

CERTIFICATE

I HEREBY CERTIFY to the best of my knowledge, information, and belief, and subject to the penalties of perjury, the following:

I am the custodian of records for the attached records from the office of Maryland State Police - CTAU. The attached records (A) were made, at or near the time of the occurrence of the matters set forth, by (or from information transmitted by) a person with knowledge of those matters, (B) were made and kept in the course of a regularly conducted business activity, and (C) were made and kept by the regularly conducted business activity as a regular practice.

01/06/2012
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CUSTODIAN OF RECORDS

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Signature
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BRIEF HISTORY OF BREATH ALCOHOL TESTING

<u>SCIENTIST</u>	<u>DEVELOPMENT</u>
1803 - W. HENRY	Henry's law, volatile substances. Describes the ratio of the weight of a Gas dissolved in liquid and the air above the liquid.
1874 - F. E. ANSTIE	Experiments with the elimination of Alcohol from the body through breath and urine.
1910 - A. R. CUSHNEY	Reported the applicability of Henry's law to blood and alveolar breath.
1922 - E.M.P. WIDMARK	Developed a scientific formula to estimate a persons BAC when certain elements are known.
1927 - E. BOGEN	First to propose analysis of breath as a test for intoxication.
1930 - LILJESTRAND & LINDE	Determined that the 2100 to 1 @ 34 degrees centigrade (breath to blood) is the correct ratio to be used for breath alcohol analysis.
1931 - R. N. HARGER	Drunkometer invented -1st testing device available for field use.
1941 - GREENBERG & KEATOR	Alco meter - 1 st automated breath testing device.
1954 - R. F. BORKENSTEIN	Breathalyzer invented - 1 st practical portable instrument.
1972	First use of infrared absorption to determine breath alcohol concentration.
1978 - M. FORRESTER	Auto Intoximeter first fuel cell device for field use.
1980 - M. FORRESTER	Intoximeter infrared unit with computer functions.
1987 - M. FORRESTER	Intoximeter/fuel cell integration.

INTRODUCTION

The impact of alcohol's influence on a person's driving ability has been proven to present a hazard to public safety on the highways. To protect the motoring public, the Maryland Vehicle Law in Sec. 21-902 declares this conduct to be unlawful and establishes penalties for this violation.

In CJ 10-301.1 through 10-309, tests for alcohol are established. In this section the Toxicologist, Post Mortem Examiners Commission, is authorized to establish methods and procedures for the analysis of alcohol to be used as evidence in driving while intoxicated or driving while under the influence of alcohol proceedings.

In accordance with this authority, the Legislature has authorized breath alcohol testing as an acceptable procedure for alcohol analysis when performed on an approved breath testing instrument. The Intoximeter Model Intox EC/IR II has been approved by the Toxicologist for breath alcohol testing in Maryland.

The Intoximeter Model Intox EC/IR II's combination of alcohol specific Fuel Cell (Electro Chemical Oxidation) and Infrared absorption (IR) for alcohol detection with modern computer technology produces a breath testing system that is accurate and efficient.

The Intoximeter Model Intox EC/IR II breath test instrument employs the well-established principles of non-dispersive infrared (NDIR) molecular absorption for qualifying alcohol **along** with the primary Fuel Cell detector that qualifies and quantifies alcohol.

The Intoximeter Intox EC/IR II uses a narrow band pass filter to isolate an absorption band at **3.46 microns, which is one of the strong Infrared absorption bands for alcohol.**

EXTERIOR FUNCTIONAL COMPONENTS AND UNITS

The Computer Module houses the computer electronic components and power supply for the Intoximeter Intox EC/IR II. The computer can receive input from the keyboard and the Infrared and Fuel Cell detection assembly. At the rear of the module is a modem connection to allow communication with other computers.

The Digital Display gives the operator information and directions from the computer. All keyboard entries are also displayed on the digital readout before being entered into the computer. The keyboard is a Standard Computer Keyboard.

The Printer gives a permanent record of each test's results. The Printer should always be checked to insure adequate paper supply before running a test. Also the paper should be checked to insure that the paper is coming out of the printer and is not allowed to feed back into the Printer mechanism. Experience has shown that when used with care the Printer will perform very well. But, if abused or misused, the Printer can cause unnecessary downtime for your instrument.

All electronic components produce heat; if allowed to overheat the electronics will not operate properly. For this reason, the Intoximeter has an interior fan that blows air through the instrument to maintain proper operating temperature. The instrument will be trouble free if operated in a clean environment and making sure the ventilation ports are not blocked.

The electronics are also protected from unexpected voltage surges by a UPS (uninterruptable power supply). This will keep the unit functioning for approximately 10 to 15 minutes depending on battery condition.

THE METRIC SYSTEM

A. LENGTH, VOLUME, MASS

ITS BEGINNING

The metric system, a standard method of measuring length, volume, weight and other values, originated in France in the late eighteenth century. Before the French Revolution, Europe had a confusing assortment of units, standards or mass, and measures. During the chaotic revolution in France, the French National Assembly decided to establish a more uniform system of measures (the metric system). Oddly enough, several years earlier, Thomas Jefferson had tried to introduce a similar system in the United States.

The metric system, adopted by France in 1793, was made mandatory there on July 4, 1837. Sixteen years before the French decree, John Quincy Adams advocated the use of the metric system in the United States. Congress however, did not pass a law legalizing the system for the public until 1866.

The metric system today is the legal system of measures in nearly every civilized country. Only in the United States (Burma and Liberia) is it not yet the system generally in use. Repeatedly our nation has approached metrication, but it has always backed away from full embrace. On December 23, 1975, President Gerald R. Ford signed the Metric Conversion Act of 1975, calling for voluntary conversion to the metric system and establishing a U.S. Metric Board to coordinate that conversion.

Even without metric legislation, we have already traveled a considerable distance down that road. Scientists use metric measurements exclusively. So do many of our engineers. The Department of Agriculture reports crop yields in metric tons. The Patent and Trademark Office now requires that patent applications include metric dimensions of items. The metric system is also used by government departments dealing in tariff operations. Most of us are familiar with 350-milligram pills, 35-millimeter cameras and film, hypodermics measured in cubic centimeters (cc's) and cars with engine displacement stated in liters. The airlines have long weighed luggage in Kilograms on overseas flights. We have watched races in the Olympic Games - all in metric. Coca-Cola, 7-Up, Pepsi-Cola and Dr. Pepper now market their products in liter containers. Wines and spirits are now bottled in metric sizes (the familiar fifth has become 750 milliliters).

Even though Congress and the President did not go so far as to require mandatory conversion, most observers see the changeover forthcoming with increasing rapidity.

WHY WE STUDY METRICS

Maryland law presumes persons to be intoxicated at or above a breath alcohol concentration of 0.08 g/210L or 0.08g/100mL of blood.

When we express alcohol concentration with the results of a chemical test, we are indicating a weight by volume relationship. To be specific, we are saying that we found present a certain **weight** of alcohol (expressed in grams) in a certain **volume** (210 liters of breath or 100 milliliters of blood) of the sample from the person tested.

DEFINITIONS

MEASURE OF LENGTH

The metric system was originally based on the distance between the North Pole and the Equator, about 6,200 miles. A line running from the North Pole to the Equator can be divided into 10 million equal parts. Each part is a meter, or 39.37 inches (the meter has since been redefined for even greater accuracy as 1,650,763.73 wavelengths of orange-red light emitted by the Krypton-86 atom).

It is from this length measurement, the meter, that the units of volume and mass are derived. The unit of volume is the liter; and unit of mass is the gram.

MEASURE OF VOLUME

The area of space an object takes up is called the volume or its cubic contents. Using a rectangular box, we can find its volume from the inside dimensions. The result is called its capacity or cubic contents.

The liter is used to measure volume. A liter is equivalent to a cubic decimeter, or 1000 cubic centimeters.

MEASURE OF MASS

The gram is the mass of one cubic centimeter of distilled water at a temperature of 4°C at sea level.

UNITS OF MEASURE

By adding Latin prefixes to the basic units (meter, liter and gram), the names of the units of division (tenths, hundredths, thousandths, etc.) are formed. For example, deci means one-tenth (0.1), centi means one-hundredth (0.01) and milli means one-thousandth (0.001). By adding Greek prefixes to the basic units, the names of the units of multiplication are formed. For example, Deka means 10, Hecto means 100, and Kilo means 1,000. For some of the more common prefixes which are likely to be encountered by chemical test operators, refer to Table I.

For the three basic units of metric measure (meter, liter and gram), refer to Tables II, III and IV.

For some common metric units and their approximate English equivalents, refer to Table V.

UNDERSTANDING THE METRIC SYSTEM

The decimal nature of the metric system is its most distinguishing characteristic. The metric system is referred to as a decimal system because it is based on the powers of ten. This means that as units increase in size, each unit is ten times larger than the preceding unit and conversely, as units decrease in size, each unit is ten times smaller than the previous unit. Refer to Table I.

To change from one unit to another in the metric system, one merely moves the decimal point. When changing from larger units to smaller units, one moves the decimal point the necessary number of places to the right. When changing from smaller units to larger units, one moves the decimal point the necessary number of places to the left.

TABLE I. Commonly Used Metric System Prefixes.

Multiplication factor	Prefix	Symbol	Meaning
1 000 000 000 = 10^9	giga	g	one billion times
1 000 000 = 10^6	mega	m	one million times.
<hr/>			
1 000 = 10^3	kilo	k (K)*	one thousand times
100 = 10^2	hecto	h (H)*	one hundred times
10 = 10^1	deka	da (D)*	ten times

BASIC UNIT OF MEASUREMENT

0.1 = 10^{-1}	deci	d	one tenth of
0.01 = 10^{-2}	centi	c	one hundredth of
0.001 = 10^{-3}	milli	m	one thousandth of
<hr/>			
0.000 001 = 10^{-6}	micro	u	one millionth of
0.000 000 001 = 10^{-9}	nano	n	one billionth of

* The designations in parentheses are used as a learning aid convention for this class only. They do not conform to the standard of the International Committee on Metrics. (i.e. all prefix designators are in lower case.)

TABLE II. The Meter.

Unit	Abbreviation	Size	One meter is equal to:
Gigameter	gm	1 000 000 000 meters	0.000 000 001 gm
Megameter	mm	1 000 000 meters	0.000 001 mm
Kilometer	km	1 000 meters	0.001 km
Hectometer	hm	100 meters	0.01 hm
Dekameter	dam (Dm)*	10 meters	0.1 dam (Dm)*
meter	m	1 meter	1 m
decimeter	dm	0.1 meter	10 dm
centimeter	cm	0.01 meter	100 cm
millimeter	mm	0.001 meter	1000 mm
micrometer	um	0.000 001 meter	1 000 000 um
nanometer	nm	0.000 000 001 meter	1 000 000 000 nm

TABLE III. The Liter.

Unit	Abbreviation	Size	One liter is equal to:
Kiloliter	kl	1000 liters	0.001 kl
Hectoliter	hl	100 liters	0.01 hl
Dekaliter	dal (Dl)*	10 liters	0.1 dal (Dl)*
liter	l	1 liter	1 l
deciliter	dl	0.1 liter	10 dl
centiliter	cl	0.01 liter	100 cl
milliliter	ml	0.001 liter	1000 ml

* The designations in parentheses are used as a learning aid convention for this class only. They do not conform to the standard of the International Committee on Metrics. (i.e. all prefix designators are in lower case.)

TABLE IV. The Gram.

Unit	Abbreviation	Size	One gram is equal to:
Kilogram	kg	1000 grams	0.001 kg
Hectogram	hg	100 grams	0.01 hg
Dekagram	dag (Dg)*	10 grams	0.1 dag (Dg)*
gram	g	1 gram	1 g
decigram	dg	0.1 gram	10 dg
centigram	cg	0.01 gram	100 cg
milligram	mg	0.001 gram	1000 mg

* The designations in parentheses are used as a learning aid convention for this class only. They do not conform to the standard of the International Committee on Metrics. (i.e. all prefix designators are in lower case.)

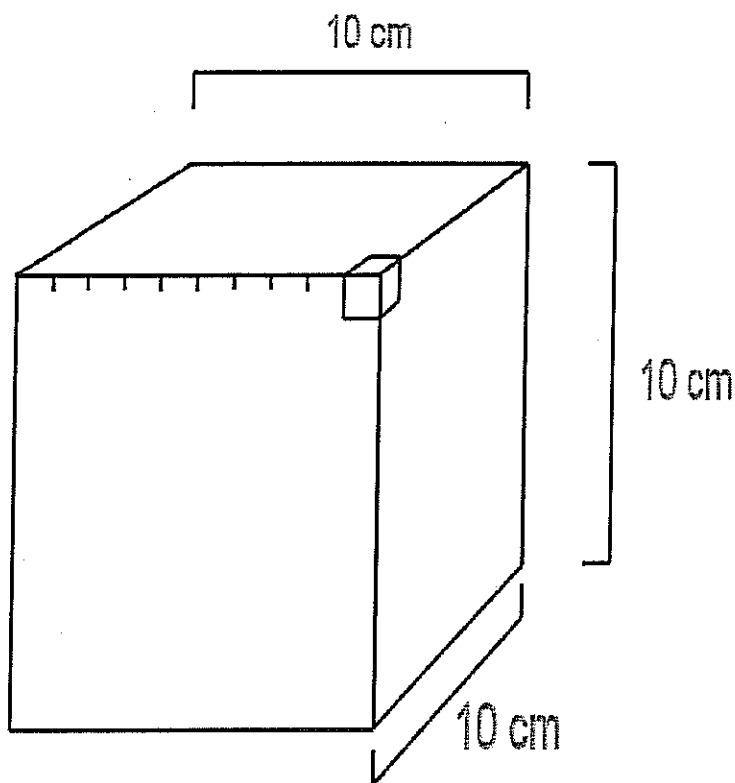
TABLE V.

Common metric units and their approximate English equivalents

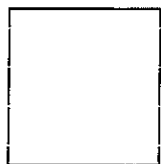
1 meter = 39.37 inches
 2.54 centimeters = 1 inch
 1 liter = 1.06 quarts
 30 milliliters = 1 fluid ounce
 454 grams = 1 pound
 1 Kilogram = 2.2 pounds
 1 dry ounce = 28.3 grams

The **large** cubed figure (10 cm per side) represents 1 liter, the basic unit of measurement of volume in the metric system. This reference volume of water weighs 1 Kilogram (1,000 grams). Also, by interpolation, we can show that this volume can be represented as 1,000 milliliters or 1,000 cubic centimeters. It can further be described as a cubic decimeter (dm³) as it is 1 decimeter (10 centimeters) on each side.

