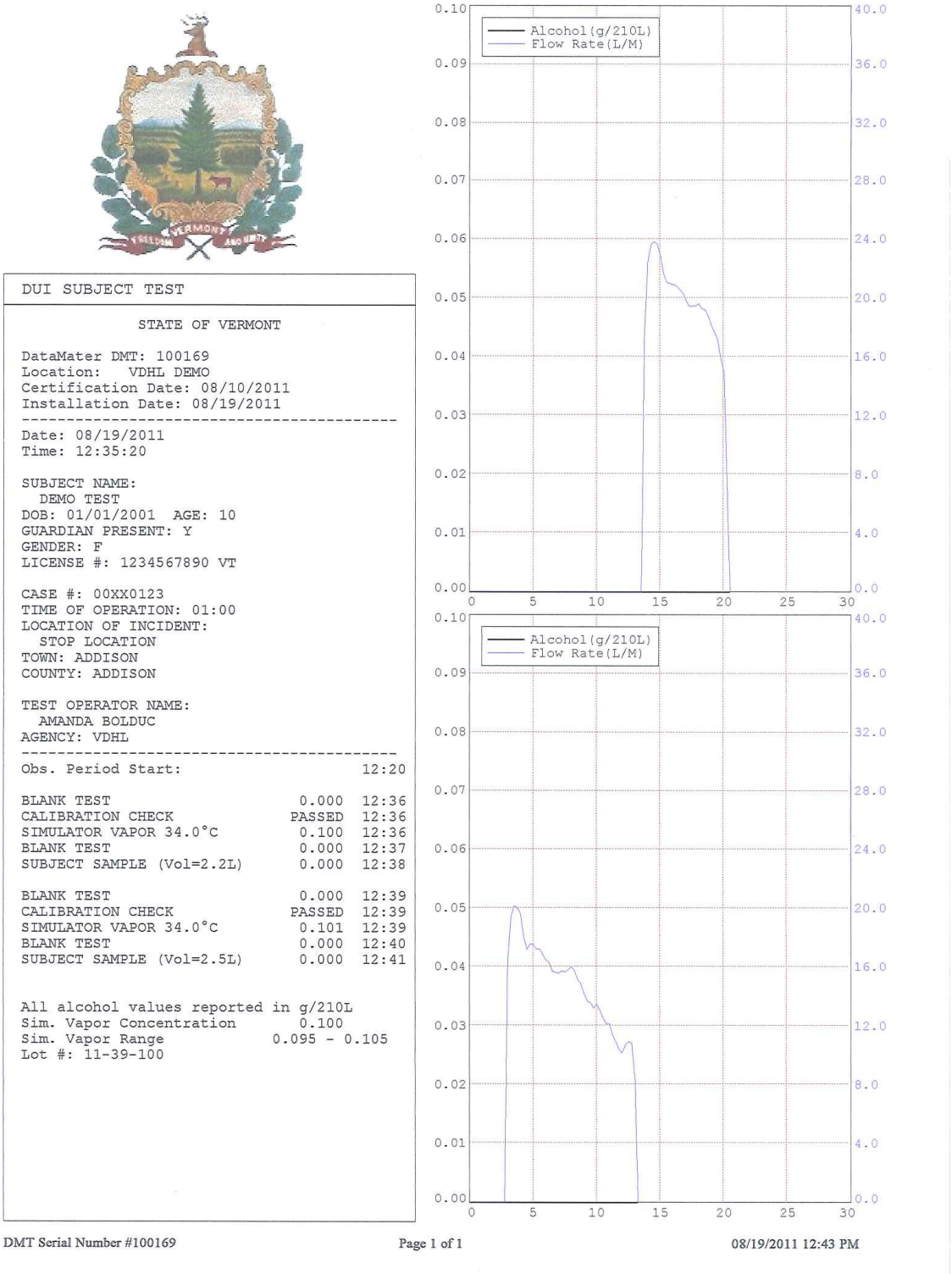
Obs. Period Start:		11:08
BLANK TEST	0.000	11:24
CALIBRATION CHECK	PASSED	11:24
SIMULATOR VAPOR 34.1°C	0.100	11:24
BLANK TEST	0.000	11:25
SUBJECT SAMPLE (Vol=3.1L)	0.000	11:26

2nd TEST NOT REQUESTED

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-39-100

DMT Serial Number #100169 Page 1 of 1 08/19/2011 11:30 AM

Figure 19: One test DUI Subject Report



DUI SUBJECT TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/19/2011
Time: 12:35:20