The **small** cube in the upper right corner is 1 cm on each side, a cubic centimeter (cc). This mass of this volume of water at 4° C is referenced as the basic unit of measurement of weight in the metric system; the gram



RELATIONSHIP AMONG MEASURES IN THE METRIC SYSTEM



Volume = length X width X height
 Volume = 10 cm X 10 cm X 10 cm
 Volume = 1,000 cubic centimeters
 1000 ml = One liter = 1,000 cc
 (by definition) therefore, 1 ml = 1 cc

Figure 1. The relationship between length, volume and mass.

One liter is equal to 1,000 cubic centimeters (10 cm X 10 cm X 10 cm). You should already know that one liter = 1,000 milliliters; therefore, one milliliter must equal one cubic centimeter. The weight of this 10 cm cube filled with water is equal to one Kilogram. Therefore, since one Kilogram is equal to 1,000 grams, one cc of water must weigh one gram.

B. TEMPERATURE CONVERSION

FAHRENHEIT- (°F)

This is probably the most familiar temperature scale. On this scale, there are 180 degrees between the freezing and boiling points of water. Water freezes at 32 degrees Fahrenheit and it boils at 212 degrees Fahrenheit. See Chart A

CENTIGRADE-CELSIUS(°C)

Scientific measurements of temperature are generally made by using the Centigrade scale. This may also be referred to as the Celsius scale. Water freezes at 0 degrees Centigrade and it boils at 100 degrees Centigrade. Since there are 100 degrees between the freezing and boiling points of water on this scale, one can see that each degree Centigrade is 1.8 times as large as each degree Fahrenheit. See Chart A

ABSOLUTE- KELVIN(°A or °K)

If it was possible to lower the temperature of something to -273°C, we would call this **absolute zero**, and this would be the zero point on the Absolute temperature scale. The freezing point of water is therefore 273 A (°C), and the boiling point is 373 A (100°C). The size of the degree on the Absolute scale is the same as on the Centigrade scale. Therefore, a temperature on the Centigrade scale is converted to Absolute temperature by adding 273° to the Centigrade reading. This temperature scale must be used to calculate the expansion or contraction of gases. (See Chart A)

TEMPERATURE CONVERSION FORMULAS

$$1 \text{ } ^\circ\text{F} = (1.8 \times ^\circ\text{C}) + 32$$

$$2. \text{ } ^\circ\text{C} = \frac{(^{\circ}\text{F} - 32)}{1.8}$$

$$3. \text{ } ^\circ\text{A} = ^\circ\text{C} + 273$$

Example: Convert 50°C to degrees Fahrenheit.

$$^{\circ}\text{F} = (1.8 \times ^\circ\text{C}) + 32$$

$$^{\circ}\text{F} = (1.8 \times 50) + 32$$

$$^{\circ}\text{F} = 90 + 32$$

$$^{\circ}\text{F} = 122.0$$

Example: Convert 98.6°F to degrees Centigrade.

$$^{\circ}\text{C} = \frac{(^{\circ}\text{F} - 32)}{1.8}$$

$$^{\circ}\text{C} = \frac{(98.6 - 32)}{1.8}$$

$$^{\circ}\text{C} = \frac{(66.6)}{1.8}$$

$$^{\circ}\text{C} = 37.0$$

Example: Convert 34°C to degrees Absolute.

$$^{\circ}\text{A} = ^{\circ}\text{C} + 273$$

$$^{\circ}\text{A} = 34 + 273$$

$$^{\circ}\text{A} = 307.0$$

Example: Convert -10°C to degrees Absolute.

$$^{\circ}\text{A} = ^{\circ}\text{C} + 273$$

$$^{\circ}\text{A} = (-10) + 273$$

$$^{\circ}\text{A} = 263.0$$

Example: Convert 100 °F to degrees Absolute.

To work this problem, we must first change 100°F to a Centigrade temperature. Then proceed with the Absolute conversion formula.

$$^{\circ}\text{C} = \frac{(^{\circ}\text{F} - 32)}{1.8}$$

$$^{\circ}\text{C} = \frac{(100 - 32)}{1.8}$$

$$^{\circ}\text{C} = \frac{(68)}{1.8}$$

$$^{\circ}\text{C} = 37.77$$

$$^{\circ}\text{A} = ^{\circ}\text{C} + 273$$

$$^{\circ}\text{A} = 37.77 + 273$$

$$^{\circ}\text{A} = 310.77$$

CHART A

	F°	C°	A°
Water Boils	212°	100°	373°
Body Temperature	98.6°	37°	310°
Breath Leaves Mouth	93.2°	34°	307°
Room Temperature	70.0°	21.1°	294.1°
Water Freezes	32.0°	0°	273°
	0°	-17.7°	255.3°
Absolute Zero	-459.4°	-273°	0°

UNITS OF MEASUREMENT

<u>METRIC</u>	<u>ENGLISH</u>	<u>CONVERSIONS</u>
1. <u>Weight</u>		
kg = kilogram	lb = pound	1 kg = 2.2 lb
g = gram	oz = ounce	28.35 g. = 1 oz
mg = milligram	---	1000 mg = 1 g
mcg = microgram	---	1000 mcg = 1 mg
2. <u>Volume</u>		
L = liter	qt = quart	1 qt = 0.946 L
mL = milliliter	fl oz = fluid ounce	1 fl oz = 29.6 mL
cc = cubic centimeters	---	1 cc = 1 mL
dL = deciliter	---	1 dL = 100 mL
3. <u>Temperature</u>		
°C = Celsius	°F = Fahrenheit	°F = (1.8 X °C) + 32

METRIC / ENGLISH RELATIONAL EQUIVALENTS

Length == Meter

1 km = 1000 m = 0.62 miles

(1 mile = 1.6 km)

1 m = 100 cm = 1.1 yards

(39.4 inches)

2.5 cm = 1 inch

Weight == Gram

1 Kg = 1000 g = 2.2 pounds

(1 pound = 454 g)

1 g = 1000 mg = 1/28 ounce

Volume == Liter

1 l = 1000 ml = 1.06 qts.

(1 qt. = 0.946 l)

30 ml = 1 fluid ounce

ALCOHOL AND SCIENTIFIC PRINCIPLES

What is an Intoximeter Intox EC/IR II?

An Intoximeter Intox EC/IR II is an instrument designed to detect and measure alcohol in a person's breath.

A. Alcohol

The type of alcohol measured by an Intoximeter Intox EC/IR II is called **ethyl alcohol** or **ethanol**. This is the kind of alcohol present in all alcoholic drinks. Beer, wine and all distilled spirits contain **ethyl alcohol**. This is also the kind of alcohol present in mouthwashes, cough medicines or any product where an alcohol is present and is to be consumed orally.

Ethyl alcohol is a colorless, clear, flammable liquid with a slight pleasant odor and a burning taste.

B. Other Alcohols

There are two other alcohols that are also widely used although not usually consumed. These are **methyl alcohol** and **isopropyl alcohol**.

Methyl alcohol, also called methanol, is wood alcohol. **Methyl alcohol** is usually found in chemical solvents, such as paint thinners or strippers.

Isopropyl alcohol, or isopropanol, is rubbing alcohol. **Isopropyl alcohol** is widely used as a disinfectant and antiseptic. Both of these alcohols are many times more toxic than **ethyl alcohol** and are not intended for human consumption. However, should these other alcohols be consumed, they will have serious and sometime lethal effects.

Alcohol Reporting Terminology

Section 10-307 of the Articles of Courts and Judicial Proceedings (Tests for Intoxication-Results of Analysis and Presumptions) states that the results of tests for intoxication be expressed as "g/210L of breath or g/100mL of blood".

In regard to tests of breath or blood for alcohol in the State of Maryland, concentration is defined as "weight by volume". This is further explained to be the weight of alcohol in grams contained in 100 milliliters (cubic centimeters) of blood or g/210L of breath. This method of reporting conforms to the Uniform Vehicle Code adopted by the American Medical Association to serve as a model for all states.

The breath testing devices are scientific instruments which determine the concentration of alcohol in a person's breath expressed as "grams of alcohol per 210L of breath". It does this by analyzing a specific volume of expired breath. The weight of alcohol in the breath sample is determined.

Precision and Accuracy of Alcohol Tests

No scientific measurement is unequivocally precise. All such measurements have an accepted scientific range or accuracy. For the breath and blood tests for alcohol, the accepted scientific range of accuracy is plus or minus 0.01 of the reported result.

II. Physical Principles

Matter is defined as anything that has **weight** and **occupies space**. Matter is said to be in one of three states or forms. These are **solid**, **liquid** or **gas**.

The state of **matter** of any substance is determined by two factors: (1) its temperature and (2) the intermolecular attraction of the molecule or atom. **Matter** that is in **solid** form has a large amount of intermolecular attraction. The molecules or atoms of a **solid** are held by this attraction into a rigid structure that gives a **solid** its shape.

With liquids the attractive force is strong enough to hold the molecules of atoms within a definite distance but not a rigid shape. **Gases** have so little attraction that they will move as much distance from each molecule or atom as possible.

All **matter** above Absolute Zero is in motion. Therefore all molecules or atoms whose temperature is above Absolute Zero are in motion. This motion is due to the energy these molecules possess. This energy of motion is called **kinetic energy**.

All forms of **matter** can be changed from one state of **matter** to another state of **matter**. When **matter** changes state it means that the individual molecules or atoms have enough **kinetic energy** to overcome the attractive force and change from **solid** to **liquid** or **liquid** to **gas**.

Temperature is a means of measuring energy. This thermal energy is resulting from the motion of molecules or atoms. When the **temperature** of **matter** is increased, the motion of the molecules or atoms is increased.

Using water as an example of one type of **matter** at a certain **temperature** (32°F or 0°C), water changes from ice to **liquid** and at higher **temperature** (212°F or 100°C) from **liquid** to steam or vapor.

These are familiar changes but water can also change from **liquid** to **gas** below 100°C (212°F).

This is called **evaporation**. **Evaporation** is a result of individual molecules gaining enough **kinetic energy** through collisions with other molecules to change states of **matter**. **Evaporation** can take place at any **temperature**, but how rapidly water **evaporates** depends on **temperature** and **humidity**.

Humidity is a measure of water content of the air vs. how much water the air can hold at a given **temperature**. **Humidity** is expressed as a percentage. Does water in a sealed, closed container **evaporate**? If by **evaporate** we mean vanish, then no. But if by **evaporate** we mean to change from **liquid** to **gas**, then yes. In a closed container the water changing from **liquid** to **gas** will be balanced by water changing back from **gas** to **liquid**. In this case an **equilibrium or balance** is established. The air in our container will be saturated with water and the **humidity** will be close to 100%. This water that is now a **gas** produces additional pressure in the container. The pressure is called the **vapor pressure**. **Gases** have definite properties that relate pressure, volume and **temperature**. These properties are related to one another by certain physical laws.

For example, we know if we **increase the temperature of a gas**, holding pressure constant, the volume must increase; but if we **hold volume constant**, the pressure must increase. An important concept to breath testing is a law that relates a property of **gases** in contact with a **liquid**. This is called **Henry's Law** and states that the amount of a **gas** present in a **liquid**

will be directly related to the pressure of the **gas** above the **liquid**.

This principle applies to the alcohol present in a person's breath as a gas. **Therefore, the higher the amount of alcohol present in a person's blood, the more alcohol present as a gas in the air in contact with this blood. But there is also a maximum amount of alcohol that can be present in this air. This amount is achieved when the blood and breath are in equilibrium. This equilibrium ration is 2100: 1. This means that at equilibrium between the blood and breath the amount of alcohol by weight of 2100 cc's of breath and 1 cc of blood are equal. This can also be stated "There is the same amount of alcohol by weight in 1 cc of blood as in 2100 cc's of deep lung air."** This is what is meant by the 2100: 1 ratio or blood-breath relationship. This is the basis of operation of all breath testing devices. This ratio was determined by experimentation and is the accepted value for breath testing equipment approved by the National Highway Traffic Safety Administration.

How does alcohol get into a person's breath from their blood?

Alcohol enters the lungs as a **liquid** in the blood through small capillaries. These capillaries are microscopic in size. The alcohol moves through the one cell semi-permeable membranes in the lungs and, by means of **kinetic energy** and **vapor pressure**, changes from a **liquid** to a **gas**.

Only in the deep lung air that is not being exhaled regularly will be blood-breath ratio be constant. Therefore, in order to conduct the most accurate breath test, it is necessary to test this deep lung air.

III. Summary

Alcohol, after its ingestion and subsequent absorption, is mixed as a **liquid** with the blood and eventually reaches the capillaries of the lungs. The capillaries, being semi-permeable membranes, allow the diffusion of water, carbon dioxide and alcohol into the thin walls of the alveoli which likewise are semi-permeable membranes. In this manner the substances reach the outer surfaces of the alveolar spaces. The molecules of **liquid** at the surfaces of the membranes by virtue of their **kinetic energy** and **vapor pressure** diffuse as a **gas** into the alveolar spaces of the lungs.

Mixed expired air, as the phrase implies, is a mixture of alveolar air and air from bronchi, trachea and mouth. 2100 cc's of alveolar air contain the same amount of alcohol as 1 cc of blood. The Intoximeter EC/IR II has been

calibrated to take care of this calculation.

How can you do a test on breath and know how much alcohol is in the blood?

It has been shown by scientific experiment that there is a specific ratio between the amount of alcohol in the alveolar air and amount of alcohol in the blood because the alveolar air is in intimate contact with the blood.* This ratio of the amount of alcohol in blood to the amount of alcohol in deep lung air has been shown to be 2100: 1. The Intoximeter EC/IR II is set (calibrated) to that ratio.

*If questioned further about "alveolar air is in intimate contact with the blood", explain about the thin semi-permeable membranes allowing diffusion of the alcohol (also water and carbon dioxide) to the surface and escape of alcohol into the alveolar sacs as a gas.

THEORY OF INTOX EC/IR II

The Intox EC/IR II employs two distinct analytical techniques to measure alcohol concentration. The Intox EC/IR uses a fuel cell, (i.e., electrochemical oxidation) and a miniaturized non-dispersive infrared molecular absorption (IR) bench. The instrument employs both of these scientific techniques.

The fuel cell sensor is specific to alcohol and is a linear sensing device. This means the fuel cell sensor is easily calibrated, ensuring calibration through the full range of its sensing capabilities.

The IR sensor has several capabilities that the fuel cell sensor does not possess. The most important of these is that the IR sensor is able to make continuous determinations of alcohol concentration, thus allowing the Intox EC/IR II to monitor a breath sample in real time. This helps determine the correct moment at which to take a sample of the breath for fuel cell analysis.

In combination, these two analytical systems provide all the necessary information to make precise and accurate determinations of breath alcohol concentration as well as ensure that the instrument analyzes a high-quality sample. This sample is one made up of alveolar breath and not upper respiratory tract breath. (Figure 1) shows a simplified diagram of the breath sampling system that contains both analytical systems.

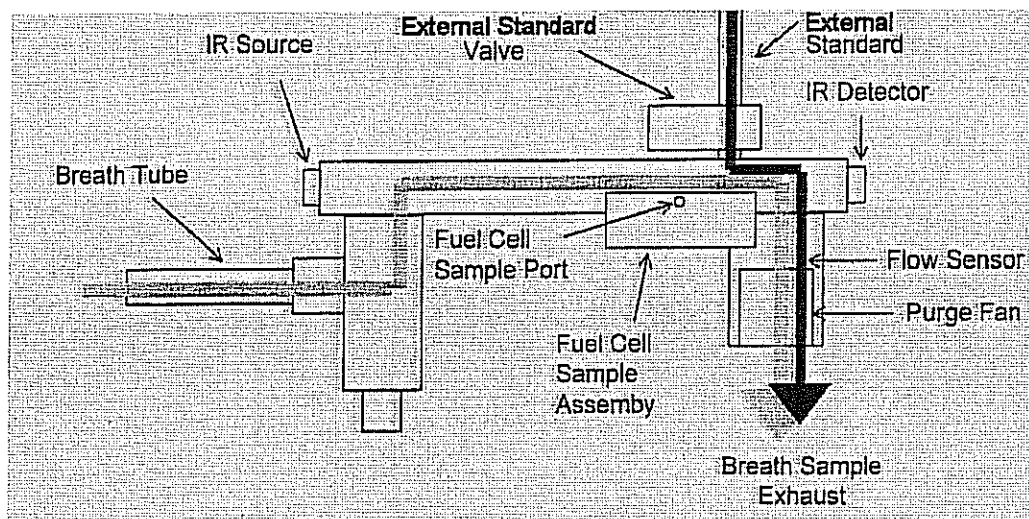


Figure 1. Optical Bench

THE FUEL CELL ANALYSIS SYSTEM

The Fuel Cell Sensor

In its simplest form, the alcohol fuel cell consists of a porous, chemically inert disk coated on both sides with finely divided platinum oxide (called platinum black). The porous disk is impregnated with an acidic electrolyte solution, with platinum wire electrical connections applied to the platinum black surfaces. The entire assembly mounts in a plastic case, which has a gas inlet that allows a fixed volume of deep lung breath to be introduced to the upper surface. (See Figure 2).

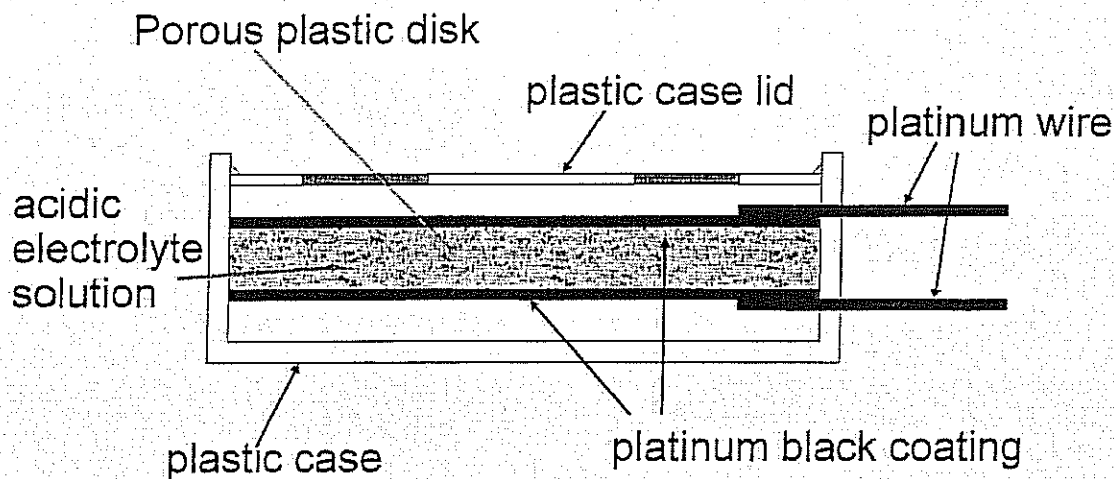


Figure 2. Fuel Cell Construction

The reaction on the cell surface causes the alcohol to be converted to acetic acid, and in the process, produces two free electrons per molecule of alcohol so converted. This reaction takes place on the upper surface of the fuel cell. This current is a usable indicator of the amount of alcohol analyzed by the fuel cell.

The fuel cell exhibits superior specificity and linearity of response over the complete range of alcohol concentration expected in the breath. When you introduce a precise volume of breath sample into a fuel cell quickly, the output current from the cell rises from zero to a peak, and then ultimately decays back to zero.

The Intox EC/IR II incorporates a unique, patented system of reading the cell, when during measurement, the resistance across the cell is essentially zero, and the current from the cell is measured directly. This results in the entire output of the cell occurring in a short enough time that the area under the curve, rather than peak alone, can be used as a measure of alcohol in the sample. (*Cont'd next page*)

The distinct advantages of this system are:

1. Better accuracy when a number of measurements are made in a short period of time,
2. Better recovery of the cell to original values after a period of intense usage,
3. Better long-term stability of calibration, and
4. Excellent linearity with respect to sample concentration.

Sampling Pump

For breath alcohol measurement, it is critical that you obtain a deep breath sample having a fixed volume. The system used in the Intox EC/IR II employs a piston as one wall of the measuring chamber. All alcohol drawn in by the sampling stroke is continuously exposed to the fuel cell surface. The Intox EC/IR II, by using a short stroke piston operating between two mechanical stops, achieves sampling that is extremely quick and reproducible. The small space between the piston and the fuel cell keeps the alcohol in proximity to the fuel cell surface for fast response.

Breath Sample Volume

The unique breath sensing system in the Intox EC/IR II requires a minimum volume of 1,500cc (1.5 liters) to ensure a deep lung sample is tested. A pressure sensor monitors the flow rate of the breath through the instrument continuously, and the microprocessor accumulates an integral of flow rate. Before reaching the required minimum volume, any cessation of flow rate will cause the instrument to abort the test. The subject is required to provide a proper breath sample. When a subject provides the proper sample and after attaining the minimum volume, the instrument takes a breath sample.

The Intox EC/IR II utilizes the infrared analysis system to evaluate the breath sample for Mouth Alcohol for proper sampling. See "Mouth Alcohol"

THE INFRARED ANALYSIS SYSTEM

Basic Principles

You can measure the infrared absorption of a gas by directing infrared light through a sample of the gas and measuring the sample by the amount of light falling on a detecting device. The level of electrical signals produced by detecting devices provides quantitative indications of gas concentration. The instrument can process these signals to produce an output indicating the value of the gas being analyzed. This type of gas analyzer operates on the principle that various gases exhibit substantially increased absorption characteristics at specific wavelengths in the infrared spectrum. Higher gas concentrations exhibit proportionally greater absorption.

Infrared energy is detected by a channel in the detector. Selectivity is controlled by the IR band pass filter used. When ethanol is introduced into the sample, the radiation reaching the ethanol detector is reduced.

The amount of signal decrease detected by the IR detector is proportional to the concentration of the gas of interest. The signals follow Lambert-Beer's law, which defines the exponential relationship between concentration and signal strength.

Infrared Filters

The illustration below is a simplified diagram showing the infrared source, filter, and detector. The filter employed in the IR detector is a narrow band pass filter at the following wavelength:

Ethanol 3.46 microns with a width of 0.2088 microns

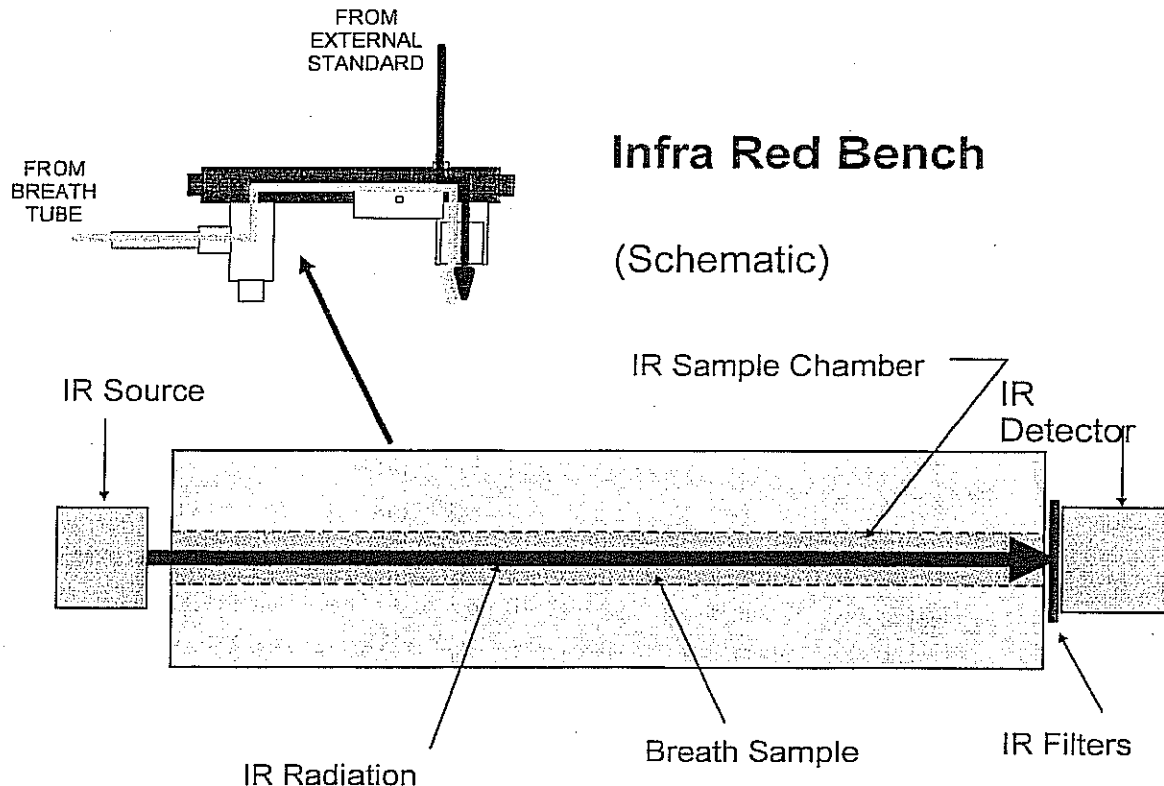


Figure 3. IR Bench Schematic

Infrared Source

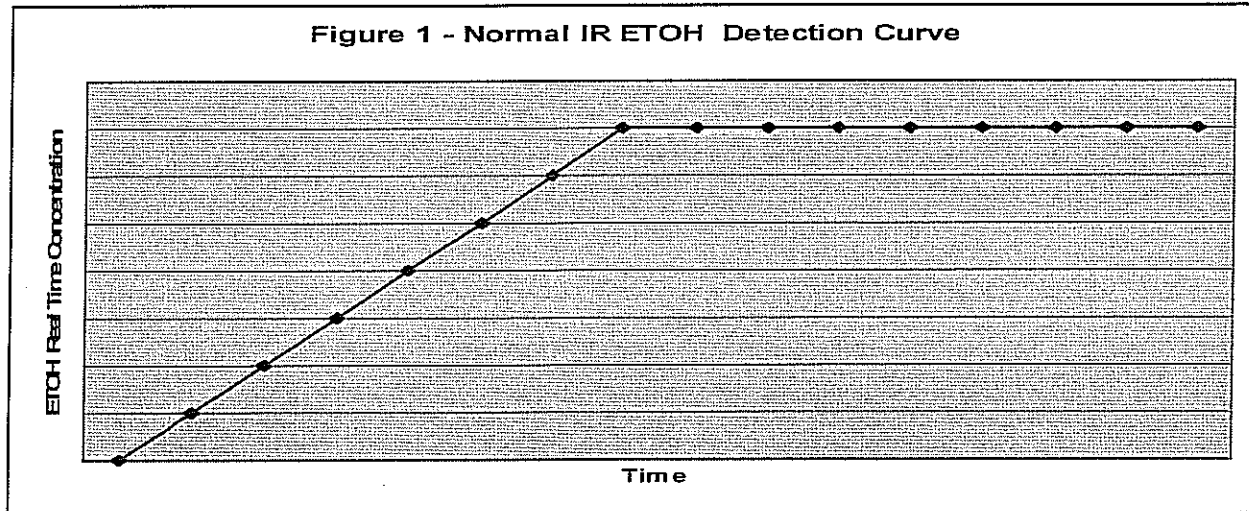
The source is a tungsten heater (Nichrome Helix) mounted in a parabolic reflector. The heater radiates energy over a wide range of wavelengths in the infrared portion of the spectrum.

Infrared Gas Cell

The infrared gas chamber is constructed of aluminum and is nickel-plated (0.0005 inch thickness). The cell path length is 4 inches and the cell inside diameter is 0.375 inch. The cell is heated to a temperature of $44^{\circ}\text{C} \pm 2^{\circ}\text{C}$ to eliminate water condensation.

Mouth Alcohol Detection

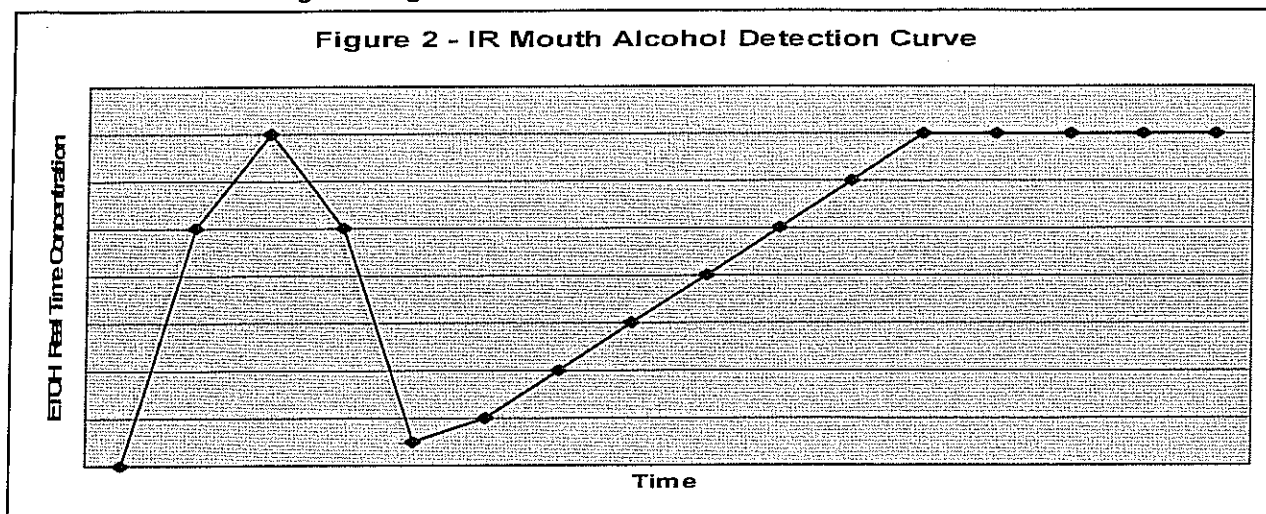
Mouth alcohol detection by the EC/IR II is accomplished by the infrared (IR) detector utilizing real time analysis of the incoming breath sample. As previously discussed, the IR is the secondary detector and qualifies the sample and does not provide a quantitative (numerical) value or result. The EC/IR II also uses the IR signal to detect mouth alcohol. When a subject blows into the instrument, and there is no mouth alcohol present, a plot of the ETOH signal from the IR would look much like Figure 1 below.