SUBJECT NAME:
DEMO TEST
DOB: 01/01/2001 AGE: 10
GUARDIAN PRESENT: Y
GENDER: F
LICENSE #: 1234567890 VT

CASE #: 00XX0123
TIME OF OPERATION: 01:00
LOCATION OF INCIDENT:
STOP LOCATION
TOWN: ADDISON
COUNTY: ADDISON

TEST OPERATOR NAME:
AMANDA BOLDUC
AGENCY: VDHL

Obs. Period Start:		12:20
BLANK TEST	0.000	12:36
CALIBRATION CHECK	PASSED	12:36
SIMULATOR VAPOR 34.0°C	0.100	12:36
BLANK TEST	0.000	12:37
SUBJECT SAMPLE (Vol=2.2L)	0.000	12:38
BLANK TEST	0.000	12:39
CALIBRATION CHECK	PASSED	12:39
SIMULATOR VAPOR 34.0°C	0.101	12:39
BLANK TEST	0.000	12:40
SUBJECT SAMPLE (Vol=2.5L)	0.000	12:41

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-39-100

DMT Serial Number #100169 Page 1 of 1 08/19/2011 12:43 PM

Figure 20: Two test DUI Subject Report

DUI SUBJECT TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/22/2011
Time: 14:25:44

SUBJECT NAME:
FIRST LAST
DOB: 01/01/2000 AGE: 11
GUARDIAN PRESENT: Y
GENDER: F
LICENSE #: 1234567890 VT

CASE #: 00XX12345
TIME OF OPERATION: 01:00
LOCATION OF INCIDENT:
I89 MM20
TOWN: ADDISON
COUNTY: ADDISON

TEST OPERATOR NAME:
YOUR FIRST YOUR LAST
AGENCY: ADDISON COUNTY SO

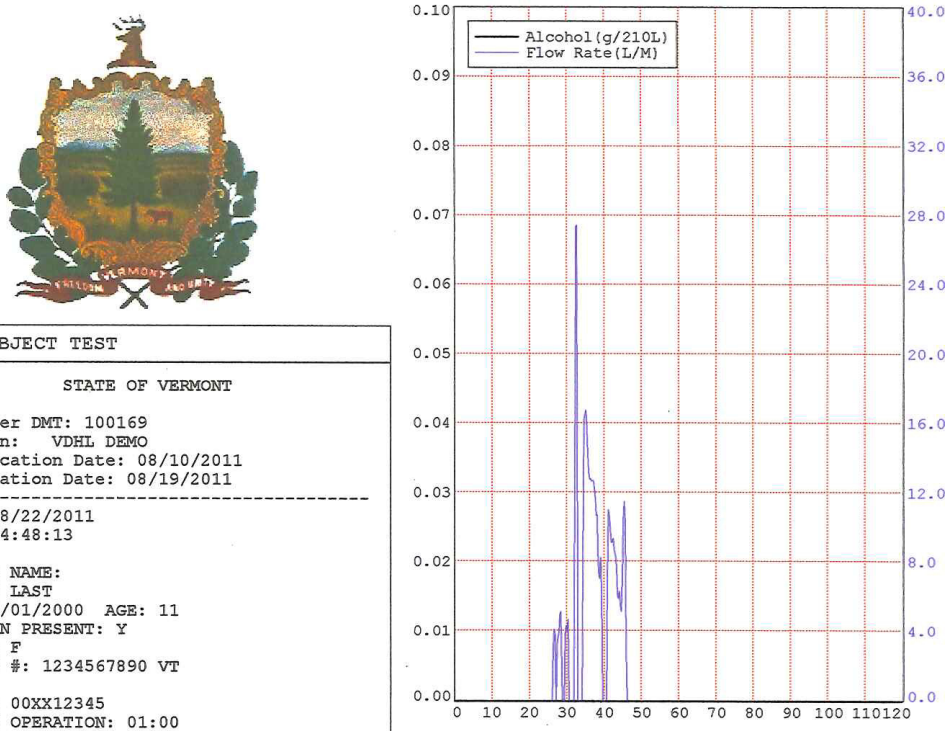
Obs. Period Start:		14:10
BLANK TEST	0.000	14:26
CALIBRATION CHECK	PASSED	14:26
SIMULATOR VAPOR 33.6°C	0.100	14:27
BLANK TEST	0.000	14:28
SUBJECT SAMPLE	REFUSED	14:28

Subject refused.
Reason: Reason for refusal

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-40-100

DMT Serial Number #100169 Page 1 of 1 08/22/2011 2:29 PM

Figure 21: Refusal DUI Subject Report



DUI SUBJECT TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/22/2011
Time: 14:48:13