There would be a gradual rise in alcohol concentration from zero (first expired breath from the mouth) to the highest concentration (deep alveolar lung air) and then "plateau" at this level. Automatic sampling by the fuel cell assembly would occur once 1,500 cc (1.5 liters) of breath sample had been introduced into the instrument.

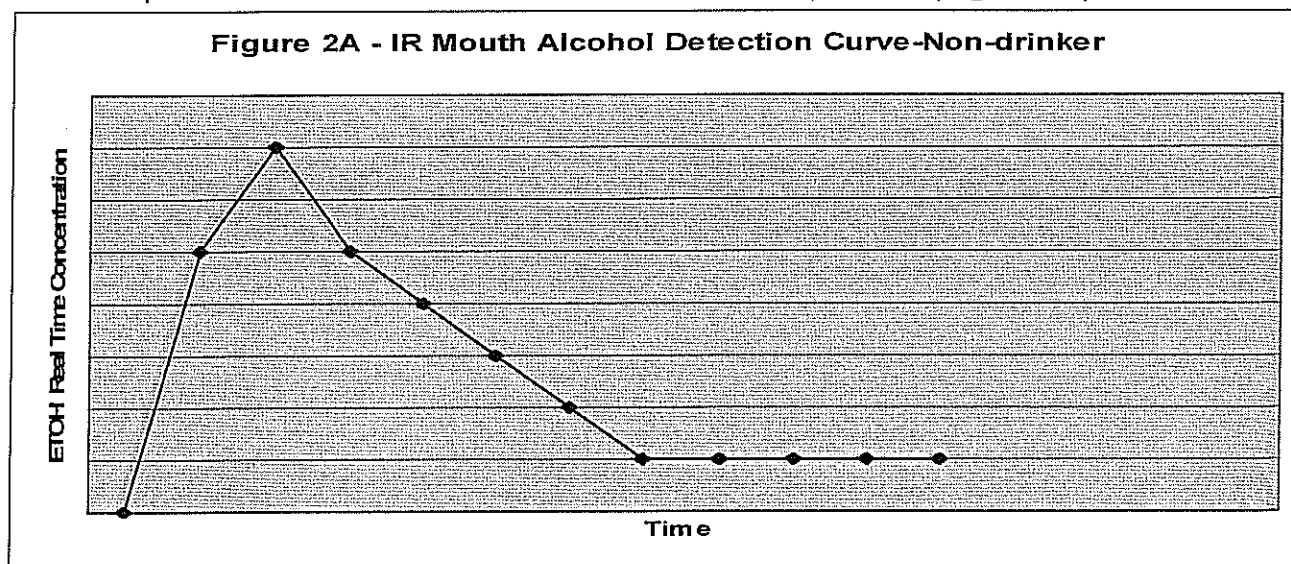
If there were mouth alcohol present in a drinking subject, the ETOH signal from the IR

would look something like Figure 2.



As the subject begins to blow with residual or regurgitated alcohol in the oral cavity, there would be a quick ramp up of the ETOH level detected by the IR. Then as upper tidal air (breath from the trachea and upper bronchial tubes) enters the IR the relative ETOH level drops. Then, as in the "normal" sample (Figure 1), there is the characteristic gradual rise to the highest concentration and then the plateau. The instrument recognizes the "spike" shown in figure 2 and aborts the test since mouth alcohol has been detected. The message "MOUTH ALCOHOL" will be shown immediately on the EC/IR display, the fuel cell sampling assembly does NOT activate and the test is aborted with the hard copy print out showing "MOUTH ALCOHOL".

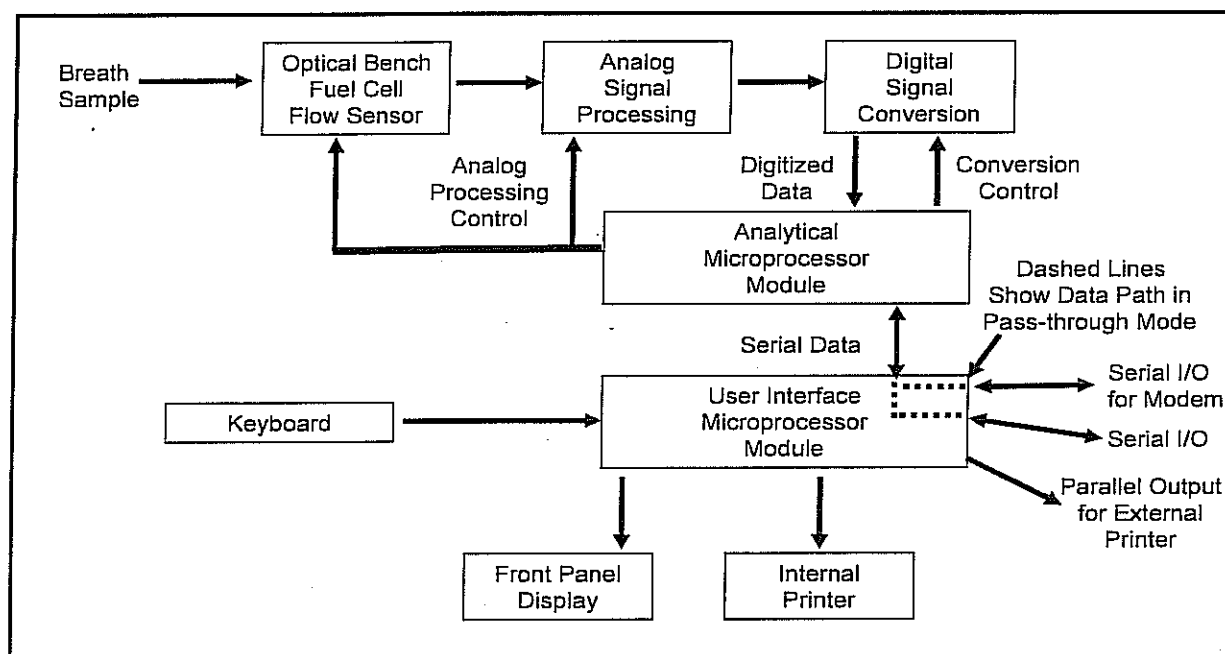
Similarly, if a non-drinking subject were to have mouth alcohol present (i.e. mouth wash, breath spray, etc.) the ETOH curve would show the "spike" as noted above, but no subsequent rise in concentration to the characteristic plateau. (Figure 2A)



Dual Microprocessor Control

The Intox EC/IR II provides a user interface that can be easily customized without affecting the reliability of the analytical functions. This system comprises two separate microprocessor-controlled modules that are connected by a secure communication link.

Figure 4 is a block diagram of the system, showing the relationship of the microprocessor modules, the optical bench, and the analog signal processing blocks.



The computer controls the hardware that measures breath alcohol content. This includes the fuel cell, infrared detector, and flow sensor. The analytical module controls and/or monitors the following environmental parameters: fuel cell temperature, IR cell temperature, instrument internal temperature, ambient barometric pressure. The module also controls such functions as fuel cell set and fuel cell sample solenoids, purge fans and gas standard manifold. The user interface computer handles input/output to the user, including keyboard, display, printer, and modem. The computer also provides control flow for various testing protocols as well as storage and retrieval of results from completed tests. Among the advantages of this system is that changes in hardware and/or software for one module do not affect the stability and reliability of the system.

CAUTION: Do not place anything containing liquids on the instrument's top cover. This includes coffee cups and soft drink containers.

ETHANOL

PHARMACOLOGY AND TOXICOLOGY

OBJECTIVES

It is the objective of this chapter to convey to the student an understanding of the effects of alcohol consumption on the human body. The information provided is directed towards explaining the physiological principles pertaining to breath alcohol testing.

ALCOHOL

Alcohol is a descriptive term which denotes a particular type of chemical compound. All alcohols are hydrocarbon derivatives. All alcohols contain a hydroxyl group composed of two atoms, one oxygen and one hydrogen. All low molecular weight alcohols are MISCIBLE (infinitely soluble) in water. Within the general category of alcohols there are many individual chemical compounds. All of these compounds are alcohols, but each possesses different chemical properties. See Table I. The different chemical structures of these various alcohols results in each chemical being metabolized by the body to different metabolic products. This is why each alcohol has a different level of toxicity. **All alcohols are toxic and if a sufficient quantity is consumed or introduced into a human, then death will result!**

Ethanol is the specific alcohol which is present in alcoholic beverages. Ethanol in its purest state is a colorless liquid, which possesses an ethereal odor and produces a burning taste sensation. **Unless otherwise specified, the term alcohol will be considered to denote ethanol in this text.**

ALCOHOL PRODUCTION

Alcohol can be produced naturally through the process of fermentation or synthetically produced through industrial means. The usual method of synthetic production is from the breakdown products produced when petroleum is refined. Alcohol synthetically produced is not sold for human consumption and is therefore not taxed by the federal government. Commonly this product is denatured (poisoned) to discourage the consumption of this non-taxed alcohol. Methanol, isopropanol and benzene are three denaturants frequently used to poison industrially produced ethanol. Consumption of denatured alcohol can be very unpleasant and possibly lethal.

All alcohol intended for human consumption must be naturally produced. Natural production of alcohol always begins with the process of fermentation. Fermentation is the only process by which beer and wine are produced, and it is the first step in the production of distilled spirits. To produce beer, the fermentation process is usually carried out in a large vat in which at least one grain, some malted barley and yeast are combined. This mixture is referred to as the "mash." The malted

barley contains an enzyme, beta-amylase, which converts the starch of the grain into sugar. The yeast then consumes the sugar and excretes ethanol as a waste product.

This process will continue until either all the sugar has been consumed or the ethanol concentration reaches a maximum of approximately 15% by volume, thereby inactivating the yeast. In the production of wine, fruit juice is substituted in place of the grain, and the malt is unnecessary because the fruit juice is already high in sugar content. When beer or wine is the desired end products, the fermentation process is usually carefully controlled so that a product with a specific alcohol concentration is collected.

Beer usually contains from 4 to 6% ethanol by volume. Wine usually contains between 12 to 15% ethanol by volume. Wines of greater alcohol content are produced by either adding additional alcohol or blending the wine with another alcoholic product, such as brandy. All values for alcoholic beverages listed in this text are approximate values and vary not only from state to state, but also from one nation to another.

Production of distilled spirits (Whiskey, Rum, Vodka, etc.) is accomplished by heating the fermented mash to evaporate the alcohol. The type of grain or cereal used in the mash along with the manner of processing determines the type of beverage produced. The vapors from the heated mash are collected and cooled to form a liquid. This distillate (liquid portion) formed from the cooled vapors contains the ethanol plus some water and flavorings from the fermented mash. Throughout the process it is essential that precautions be taken to insure that ethanol is the only alcohol collected. After the distillate is collected it is commonly placed in charred wooden barrels for aging. During the aging process certain chemicals are extracted from the wood and dissolved in the distillate. It is these chemicals, called congeners, which give aged distilled spirits (Whiskey, Scotch or Rum) their distinctive color, aroma and taste. Colorless distilled spirits (Vodka and Gin) are not aged and consequently have only a faint odor in comparison to aged spirits. Distilled spirits usually contain from 40 to 50% ethanol by volume. Fermented fruit juice may also be distilled. This is the process used to produce brandy. After distillation, the brandy is usually aged in oak barrels for at least three years.

PROOF SYSTEM

In the United States the ethanol concentration of distilled beverages is shown by the proof system. The proof of an alcoholic beverage is equal to twice the ethanol concentration. As a example: 100 proof whiskey contains 50% ethanol by volume. Pure ethanol would be 200 proof because it is 100% ethanol.

ABSORPTION OF ALCOHOL

Ethanol can enter the human body in several different manners: injection, inhalation, and ingestion. Ethanol has not been demonstrated to accumulate in the body as a result of absorption through the skin. Injection of ethanol directly into the body is an extremely dangerous procedure because it produces a localized concentration of ethanol that can severely affect the heart and other vital organs. This

phenomenon is referred to as the "bolus effect." Another possible route for ethanol to enter the body is through inhalation of alcoholic vapors. When the alcoholic vapors come into contact with the lungs and mucous membranes lining the nasal passages and throat, then the ethanol can diffuse through the membranes into the blood. However, to reach significant levels of alcohol concentration requires exposure to a severely irritating environment for an extended period of time. It is therefore most unlikely that any individual would become intoxicated in this manner. The usual method for alcohol to enter the body is by ingestion of an alcoholic beverage. See figure 1.

Ethanol is absorbed into the blood stream by contact with and diffusion through mucous membranes. **Ethanol is not digested, but absorbed unchanged!** The mouth, throat and the entire gastrointestinal tract are all common sites of alcohol absorption. The anal canal, vaginal tract, and urethra are also lined with mucous membranes and could serve as possible sites for alcohol absorption.

Once the alcoholic beverage enters the oral cavity absorption begins immediately. Absorption continues as the beverage passes into the stomach and later into the small intestine. Since the alcohol absorbed through the mucous membranes lining the mouth is rapidly distributed to the surrounding tissue, the presence of alcohol can still be detected even after the alcoholic beverage has been swallowed. Residual alcohol is the alcohol which remains in the mouth and will affect a breath alcohol test. Alcohol can be reintroduced back into the oral cavity under certain conditions. If alcohol is present in the stomach, and if some of the alcohol is regurgitated back into the mouth, then a portion of that alcohol would be absorbed by the mucous membranes lining the oral cavity. Regardless of how the alcohol is introduced into the mouth, the presence of residual alcohol diminishes below significant levels within fifteen minutes.

When the alcoholic beverage reaches the stomach some of the ethanol is absorbed through the stomach lining directly into the blood stream. This absorption from the stomach is unique because most other substances ingested cannot diffuse through the protective stomach lining.

The rate of absorption of ethanol through the stomach lining and the passage to the remainder of the gastrointestinal tract can vary due to several factors. The type of alcoholic beverage consumed can affect the absorption rate. Carbonated beverages tend to promote absorption while fatty or oily beverages tend to slow down absorption. The concentration of ethanol in the alcoholic beverage consumed can also affect absorption. If the alcohol concentration in the stomach becomes too high this can irritate the stomach lining and reduce the amount absorbed from the stomach. Studies have also demonstrated that there is a concentration of ethanol in a beverage which promotes that most rapid absorption. Concentrations higher or lower than this level are absorbed less rapidly. Altitude has an effect on the rate of alcohol absorption. Higher altitudes tend to promote faster absorption of ethanol. The functioning of the pyloric sphincter, which controls the passage of the stomach contents from the stomach to the small intestine, can also have an effect on the rate of ethanol absorption. The longer the ethanol is held in the stomach the slower the overall rate of absorption. The most significant effect on alcohol absorption is the quantity of food substances ingested with or immediately prior to consumption of an alcoholic beverage. A large amount of food present in the stomach will serve to delay the absorption of ethanol. If no food is present in the stomach the rate of ethanol

absorption is faster. See Page 14. The small intestine is the site of the most rapid absorption of ethanol. All of these various factors combine with others to determine the specific absorption rate of a particular dose of alcohol consumed by a particular individual. Because of these various factors, absorption of ethanol can best be explained through the use of general rules which describe the overall concepts, but may not be specific for a particular situation. As a general rule only, complete absorption of a single alcoholic beverage is usually accomplished in from forty-five minutes to an hour, with an empty stomach.

DISTRIBUTION OF ALCOHOL

Once the alcohol has been absorbed it is transported throughout the entire body. See Page 15. When the ethanol is absorbed into the blood stream from the small intestine it is transported to and passes through the liver. From the liver the alcohol next passes with the blood to the right side of the heart. The alcohol and blood then travels to the lungs and then returns to the left side of the heart. When the alcohol and blood leave the heart they are distributed throughout the entire body. The blood leaving the heart reaches the brain tissue directly through the carotid arteries. Studies have shown that equilibrium between the arterial blood and the brain is reached extremely rapidly.

The concentration of ethanol in the various tissues depends upon the tissue water content. The greater the water content of a tissue, the greater its alcohol concentration will be in relation to other tissues. Water content varies according to the different kinds of tissue. For example, the water content of muscle is greater than the water content of bone. The tissue water content can also vary from one individual to another. An obese person has less water per pound of body weight than an emaciated person because adipose (fat) tissue has a very low water content. Body water content also varies according to sex. Females have less water per pound of body weight than males because of the presence of adipose tissue in the breasts, buttocks, and thighs. Since the concentration of alcohol is directly proportional to the body water content (within the limits already discussed) the concentration will vary according to the body weight. As a general rule, the heavier a person is, the greater the amount of alcoholic beverage that must be consumed to reach a specific alcohol concentration in the body. See Page 18. The rate of alcoholic beverage consumption can affect the distribution of alcohol throughout the body. A slow steady rate of consumption allows absorption and distribution to closely follow, thereby producing a slow steady rise in the alcohol concentration of the body. However, rapid consumption of a large quantity of alcoholic beverage results in the absorption exceeding the rate of distribution. This produces a rapid rise in the alcohol concentration of the body. When this happens, the alcohol concentration in the arterial blood will exceed the alcohol concentration in the venous blood. It is important to remember that it is the alcohol concentration in the arterial blood which is reaching the brain tissue and exerting the effects on mental and physical faculties.

ELIMINATION OF ALCOHOL

Ethanol is removed or eliminated from the body in several ways: metabolism, excretion, and evaporation. Metabolic processes account for elimination of most of the alcohol consumed. As the alcohol is transported through the body with the blood it passes again and again through the liver. During each pass through the liver a portion of the alcohol is metabolized by the enzyme Alcohol Dehydrogenase (ADH). The ethanol is oxidized to simpler compounds such as acetaldehyde and acetic acid. The acetic acid can then be broken down by another process into carbon dioxide and water. The carbon dioxide and water are eventually formed into urea and excreted through the kidneys. The rate at which ethanol is oxidized is constant for a particular individual, but varies somewhat from one person to another. Reported rates for alcohol oxidation usually range from 0.010 g/210L to 0.025 g/210L per hour.

Higher rates of oxidation have been reported and are usually associated with chronic consumption of large quantities of ethanol. Although the average ratio for ethanol oxidation is approximately 0.015 - 0.018 g/210L per hour, the value of 0.02 g/210L per hour may be used for ease of computation.

A small percentage of ethanol consumed is excreted unchanged into the urine. The amount of ethanol in the urine is proportional, within certain limits, to the ethanol concentration in the blood. Prior to elimination from the body the urine is stored in the bladder. The bladder is very poorly supplied with blood and very little of the urine alcohol is reabsorbed back into the blood stream.

A portion of the ethanol consumed is eliminated from the body through the process of evaporation. Alcohol dissolved in the perspiration is transported through the skin and then evaporates into the surrounding air. A portion of the ingested alcohol is also volatilized into the breath and then exhaled from the body. The exchange of alcohol from the blood to the breath occurs in the alveoli of the lungs.

The alveoli are minute tissue sacs in the lungs which are richly supplied with blood from the heart. The separation between the alveoli and the blood capillaries is permeable to certain vapors. This is where the exchange between oxygen and carbon dioxide takes place. By diffusion a portion of the alcohol in the blood can volatilize into the breath. This exchange of alcohol from the blood to the breath can be explained by Henry's Law. According to Henry's Law the concentration of a volatile substance in the air above a fluid is proportional to the concentration of the volatile substance in the fluid. The temperature of breath emanating from the mouth is normally 34°C. At this temperature the blood:breath ratio of 1:2100 has been accepted for use in computing alcohol concentrations. This means that a breath test instrument is calibrated so that 2100 milliliters of alveolar breath, at 34° Centigrade, will have the same alcohol concentration as one milliliter of blood.

The blood:breath ratio is based upon a breath temperature of 34°C. If a breath sample were collected and analyzed from an individual with a high fever this would affect the results of a breath test. If the breath temperature is significantly greater than normal, then more alcohol will be evaporated into the breath. This causes an increase in the final result of a breath alcohol test. If the breath temperature is

significantly lower than normal, then less alcohol will be evaporated into the breath. This causes a decrease in the final result of a breath alcohol test. However, to have a significant effect the breath temperature must vary by at least 2°F. For example a subject with an alcohol concentration of 0.10 g/210L and who had a fever of 2°F above normal would produce a breath alcohol result of 0.106 g/210L.

In breath alcohol testing it is important to collect an alveolar sample. If an alveolar sample is not collected, then the sample will be diluted with breath of lower alcohol concentration from the upper respiratory tract. This will result in a lower than optimum test result. It is the responsibility of the breath test operator to collect the best sample possible.

Regardless of the method, elimination is a physiological process and as such is not significantly affected by exercise or stimulants such as caffeine. Therefore neither stimulants nor exercise will affect the results of a breath alcohol test. Fructose, a sugar, has been suggested to increase the rate of elimination, but no consistent evidence has been demonstrated. Of course increasing the rate of elimination would only speed up the process of sobering up, and would not change the effect of the alcohol on a person's performance. Currently the only proven method for sobering up is to allow sufficient time for the body to eliminate the alcohol.

DOSAGE FORMS OF ALCOHOL

Alcohol is usually ingested through the consumption of an alcoholic beverage. To ease certain computations a hypothetical normal dosage is used. Beer is about 4% ethanol by volume, therefore a 12 fluid ounce container of beer contains approximately one-half fluid ounce of pure ethanol. ($12 \text{ fl. oz. of beer} \times [0.04 \text{ fl. oz. ethanol} \div 1 \text{ fl. oz. of beer}] = 0.48 \text{ fl. oz. ethanol}$) One fluid ounce of 100 proof distilled spirits contains one-half fluid ounce of pure ethanol. ($1 \text{ fl. oz. 100 proof spirits} \times [0.5 \text{ fl. oz. ethanol} \div 1 \text{ fl. oz. 100 proof spirits}] = 0.50 \text{ fl. oz. ethanol}$) For the purpose of discussion one "drink" will be considered one 12 fluid ounce serving of beer or one fluid ounce serving of 100 proof distilled spirits.

ALCOHOL CONCENTRATION CURVE

As noted before, body weight affects the alcohol concentration reached when a given amount of alcoholic beverage is consumed. Assuming the normal healthy male to have a body weight of 150 pounds, the consumption of one drink could produce an alcohol concentration of 0.025 g/210L in the blood. Recall that the body is capable of eliminating alcohol at the rate of about 0.02 g/210L per hour, or the equivalent of less than one drink per hour. Therefore in order to accumulate alcohol in the body, the rate of absorption must exceed the rate of elimination. When consumption ceases and absorption has been completed the alcohol concentration will gradually fall as the alcohol is eliminated from the body. On Page 16 shows a generalized representation of an alcohol concentration curve. This curve can be divided into three phases: the absorption phase, the peak phase, and the elimination phase. The slope of each

phase will vary according to the various factors affecting absorption, distribution, and elimination of alcohol. It is important to understand that absorption, distribution, and elimination occur in all of these phases. However, in the elimination phase the rate of elimination is greater than the rate of absorption. This results in a net decrease in the alcohol concentration of the body.

The best method of determining the alcohol concentration in the body, at any particular time, is to conduct a chemical test. When a breath alcohol test is administered the results demonstrate the alcohol concentration at the time the sample was collected and analyzed.

Based upon the results of a breath alcohol test there are three possibilities as to what the alcohol concentration was at a time prior to the test. The alcohol concentration at a prior time could have been the same, higher, or lower depending on the circumstances. See Page 16.

In regards to an individual arrested for driving while intoxicated, the alcohol concentration is usually higher at the time of arrest compared to the time of the breath alcohol test.

INTOXICATION

When the alcohol concentration reaches a certain level the individual concerned is intoxicated. Intoxication refers to the reduction or loss of normal physical and mental faculties. Intoxication is based upon measurable changes in an individual's performance of a specific task, such as operating a motor vehicle. The term "intoxication" should be separated from the more common term "drunk." The term drunk is used as a descriptive word denoting a particular type of observed behavior.

A tremendous amount of research has been performed to identify the progressive levels of intoxication, induced by ethanol, with regards to impairment in the operation of a motor vehicle. This information does not apply either to public intoxication or the operation of boats, planes or trains.

The single fundamental fact regarding alcohol consumption is that increasing alcohol concentration results in increasing impairment of normal physical and mental faculties. Research has demonstrated that between 0.00 and 0.04 alcohol concentration, the majority of individuals do not demonstrate significant measurable impairment. Changes in personality and mental states are sometimes observed and some persons do show impairment even at this low level of alcohol concentration. When the alcohol concentration increases to between 0.05 and 0.08 the majority of individuals demonstrate some degree of measurable impairment. Judgment is the first area noticeably affected. Behavioral changes are sometimes observed and there is a loss of social inhibitions. Fine muscular coordination is affected and complex reaction time is lengthened. Complex reaction is the time required for a person to perform two tasks almost simultaneously. Above 0.08 alcohol concentration, current research has shown that all persons are impaired with regards to the operation of a motor vehicle. See Page 13. Increasing the alcohol concentration above 0.08 results in further impairment of normal physical and mental faculties.

As the alcohol concentration continues to rise, it presents a threat to life. Persons with an alcohol concentration of 0.30 or greater should be carefully observed and consideration given to seeking medical assistance. This level of alcohol may

cause respiratory depression. An individual with an alcohol concentration of 0.40 or greater may lapse into a coma. This level of alcohol could result in death, although persons receiving medical attention have survived higher levels.

TOLERANCE AND ETHANOL

The least understood phenomenon of alcohol consumption is tolerance. Tolerance is usually defined as the effect which results from the chronic use of a drug when a larger dose has become necessary to achieve the desired effect. However, in discussing alcohol tolerance it is more convenient to reverse this definition and consider tolerance as the effect when the expected changes in behavior or impairment in performance of a specific task are not observed. There are two general types of tolerance: natural tolerance and learned tolerance.

Natural tolerance consists of three areas: inborn tolerance, physical tolerance and stress tolerance. Certain individuals demonstrate a natural inborn tolerance to low levels of alcohol concentration. These persons are able to perform a specific task as well and sometimes slightly better with a low level of alcohol compared to their performance when alcohol free. This effect may result from the alcohol lowering these individuals' anxiety in the testing situation. This type of tolerance has only been demonstrated at levels below 0.08, and is most prominent between 0.04 and 0.06 alcohol concentration. Another form of natural tolerance is physical tolerance. The effect of a given alcohol concentration will always be greater in persons who are ill as compared to the same persons when healthy. These individuals' normal physical and mental faculties are already affected due to their sickness, and this adds to the effects of the alcohol. Another form of natural tolerance is stress tolerance. In high stress or anxiety situations adrenaline is released in the human body to stimulate the body's response to the source of stress. In intoxicated individuals, this results in those persons appearing less intoxicated than they really are. Stress tolerance is only a temporary effect lasting for a few minutes. Due to the transient nature of this response, it has been difficult to determine whether this effect results in a lessening of the influence of the alcohol on these persons, or if the adrenaline assists in making these individuals aware of their situation resulting in these persons attempting to consciously disguise their intoxication. Regardless of how a person appears, it is important to remember that it is the impairment of the individual's normal and mental faculties which are important. An individual may consciously or unconsciously attempt to disguise his intoxication, but cannot alter the fact that his judgment, reactions, and coordination are impaired.

Learned tolerance consists of three areas: Behavioral tolerance, acquired tolerance, and acute tolerance. Behavioral tolerance is a result of the influence of the social setting and the social customs associated with alcohol consumption in a particular situation. An individual will behave differently in different social settings even though the alcohol concentration in that person was the same on both occasions. An individual's mood or sense of well-being will influence their behavior at a particular alcohol concentration. A person who is depressed and unhappy is usually more depressed and unhappy following the consumption of alcohol. This effect is usually best observed at low levels of alcohol concentration, because higher levels may alter the person's perception of reality. Another type of learned tolerance is acquired tolerance. Acquired tolerance results from the chronic use of alcohol. A chronic user of alcohol is accustomed to the effects of alcohol and may attempt to compensate for these effects. These persons attempt to alter their behavior in order that they do not appear intoxicated. Tests demonstrate that these persons are indeed impaired in judgment, reaction, and coordination, but have learned through experience to disguise their outward appearance of intoxication. A novice drinker (one who has not experienced the effects of alcohol) will demonstrate greater outward effects than those expected at a given alcohol concentration. This is due to the absence of an acquired tolerance. The last type of learned tolerance is acute tolerance. This is sometimes referred to as the Mellanby Effect. Acute tolerance is the result of an individual comparing his own assessment of his present condition with his past condition. Refer to page 16. During the absorption phase of the alcohol concentration curve, the individual compares his perceived state with his condition when alcohol free. Thus a person at the position marked "x" compares his present state with his condition when alcohol free. His perception has been altered so that the effects of alcohol are overestimated. Later during the elimination phase the same individual compares his present perceived state with the peak phase of the alcohol concentration curve. Thus a person at the position marked "y" compares his present condition with the time when the alcohol in his body was at its highest concentration. His perception has been altered such that the effects of the alcohol are underestimated. In both instances the alcohol concentration was equal and the person equally impaired. However, because the individual perceives himself as less intoxicated in the elimination phase, although equally impaired at a given alcohol concentration, this increases the hazard of operating a motor vehicle.