SUBJECT NAME:
FIRST LAST
DOB: 01/01/2000 AGE: 11
GUARDIAN PRESENT: Y
GENDER: F
LICENSE #: 1234567890 VT

CASE #: 00XX12345
TIME OF OPERATION: 01:00
LOCATION OF INCIDENT:
I89 MM22
TOWN: ADDISON
COUNTY: ADDISON

TEST OPERATOR NAME:
YOUR FIRST YOUR LAST
AGENCY: ADDISON COUNTY SO

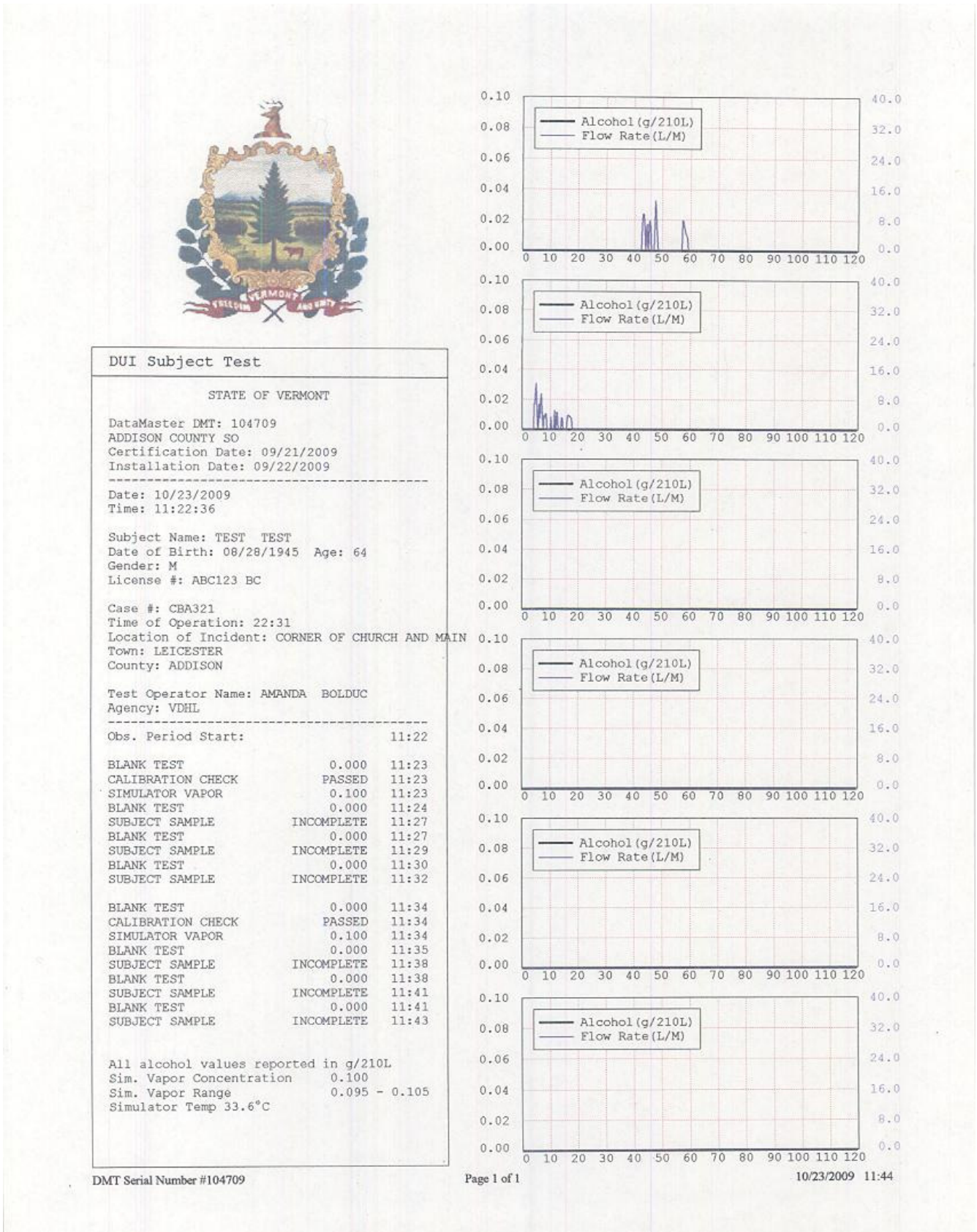
Obs. Period Start:		14:33
BLANK TEST	0.000	14:49
CALIBRATION CHECK	PASSED	14:49
SIMULATOR VAPOR 33.6°C	0.100	14:49
BLANK TEST	0.000	14:50
SUBJECT SAMPLE	INCOMPLETE	14:53
BLANK TEST	0.000	14:53
SUBJECT SAMPLE	REFUSED	14:53

Subject incapable of providing sample.
Reason: could not provide

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-40-100

DMT Serial Number #100169 Page 1 of 1 08/22/2011 2:55 PM

Figure 22: Incapable DUI Subject Report



DUI Subject Test

STATE OF VERMONT

DataMaster DMT: 104709
ADDISON COUNTY SO
Certification Date: 09/21/2009
Installation Date: 09/22/2009