Because of the various aspects of alcohol tolerance, judging an individual's intoxication can be very difficult when based solely on visual observation. Most people have not closely associated with intoxicated individuals under circumstances which would allow objective evaluation. One person's judgment of another's intoxication is often influenced by their interpersonal relationships and social prestige. The best method for determining intoxication is to administer a chemical test to determine the alcohol concentration in that individual.

EFFECTS OF ALCOHOL

Ethanol acts as a depressant, not as a stimulant. It is this action of alcohol which accounts for its effects on the human body. The effects of alcohol can be demonstrated in all sensory-motor functions, plus there are definite effects of the biochemical pathways of the body. Ethanol has such a broad spectrum effect due to

both the large quantity consumed and the site of action. It is not the alcohol in the peripheral areas of the body which impairs a person's coordination, but the alcohol concentration in the brain tissue. It is in the brain that alcohol exerts its effects. In the brain the alcohol acts to depress nerve transmission and to reduce coordination between various nerve centers. Depressing the nerve transmission results in the reduction of normal physical and mental faculties.

The first effect of alcohol on mental faculties is the impairment of judgment. Judgment is a general name given to various decision making aspects of human behavior. Such topics as social inhibitions, self evaluation, risk assessment, and perception of reality are all included under judgment. Alcohol depresses learned social and cultural inhibitions. This can result in an individual demonstrating inappropriate behavior or the expression of suppressed hostility. The depression of these inhibitions allows for the release of suppressed behavior that otherwise would have been concealed. Consumption of alcohol also results in an impairment of self-evaluation. Self-evaluation is the ability of an individual to judge their own behavior or performance in a particular situation. When individuals are required to perform a specific task both in an alcohol free state and later when intoxicated, these individuals will consistently rate their performance when intoxicated as better than when alcohol free.

However, independent observation of these individuals clearly demonstrates that when intoxicated they performed the task slower and with more errors. These individuals have lost the ability of judge their own performance. Alcohol also has the ability to create a feeling of euphoria. Euphoria is a sense of well-being. Because of this artificial sense of well-being, combined with an increase in the pain threshold, an intoxicated individual may ignore minor injuries. Serious injuries may be considered trivial with no attempt made to seek the necessary medical attention. Because of the induced state of euphoria an intoxicated individual's perception of reality is altered. Another aspect of judgment affected by alcohol is risk assessment. Each person has the ability to determine what risks are acceptable to them and to understand the consequences of their actions. An intoxicated individual may accept risks which would be unacceptable when alcohol free.

Other aspects of an individual's mental faculties are also affected by alcohol. Intoxicated individuals may exhibit a loss of memory such as the inability to recite the alphabet. Intoxicated persons sometimes have difficulty in remembering the date and the time of day. Intoxicated individuals may demonstrate a shortened attention span and the inability to concentrate on a particular task.

Alcohol also has significant effects on the physical faculties. The sense of vision and visual perception, hearing, smell and taste are all affected by alcohol. Alcohol can cause a blurring of vision because it depresses the coordination between the eyes such that they do not focus on the same spot, as in normal vision. As the alcohol concentration is increased, this results in diplopia (double vision). Alcohol lengthens the glare recovery time. Glare recovery is the adjustment back to normal vision after a bright light has been shined in the eyes. Alcohol increases the time required for the eyes to make this necessary adjustment for night driving. When intoxicated, dim lights are more difficult to perceive, and colors are harder to distinguish than when alcohol free. An intoxicated individual may demonstrate the effect called light fixation. The intoxicated person's attention becomes fixed on a

flashing light. It is not uncommon for police vehicles to be struck by another vehicle driven by an intoxicated person because of this effect. An intoxicated individual will also demonstrate the effect known as Positional Alcohol Nystagmus. When an intoxicated individual places his head in a lateral position it can cause rapid involuntary eye movements. This is why intoxicated persons sometimes complain of the room spinning around. Because of the rapid eye movements the individual perceives that the room is moving. Another aspect of the effects of alcohol on visual perception results in the distortion of distance estimation. An intoxicated person will consistently overestimate distances and as one consequence will underestimate speed when operating a motor vehicle.

Alcohol also impairs the hearing perception. Although no direct effect has been shown on the physical mechanism of hearing, alcohol raises the minimal level of noise to which the person will respond. Noises which are usually heard are ignored due to lack of attention. One consequence of this is that an intoxicated individual will raise his voice to compensate for this perceived hearing loss.

The nasal nerves are sensitive to even small quantities of alcohol. Alcohol quickly dulls the sense of smell. Because of this the drinker quickly becomes unaware of his own odor.

Alcohol also dulls the taste sensation resulting in most food tasting bland when an excess of alcohol has been consumed.

Alcohol also exerts its effects on other physical faculties. Muscular coordination is affected by alcohol. Alcohol depresses the nerve transmission to the muscle which affects the performance of the muscle. At low levels of alcohol concentration fine muscular coordination is affected. As the alcohol concentration increases, larger groups of muscles are impaired, affecting gross muscular coordination. If the alcohol concentration continues to rise the involuntary muscles are affected and respiration ceases, resulting in death. Because of the effects of alcohol on the nerves and muscles, reaction time is lengthened. At alcohol concentrations above 0.08, the reaction time for performing a complex task is dramatically increased.

Alcohol can act as a vasodilator. This causes a relaxation of the blood vessel walls and results in more blood in the peripheral areas of the body (hands, feet, etc.). This effect is responsible for the flushed face observed in certain individuals who consume alcohol. This results in additional heat being lost from the human body because of the increase of blood near the body surface. Alcohol should not be given to a person suffering from exposure to cold, because this may only further lower that person's body temperature.

Alcohol is a diuretic. Alcohol depresses the release of antidiuretic hormone which results in less water being retained in the body. This effect is best demonstrated when the alcohol concentration is rising.

INTOXICATION WITHOUT ALCOHOL

Alcohol is not the only agent which could produce the effects already described. The situation will occasionally arise where an individual appears intoxicated, but the breath alcohol test results are either negative or much lower than expected from the observed behavior. This situation could occur if the subject was a novice drinker, who lacked the experience of coping with alcohol induced intoxication. However, the breath test operator should be aware that symptoms similar to alcohol intoxication can be produced by: a combination of alcohol and drugs, drugs alone, or certain diseases or illness.

When alcohol is consumed in combination with other chemical agents, illicit or prescribed, the symptoms of alcohol intoxication may be altered. This may explain the situation where an individual appears very intoxicated, but the breath alcohol test results demonstrate a low level of alcohol. Combining drugs or other chemical agents with alcohol can produce two types of effects: additive or synergistic. When a given dose of a drug is combined with a given dose of alcohol and the effects are equal to either two doses of the drug or alcohol, this is referred to as the additive effect. The combination of alcohol and Phenobarbital is an example of the additive effect. The synergistic effect exists when a given dose of a drug is combined with a given dose of alcohol and the effects produced are greater than two doses of either the drug or alcohol alone. The combination of alcohol and valium is an example of synergistic effects.

Drugs or other chemical agents, in the absence of alcohol, are capable of producing symptoms similar to alcohol intoxication. The breath alcohol test will not determine the presence of drugs other than alcohol. Other types of chemical tests must be performed to determine the presence of drugs or other chemical agents. Therefore, if an individual appears very intoxicated, but the breath alcohol test results are negative, consideration should be given to the possibility that the individual is under the influence of drugs.

Certain illness or disease states are also able to produce symptoms similar to alcohol intoxication. Diabetes, epilepsy and trauma are examples of conditions which may fall within this category. When individuals have a low or negative breath alcohol test result, the breath test operator should consider the possibility of a medical condition being present. If a medical condition is suspected the operator should follow department policy as it pertains to medical treatment for suspects.

ALCOHOL—Effect on Driver

Judgment is impaired.
Self-confidence increases.
Inhibitions and restraints are relaxed.
Vision, particularly side vision, is diminished.
Less able to give attention required for safe driving.

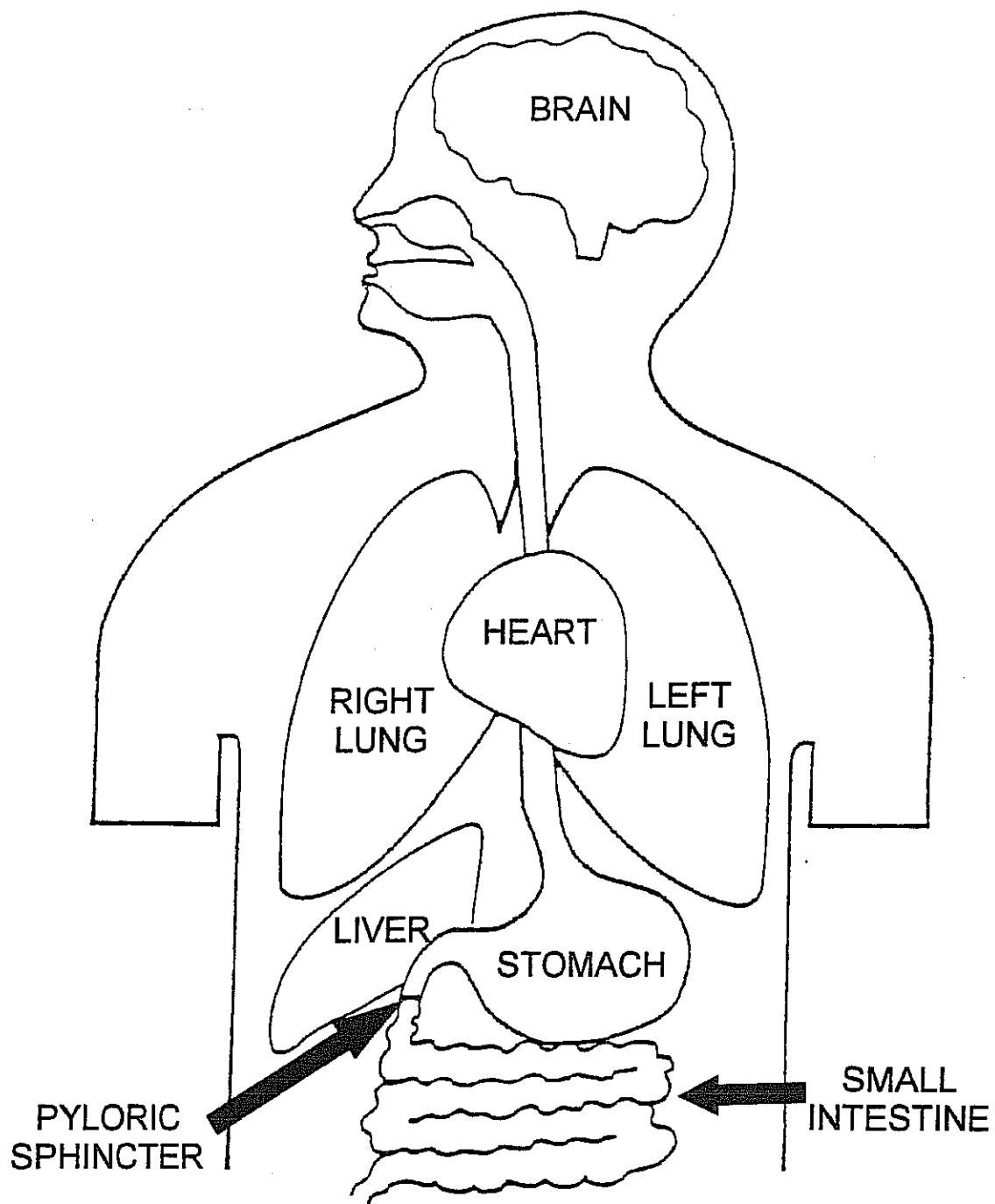
Stages

General Clinical Signs/Symptoms

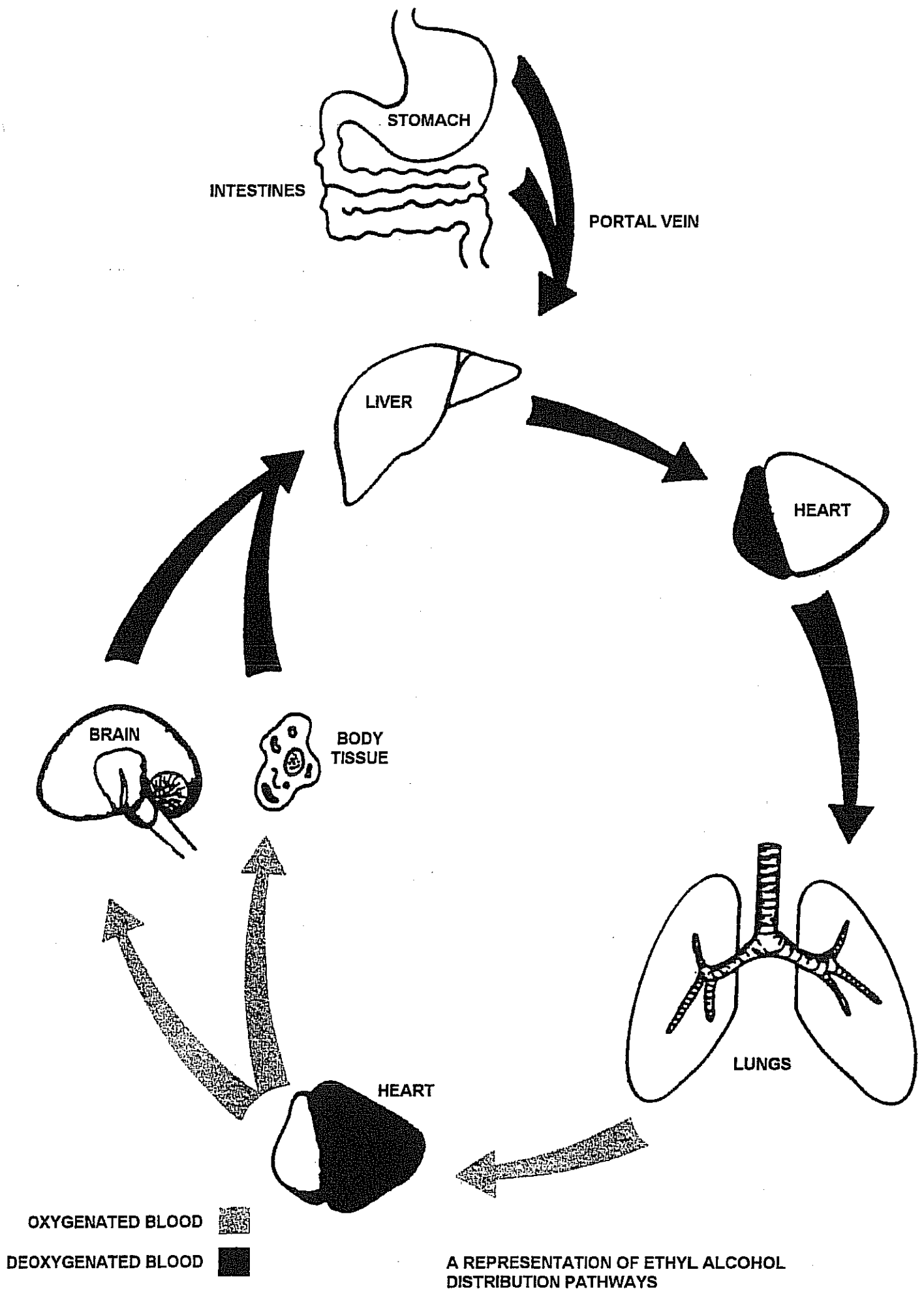
- | | |
|-----------------------|--|
| 1. Sobriety .00-.06 | No apparent influence. Subject behavior is near normal from ordinary observation. Slight changes are detectable by special tests. |
| 2. Euphoria .03-.12 | Mild euphoria, sociability, Talkativeness, Increased Self-confidence, decreased inhibitions. Diminution of attention, judgment and control. Loss of efficiency in finer performance tests. |
| 3. Excitement .09-.25 | Emotional instability; decreased inhibitions, loss of critical judgment. Impairment of memory and comprehension. Decreased sensory response; increased reaction time. Some muscular in-coordination. |
| 4. Confusion .18-.30 | Disorientation, mental confusion; dizziness. Exaggerated emotional states (fear, anger, grief, etc.) Disturbance of sensation (diplopia, etc.) and of perceptions of color, form motion dimensions. Decreased pain sense. Impaired balance, muscular in-coordination, staggering gait, slurred speech. |
| 5. Stupor .27-.40 | Apathy, general inertia, approaching paralysis. Markedly decreased response to stimuli. Marked muscular in-coordination, inability to stand or walk. Vomiting, incontinence of urine and feces. Impaired consciousness, sleep or stupor. |
| 6. Coma .35-.50 | Complete unconsciousness, coma, anesthesia. Depressed or abolished reflexes, subnormal temperature. Incontinence of urine and feces embarrassment of circulation and respiration. Possible death. |
| 7. Death .45-up | Death from respiratory paralysis. |

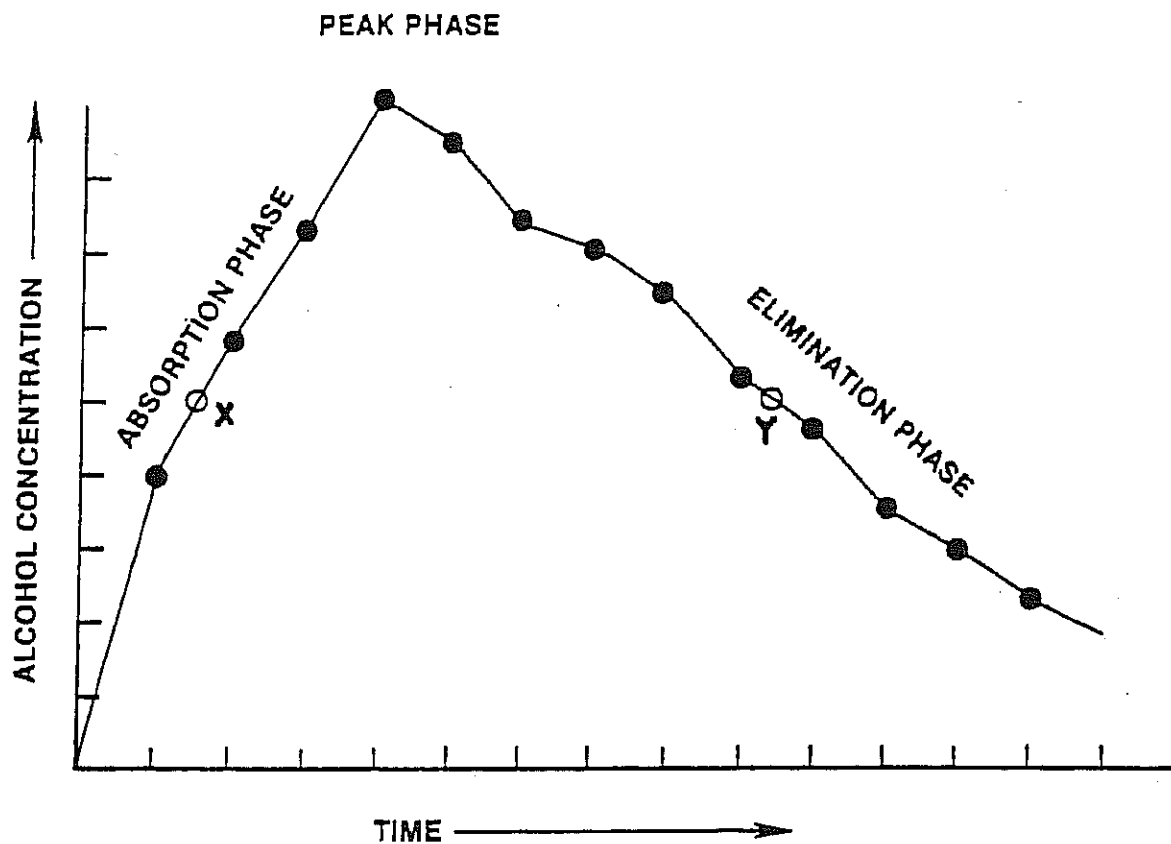
Source --Kurt M. Dubowski, Ph.D. Professor of Biochemistry and Toxicology, Medical Center, University of Oklahoma, Oklahoma City, Oklahoma.

These occurrences may develop at low blood alcohol percentages. Yet, an officer may not notice these conditions under observations. Therefore, it is possible for one to drive abnormally and yet physically appear normal. By the time one shows slight physical indications, he is already affected mentally.



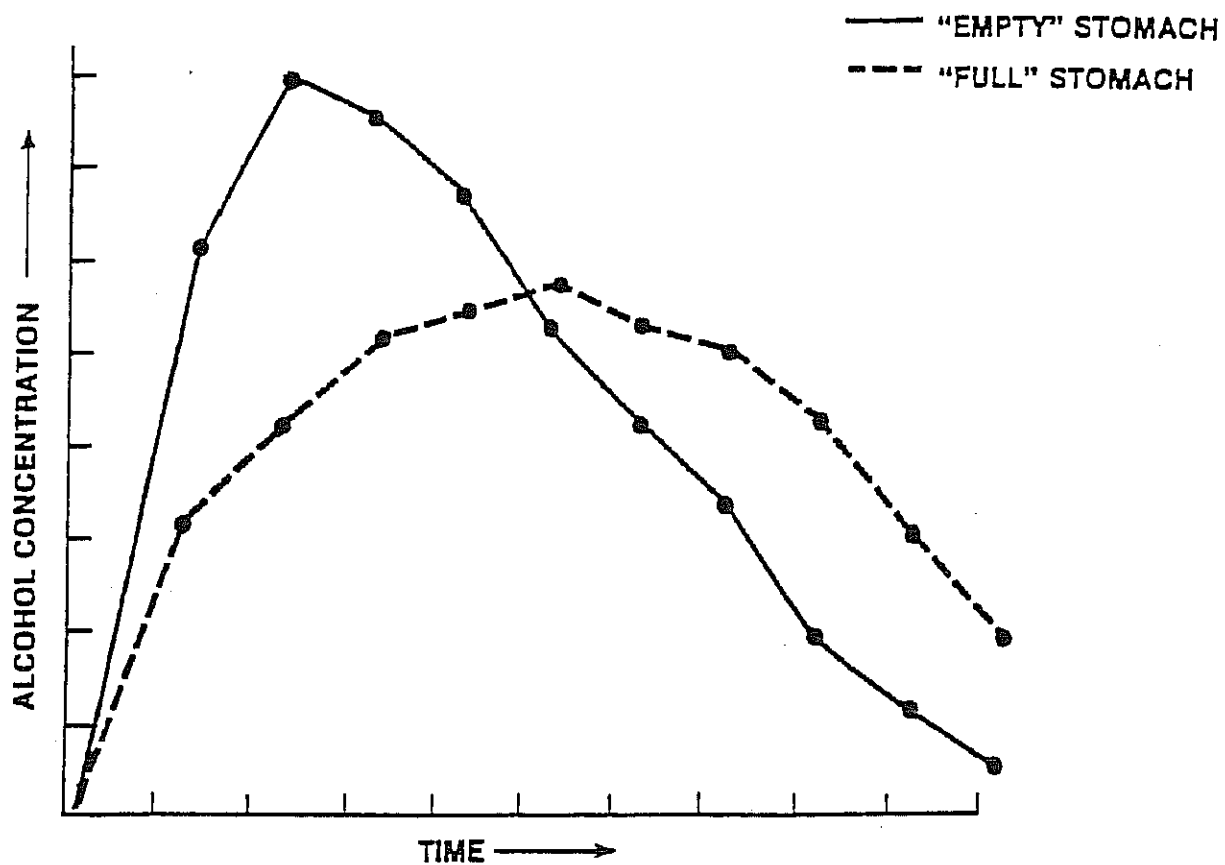
A REPRESENTATION OF HUMAN ANATOMY AS IT APPLIES TO ETHYL ALCOHOL ABSORPTION AND DISTRIBUTION.





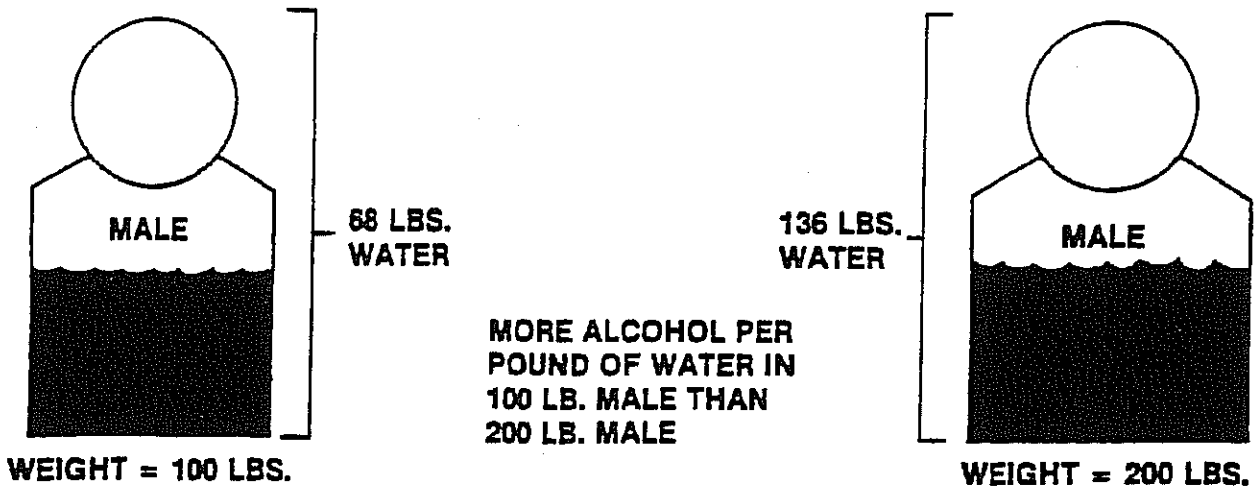
X, Y = THE SAME ALCOHOL CONCENTRATION AT DIFFERENT TIMES

GENERALIZED ALCOHOL CONCENTRATION CURVE



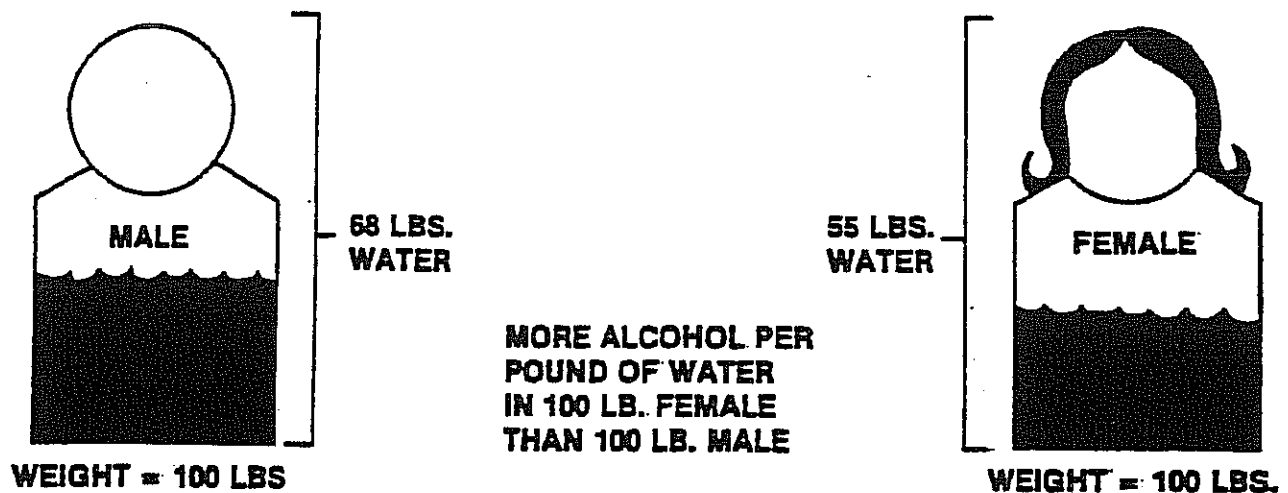
**ABSORPTION OF AN EQUAL DOSE OF ETHYL ALCOHOL IN
"EMPTY" vs. "FULL" STOMACH**

**EACH MAN CONSUMES ONE
FLUID OUNCE OF ETHYL ALCOHOL**



**200 LB. MAN MUST CONSUME TWICE AS MUCH AS THE 100 LB. MAN TO ATTAIN
THE SAME ALCOHOL CONCENTRATION**

**EACH PERSON CONSUMES ONE
FLUID OUNCE OF ETHYL ALCOHOL**



**100 LB. MALE MUST CONSUME MORE ALCOHOL THAN THE 100 LB. FEMALE TO
ATTAIN THE SAME ALCOHOL CONCENTRATION**

**RELATIONSHIP OF BODY WATER CONTENT
TO ALCOHOL CONCENTRATION**

MISCONCEPTIONS

- Alcohol can act as a stimulant.
- One can detect the odor of alcohol on the breath.