Date: 10/23/2009
Time: 11:22:36

Subject Name: TEST TEST
Date of Birth: 08/28/1945 Age: 64
Gender: M
License #: ABC123 BC

Case #: CBA321
Time of Operation: 22:31
Location of Incident: CORNER OF CHURCH AND MAIN
Town: LEICESTER
County: ADDISON

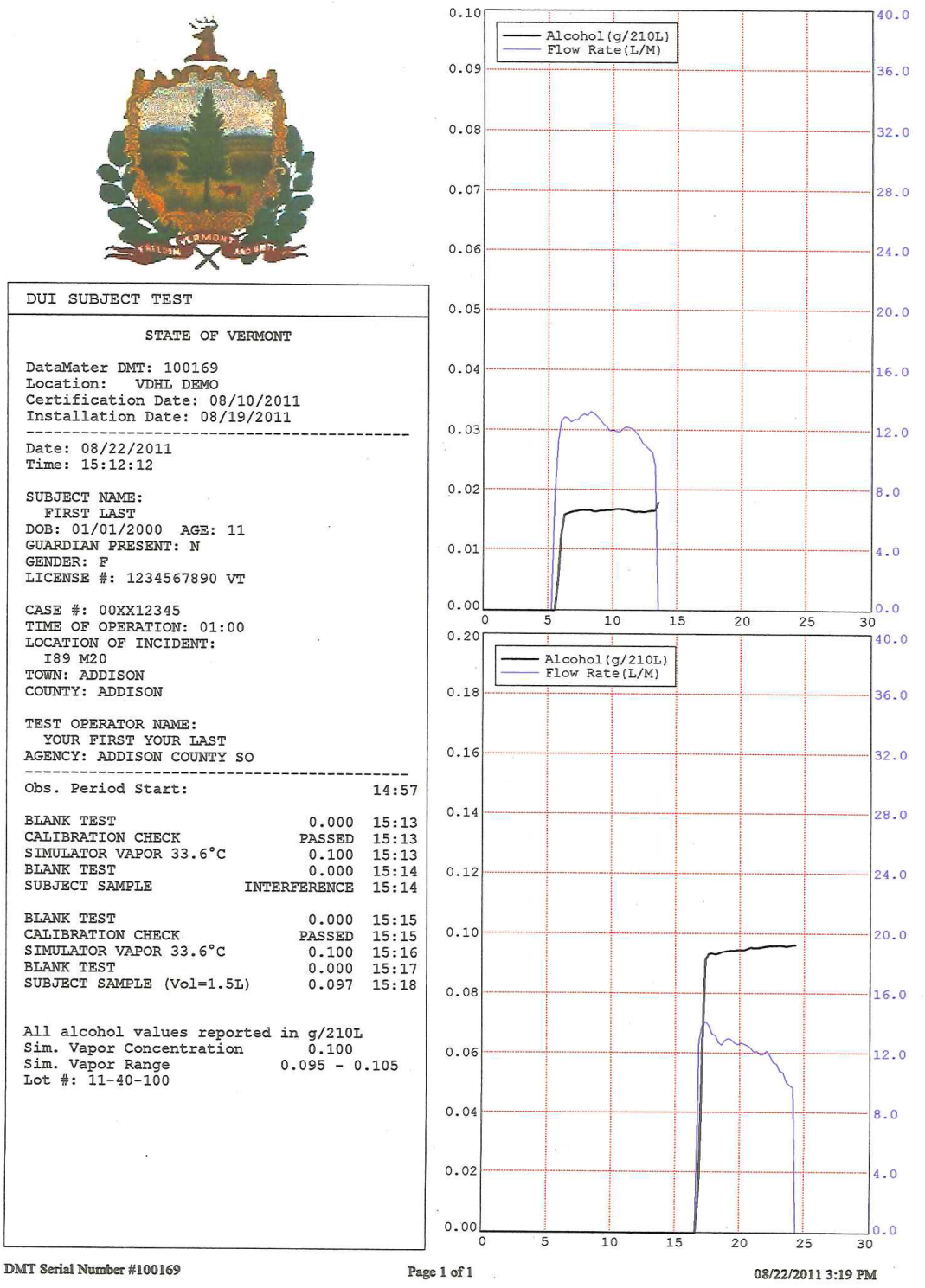
Test Operator Name: AMANDA BOLDUC
Agency: VDHL

Obs. Period Start:		11:22
BLANK TEST	0.000	11:23
CALIBRATION CHECK	PASSED	11:23
SIMULATOR VAPOR	0.100	11:23
BLANK TEST	0.000	11:24
SUBJECT SAMPLE	INCOMPLETE	11:27
BLANK TEST	0.000	11:27
SUBJECT SAMPLE	INCOMPLETE	11:29
BLANK TEST	0.000	11:30
SUBJECT SAMPLE	INCOMPLETE	11:32
BLANK TEST	0.000	11:34
CALIBRATION CHECK	PASSED	11:34
SIMULATOR VAPOR	0.100	11:34
BLANK TEST	0.000	11:35
SUBJECT SAMPLE	INCOMPLETE	11:38
BLANK TEST	0.000	11:38
SUBJECT SAMPLE	INCOMPLETE	11:41
BLANK TEST	0.000	11:41
SUBJECT SAMPLE	INCOMPLETE	11:43

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Simulator Temp 33.6°C

DMT Serial Number #104709 Page 1 of 1 10/23/2009 11:44

Figure 23: Incomplete sample DUI Subject Report



DUI SUBJECT TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/22/2011
Time: 15:12:12

SUBJECT NAME:
FIRST LAST
DOB: 01/01/2000 AGE: 11
GUARDIAN PRESENT: N
GENDER: F
LICENSE #: 1234567890 VT

CASE #: 00XX12345
TIME OF OPERATION: 01:00
LOCATION OF INCIDENT:
I89 M20
TOWN: ADDISON
COUNTY: ADDISON

TEST OPERATOR NAME:
YOUR FIRST YOUR LAST
AGENCY: ADDISON COUNTY SO

Obs. Period Start:		14:57
BLANK TEST	0.000	15:13
CALIBRATION CHECK	PASSED	15:13
SIMULATOR VAPOR 33.6°C	0.100	15:13
BLANK TEST	0.000	15:14
SUBJECT SAMPLE	INTERFERENCE	15:14
BLANK TEST	0.000	15:15
CALIBRATION CHECK	PASSED	15:15
SIMULATOR VAPOR 33.6°C	0.100	15:16
BLANK TEST	0.000	15:17
SUBJECT SAMPLE (Vol=1.5L)	0.097	15:18

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-40-100

DMT Serial Number #100169 Page 1 of 1 08/22/2011 3:19 PM

Figure 24: Interference Detected DUI Subject Report

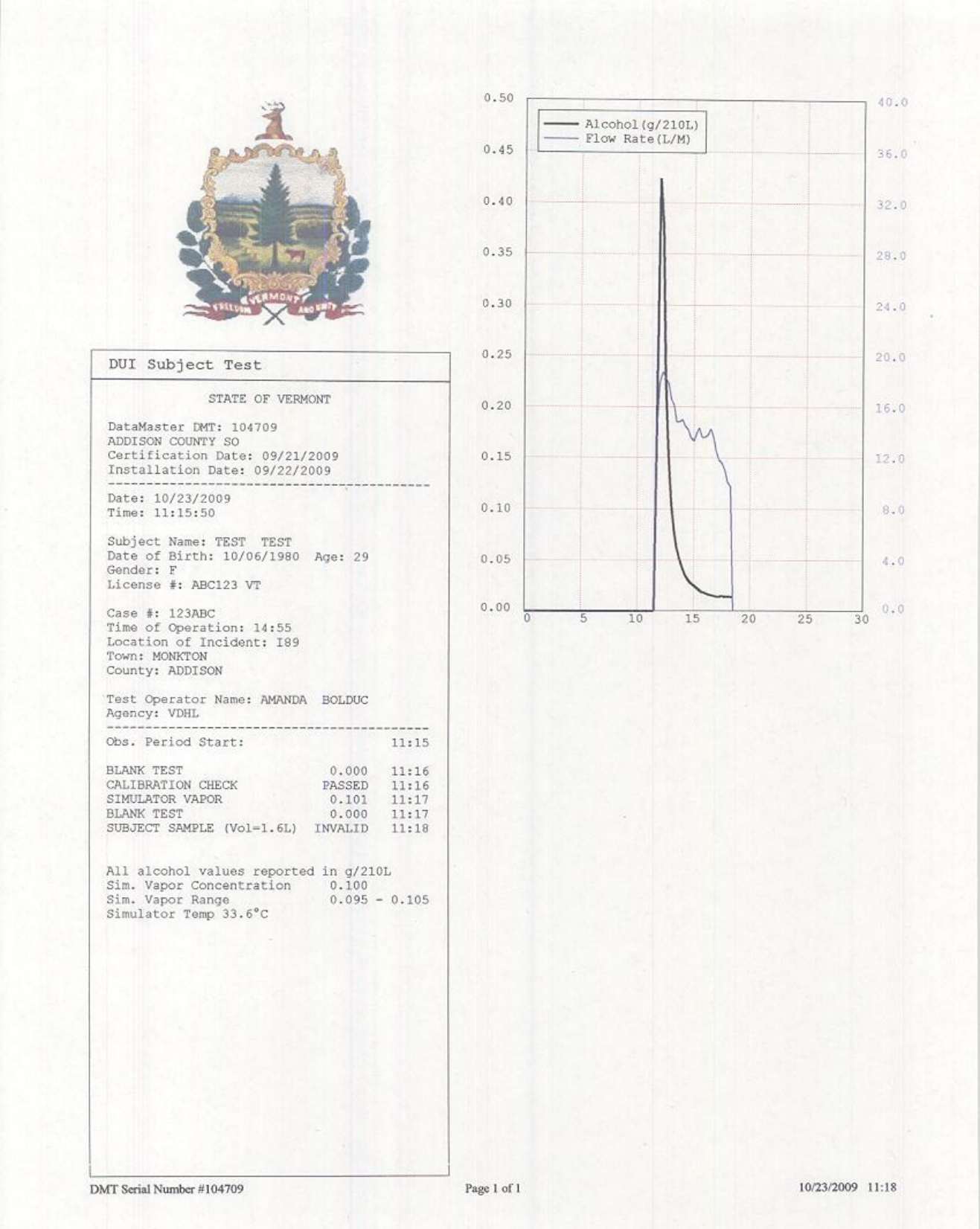
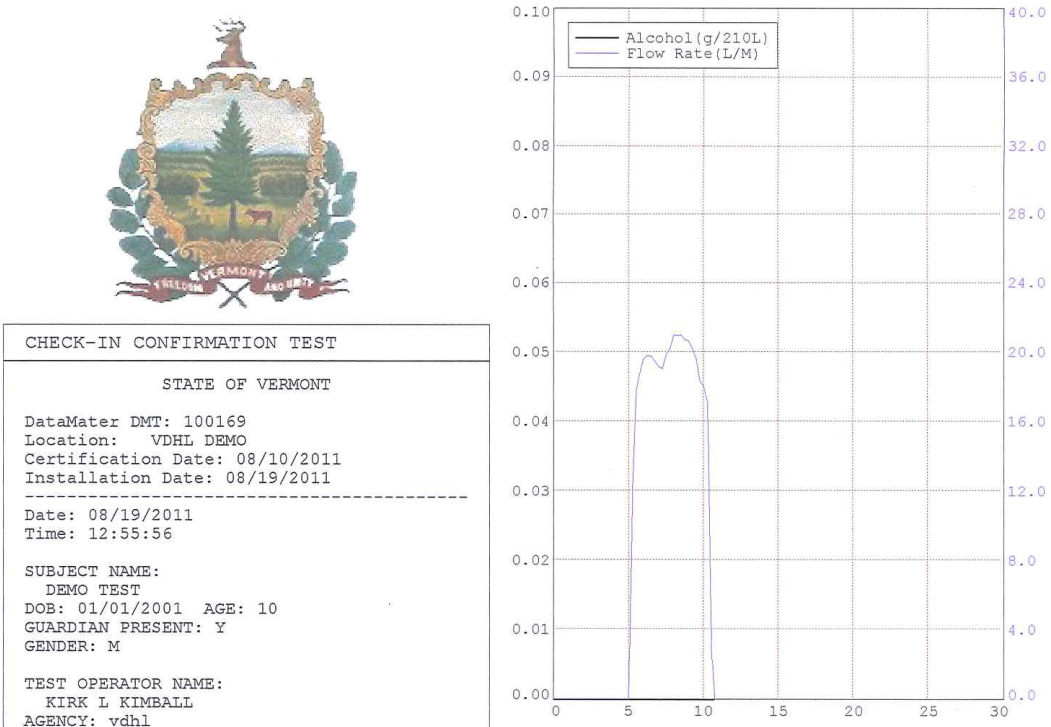


Figure 25: Invalid DUI Subject Report



CHECK-IN CONFIRMATION TEST

STATE OF VERMONT

DataMater DMT: 100169
Location: VDHL DEMO
Certification Date: 08/10/2011
Installation Date: 08/19/2011

Date: 08/19/2011
Time: 12:55:56

SUBJECT NAME:
DEMO TEST
DOB: 01/01/2001 AGE: 10
GUARDIAN PRESENT: Y
GENDER: M

TEST OPERATOR NAME:
KIRK L KIMBALL
AGENCY: vdhl

BLANK TEST	0.000	12:56
CALIBRATION CHECK	PASSED	12:56
SIMULATOR VAPOR 34.1°C	0.100	12:57
SUBJECT SAMPLE (Vol=1.7L)	0.000	12:58
BLANK TEST	0.000	12:58

All alcohol values reported in g/210L
Sim. Vapor Concentration 0.100
Sim. Vapor Range 0.095 - 0.105
Lot #: 11-39-100

DMT Serial Number #100169 Page 1 of 1 08/19/2011 1:00 PM

Figure 26: Check-In Test Report

SECTION VI

ERROR MESSAGES AND RESPONSES

ERROR MESSAGES AND RESPONSES

Some error messages may require a DataMaster Supervisor or the Vermont Department of Health Laboratory to inspect and/or service an instrument. However, when receiving an error message it is permissible to retry the test. If the second attempt results in a passing test, the subject results are acceptable. DataMaster DMT Supervisors should be made aware of any and all errors. Any and all reports generated during a testing sequence including those displaying errors should be retained with the case file.

When encountering error messages that cannot be remedied, post "OUT OF SERVICE" on the DataMaster DMT and leave a **detailed** message for your DataMaster Supervisor.

AMBIENT FAIL: The instrument is detecting alcohol in the ambient air.

- Remove the mouthpiece from the breath tube.
- Remove possible contamination sources from the processing area.
- Open windows or use a fan to draw fresh air into the room if possible.
- Contact DataMaster DMT Supervisor.

BLANK ERROR The instrument is unable to reach zero apparent alcohol.

- Remove the mouthpiece from the breath tube.
- Remove possible contamination sources from the processing area.
- Open windows or use a fan to draw fresh air into the room if possible.
- Contact DataMaster DMT Supervisor.

BREATH TUBE TEMPERATURE OUT OF RANGE The breath tube temperature is not between 30°C and 50°C.

- Check the breath tube connections at the rear of the instrument. Ensure both connections are secure.
- Contact DataMaster DMT Supervisor.

CALIBRATION CHECK ERROR The instrument is not reading the calibration correctly.

- Contact DataMaster DMT Supervisor.

COMMUNICATION ERROR The embedded microprocessor is not communicating with the controller board correctly.

- Turn the instrument off. Wait ten (10) seconds and turn the instrument on.
- Contact DataMaster DMT Supervisor.

DATA ENTRY MISTAKTES An error is noted on the ticket which may include an incorrect date, time, or entry by the operator.

- When the DataMaster DMT reports print, place a single line through the incorrect data and hand write the correct information on all three copies of the report.
- Mark the change with your initials and date.
- Document the discrepancy on your processing form.
- Contact DataMaster DMT Supervisor or Records Administrator to correct any date or time discrepancies on the instrument.

DETECTOR OVERFLOW The detector is out of range or the subject's BrAC is greater than 0.600

- If you suspect the subject's BrAC is over 0.600, seek medical attention.
- Contact DataMaster DMT Supervisor.

FILTER # (1,2,3) WON'T ZERO One of the filters is not reading properly.

- Contact DataMaster DMT Supervisor.

FILTER WHEEL ERROR The filter wheel is not activating properly.

- Contact DataMaster DMT Supervisor.

INCOMPLETE The subject failed to provide an adequate breath sample within two minutes.

- Instruct the subject again on proper delivery of a breath sample.
- If it is clear that the subject is unable to provide an adequate breath sample select the option for "INCAPABLE", have blood drawn.
- If it is clear that the subject is unwilling to provide an adequate breath sample select the option for "REFUSAL".

INTERFERENCE (SIMULATOR SAMPLE) The ratio between the measurements at the three filters is not what is expected for ethanol.

- Try the test again
- Ensure the room temperature is between 65° and 78°F.
- Ensure the ambient air surrounding the instrument is free from alcohol and other contaminants. Ventilate the room if necessary.
- Contact DataMaster DMT Supervisor.

INTERFERENCE (SUBJECT SAMPLE) The ratio between the measurements at the three filters is not what is expected for ethanol.

- When DataMaster DMT prompts "SUBJECT TAKE SECOND TEST? YES or NO" select "YES" and have subject provide a second sample.
- If "INTERFERENCE" message remains you may have subject's blood drawn.

INVALID SAMPLE An abnormal breath profile has been obtained during sample delivery.

- Restart the testing process from the "RUN" screen including the fifteen minute observation period.
- Instruct the subject again on proper delivery of a breath sample.

KEYBOARD DOES NOT FUNCTION

- Disconnect keyboard from the back of the instrument.
- Reconnect the keyboard into the USB port at the back of the instrument.
- Turn the instrument off. Wait ten (10) seconds and turn the instrument on.
- If available try a different USB keyboard.
- Contact DataMaster DMT Supervisor.

LOCKED or FROZEN DISPLAY The instrument is not responding to either the keyboard or the touch screen.

- Turn the instrument off. Wait ten (10) seconds and turn the instrument on.
- Contact DataMaster DMT Supervisor.

PLEASE BLOW flashes but instrument does not accept a sample.

- Refer to graphic display to ensure subject is providing adequate air flow.
- Remove the mouthpiece from the breath tube and replace with a new mouthpiece.
- Have the subject attempt to provide another breath sample.
- Contact DataMaster DMT Supervisor.

PUMP ERROR The flow detector does not detect pump operation or the pump speed is incorrect.

- Ensure the breath tube is free from obstruction during a purge cycle.
- If error remains, turn instrument off for ten (10) seconds and turn back on.
- Contact DataMaster DMT Supervisor.

SAMPLE CHAMBER NOT TO TEMPERATURE Sample chamber is not between 45°C and 55°C.

- Contact DataMaster DMT Supervisor.

SIMULATOR OUT OF RANGE Simulator concentration is not within +/- 5% of the certified concentration.

- Attempt the test again.
- Contact DataMaster DMT Supervisor.

SIMULATOR TEMPERATURE TOO HIGH or TOO LOW Simulator temperature is not within 33.5 and 34.5°C.

- Contact DataMaster DMT Supervisor.

SIMULATOR TIME OUT The simulator took too long to reach plateau while running a Simulator Vapor test.

- Attempt the test again.
- Contact DataMaster DMT Supervisor.

PRINTER PROBLEMS The instrument is unable to communicate with the printer.

- Ensure the USB cable is connected to both the DataMaster DMT and the printer. Ensure the printer is turned on and has sufficient ink and paper.
- Turn the instrument off. Wait ten (10) seconds and turn the instrument on.
- Press the "COPY" button to reprint reports.
- If after several attempts you are unable to get a readable report contact your DataMaster DMT Supervisor or DataMaster Records Administrator. They may be able to remedy the printer problem and will be able to access prior reports.

RADIO FREQUENCY DETECTED A radio frequency transmission has been detected in the testing environment.

- Turn radio off and ensure that there are no active transmitters in the processing area.
- After beginning a new test, answer "Y" to "USE PREVIOUS DATA? YES or NO".

SUCK BACK ERROR Air flow is in the reverse direction during a subject sample delivery.

- Restart the testing sequence. When prompted to use previous timer and use previous data, select "YES."
- Instruct the subject again on proper delivery of a breath sample.

SECTION VII

TESTIMONY PREPARATION

EXAMPLES OF DIRECT EXAMINATION QUESTIONS FOR A POLICE OFFICER TESTIFYING TO AN INFRARED BREATH TEST RESULT

Preliminary questions regarding the officer's training, experience, basis for the stop, investigation, field sobriety testing and other observations will precede testimony regarding the test.

TEST SEQUENCE QUESTIONS:

1) Where did you take the defendant to administer the breath test?
2) Were you the person who administered the breath test to the defendant?
3) What instrument did you use to obtain a breath test from the defendant?
4) Have you received training in the operation of the DataMaster?
5) Where did you receive this training?

(Questions 6-10 are leading but should be permitted as foundational only)

6) Did your training include the procedures for operating the DataMaster?
7) Did you receive any practical experience for operating the DataMaster during your training?
8) Did you pass a written examination as part of your training for operating the DataMaster?
9) Did you pass a proficiency test for operating the DataMaster during your training?
10) How many times have you administered a breath test utilizing the DataMaster?

OBSERVATIONS OF DEFENDANT:

1) Prior to administering the test, did you observe the defendant?
2) For how long did you observe the defendant?
3) During this observation, what were you looking for?

4) As you watched the defendant during the waiting period, did you observe any of the signs that you were trained to look for?

5) If you had observed any of these signs, what would you have done?

ADMINISTERING THE TEST:

1) After observing the defendant, were you prepared to run a test?

2) Was the DataMaster ready to perform a test?

3) How did you know?

4) After ensuring that the DataMaster was ready, what did you do?

5) Did you enter all of the information as requested by the DataMaster?

6) What did the DataMaster do next?

7) Did you attach a new mouthpiece for the subject to give a breath sample through?

8) After the defendant gave a breath sample, did a BrAC value appear on the display?

9) Did a BrAC value print on the evidence ticket?

10) Was the printed evidence ticket, which displays the defendant's results, attached to the case?

11) Do you recognize that printed evidence ticket?

12) How do you recognize the printed evidence ticket?

13) Did the instrument encounter any problems in completing the test?

ADDITIONAL INFORMATION:

The officer should be prepared to testify to how he/she knew that the instrument was operating properly when the test was given.

The best testimony here would be to state that the DataMaster went through its normal procedures of checking itself and that, based on the officer's training and experience, he/she determined the instrument was operating properly.

An officer may be asked to explain how the DataMaster functions. As this class is focused on instructing officers on the proper operation of the instrument and not in the technology behind it, officers should respond to those questions beyond the scope of this training in the following manner:

"I am not qualified to explain that but I do know based on my training and experience that the DataMaster was operating properly at the time of the test."