MISCONCEPTIONS

- Onions and garlic on the breath can affect a breath alcohol test.
- Drinking alcohol when cold warms up the individual.

MISCONCEPTIONS

- Intoxication can be determined merely by a physical examination.
- An individual without overt symptoms of intoxication cannot be intoxicated.

MISCONCEPTION

- Coffee sobers up an intoxicated individual.

FACT

- It is likely that at least one quarter of all American motorists have driven while intoxicated at least once in their lives.

FACT

- The rate of alcohol involvement in fatal crashes is three and one-third times as high at night as during the day

FACT

- About 3 in every 10 Americans will be involved in an alcohol-related crash at some time in their lives.

METHANOL

- Wood alcohol
- Converted in body first to formaldehyde and then to formic acid
 - ◆ severe metabolic acidosis
 - ◆ blindness

ISOPROPANOL

- Rubbing alcohol
- Approximately twice as toxic as ethanol
- Metabolized to acetone

ACETONE

- Solvent
- Identified in the following conditions:
 - ◆ fasting
 - ◆ ketoacidosis
 - ◆ isopropanol ingestion

ETHYLENE GLYCOL

- Not volatile alcohol
- Component of antifreeze
- Metabolized to oxalic acid which binds calcium to form calcium oxalate crystals
 - ◆ crystals deposit in tubules of kidney
 - ◆ acute renal failure

SOURCES of ETHANOL

- ALCOHOLIC BEVERAGES
- Cold medications
- Mouthwashes
- Perfumes
- Colognes

ALCOHOLIC BEVERAGES

- Fermented beverages (made from agricultural products such as fruits or grains)
- Distilled beverages
- Compounded beverages (made by combining fermented and/or distilled products with flavoring substances)

ETHANOL PRODUCTION: FERMENTATION

- Produces ethanol concentrations up to about 15% (30 proof)
- Sufficient to make beer or wine
- First step in liquor production

ETHANOL PRODUCTION: DISTILLATION

- Fermented product is heated to separate alcohol
- Vapors are collected and aged
- Aging process extracts congeners from aging containers

UNITS

- $0.10 \text{ g/dL} = 0.10 \text{ g/100 mL} = 0.10 \% \text{ (w/v)}$
pertains to BLOOD
- 0.10 g/210 L pertains to BREATH
- $1\% = 2 \text{ proof}$

STRENGTH OF DRINKS

- BEER: 4-6 % ethanol by volume
- WINE: 12-15 % ethanol by volume
- LIQUOR: 40-50 % ethanol by volume

STANDARD DRINKS (0.5 oz. pure ethanol)

- 12 oz. beer
- 4 oz. glass of wine
- 1 oz. 100-proof liquor

PHARMACOKINETICS

- ABSORPTION
- DISTRIBUTION
- ELIMINATION

ABSORPTION

- SKIN CONTACT
- INHALATION
- INJECTION
- INGESTION

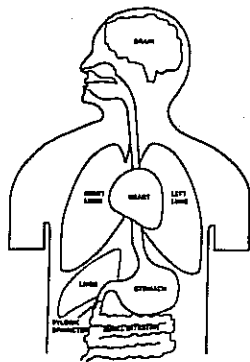


FIGURE 1. A REPRESENTATION OF HUMAN ANATOMY AS IT APPLIES TO ETHYL ALCOHOL ABSORPTION AND DISTRIBUTION

FACTORS AFFECTING ORAL ABSORPTION OF ETHANOL

- Carbonated beverages enhance absorption
- Fatty or oily beverages slow absorption
- Ethanol concentration
- Higher altitudes promote absorption
- PRESENCE OF FOOD DELAYS ABSORPTION

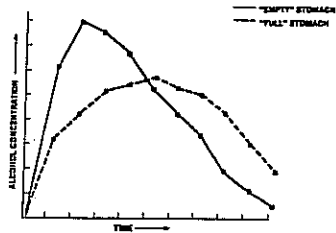


FIGURE 2. ABSORPTION OF AN EQUAL DOSE OF ETHYL ALCOHOL IN "EMPTY" VS. "FULL" STOMACH

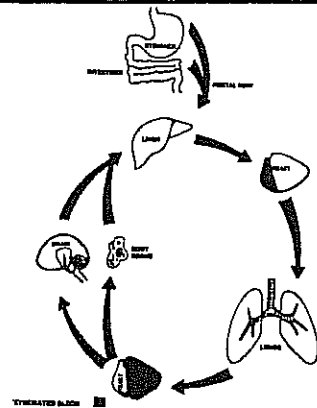


FIGURE 3. A REPRESENTATION OF ETHYL ALCOHOL METABOLISM PATTERNS

ETHANOL DISTRIBUTION

- DISTRIBUTION DEPENDS ON THE WATER CONTENT OF THE FLUID OR TISSUE:

The greater the water content, the greater is its ethanol concentration relative to other tissues.

ETHANOL DISTRIBUTION

- individual variations
 - fat vs slender
 - male vs female

ETHANOL DISTRIBUTION

Average ratios

- Serum/Blood 1.18
- Liver/Blood 0.6
- Vitreous humor/Blood 1.18
- Urine/Blood 1.3

ETHANOL ELIMINATION

- EVAPORATION
- METABOLISM
- EXCRETION

ETHANOL METABOLISM

- defined as the chemical changes that the body performs on a substance to facilitate its removal from the body

ETHANOL METABOLISM

- occurs in the liver
- enzymes (catalysts):
 - ◆ alcohol dehydrogenase
 - ◆ aldehyde dehydrogenase
- final breakdown products are carbon dioxide and water

ETHANOL METABOLISM

- Ethanol + NAD → Acetaldehyde + NADH
 - ◆ alcohol dehydrogenase
 - ◆ rate-limiting step
- Acetaldehyde + NAD → Acetate + NADH
 - ◆ aldehyde dehydrogenase

ETHANOL METABOLISM

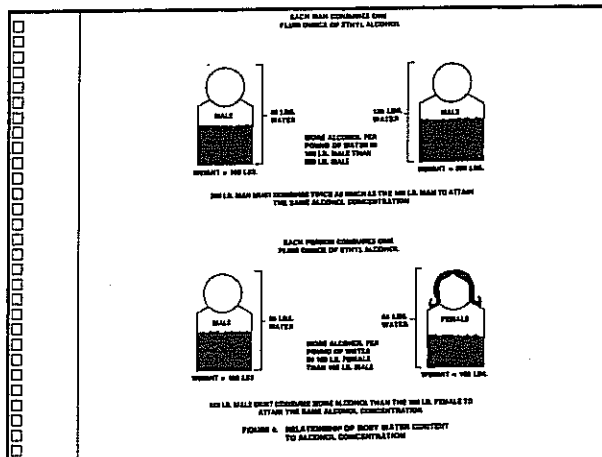
- occurs at a constant rate
- 0.015- 0.025 g/210 L (100 mL) per hour
- constant for an individual, but varies between individuals

ETHANOL EXCRETION

- as blood containing ethanol circulates through the kidney, an amount remains in the kidney
- this can work its way into the urine
- <10% of the consumed ethanol is excreted unchanged in the urine

ETHANOL ACCUMULATION

- for a 150 lb. man, 1 drink leads to an alcohol concentration of $0.025 \text{ g/210 L} = 0.025\%$
- a heavier man will have a lower alcohol concentration after 1 drink
- a lighter man will have a higher alcohol concentration after 1 drink



ETHANOL ACCUMULATION

- 150 lb. man rapidly drinks 3 standard drinks
 - ◆ peak concentration: 0.075 g/210 L
 - ◆ 1 hour later: 0.060 g/210 L
 - ◆ 2 hours later: 0.045 g/210 L

ETHANOL ACCUMULATION

- 150 lb man rapidly drinks 3 standard drinks during each of 3 hours

- ◆ after 1 hr.: 0.075 g/210 L

- ◆ after 2 hr: $0.075 + 0.075 - 0.015 = 0.135 \text{ g/210L}$

- ◆ after 3hr: $0.135 + 0.075 - 0.015 = 0.195 \text{ g/210L}$



WIDMARK'S FORMULA

$$A = \frac{WC}{0.8}$$

A = amount of ethanol (ml)
W = body weight in grams
(1 lb = 454 g)
D = distribution ratio = 0.68 for men
0.55 for women
C = blood ethanol concentration (g/ml)
0.8 = specific gravity of ethanol

ENDOGENOUS ETHANOL FORMATION

- Defined as the ethanol produced naturally by the body.
- Scientific literature reports no endogenous ethanol formation above 0.003 %.

BLOOD BREATH RATIO

- the amount of alcohol in 2100 mL of breath = the amount of alcohol in 1 mL of blood
- there are individual differences, but for the vast majority of individuals, the 2100:1 ratio will cause an underestimation of the blood alcohol concentration

BREATH SAMPLING

- important to collect alveolar or deep lung air, since it is the deep lung air which is in equilibrium with the blood
- collected breath specimen should have a temperature close to 34°C

BREATH SAMPLING

- hypothermia decreases amount of alcohol in vapor phase
- hyperthermia increases amount of alcohol in vapor phase
- to avoid contamination from mouth, subject is to be carefully observed for 20 minutes mouth is kept empty, no belching, etc.

HENRY'S LAW

- The mass of a gas dissolved in a given mass of solution at constant temperature is directly proportional to the pressure the gas exerts above the solution once equilibrium is achieved.

HENRY'S LAW

- 5 Components
 - ◆ closed container
 - ◆ constant temperature
 - ◆ volatile substance
 - ◆ liquid
 - ◆ gas
- amount of volatile substance in liquid \propto amount of volatile substance in gas

Henry's law: Application to Ethanol

■ 5 Components

- ◆ closed container [ALVEOLAR SACS]
- ◆ constant temperature [37°C]
- ◆ volatile substance [ETHANOL]
- ◆ liquid [BLOOD]
- ◆ gas [ALVEOLAR AIR]

PHARMACOLOGIC EFFECTS OF ETHANOL

- CNS DEPRESSION
- Vasodilatation
- Lowering of body temperature
- Increased stomach acid production
- Birth defects lower IQ, slower growth, facial abnormalities
- Increased urine output

CNS DEPRESSION

- impaired judgement
- depressed learned social and cultural inhibitions
- impaired self evaluation
- euphoria
- memory loss
- shortened attention span

**PHYSICAL DEFICITS
PRODUCED BY ALCOHOL**

- blurred vision
- increased glare recovery time
- light fixation
- nystagmus

**PHYSICAL DEFICITS
PRODUCED BY ALCOHOL**

- altered distance perception
- impaired hearing
- reduced muscle coordination
- increased reaction time

**0.01-0.05g/dL
"Subclinical"**

- Influence/effects not apparent or obvious
- Behavior nearly normal by ordinary observation
- Impairment detectable by special tests

“Euphoria”

- Mild euphoria, sociability, talkativeness
- Increased self-confidence; decreased inhibitions
- Diminution of attention, judgement, and control
- Beginning of sensory-motor impairment Slowed information processing
- Loss of efficiency in critical performance tests

[illegible]

“Excitement”

- Emotional instability; loss of critical judgement
- Impairment of perception, memory, and comprehension
- Decreased sensory response; increased reaction time

“Excitement”

- Reduced visual acuity, peripheral vision, and glare recovery
- Sensory-motor incoordination; impaired balance
- Drowsiness

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TOLERANCE

- **DEFINITION** Effect which results from the chronic use of a drug where a larger dose becomes necessary to achieve the desired effect.

ACQUIRED TOLERANCE

- results from the chronic use of alcohol
- chronic users are able to hide their impairment because they become familiar with the effects that alcohol produces
- individuals are still impaired in judgement, reaction and coordination

METABOLIC TOLERANCE

- biochemical changes which affect the rate of metabolism and elimination from the body
- due to induction of MEOS (microsomal ethanol oxidizing system)
 - ◆ cytochrome P450
 - ◆ CYP11E1

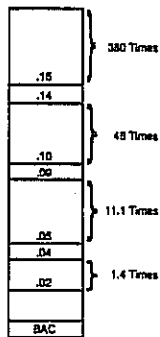
MELLANBY EFFECT

- acute tolerance to ethanol
- an individual perceives himself as less impaired at a given alcohol concentration in the elimination phase than at that same concentration in the absorptive phase
- impairment remains

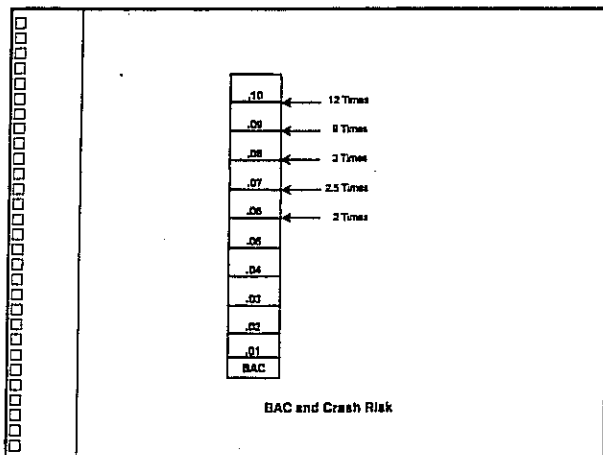
ETHANOL - DRUG INTERACTIONS

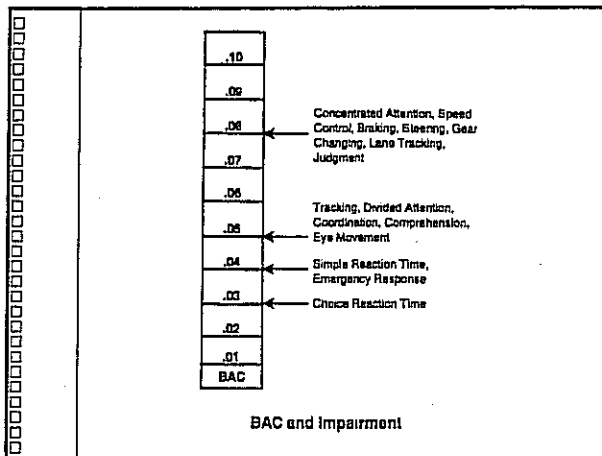
■ PHARMACODYNAMIC

- ◆ antagonistic: canceling of effects of one drug by the administration of another drug
- ◆ additive: total effect is sum of the effects of the individual drugs
- ◆ synergistic: total effect is greater than the sum of the effects of the individual drugs
- ◆ potentiating: increase in the effect of a toxic substance acting simultaneously with a nontoxic substance



Relative Fatality Risk for Drivers in Single Vehicle Crashes by BAC (Zador, IIHS, 1991)





Time for a Break!!!!

Please return and be ready to resume class in 10 minutes.

TRAINING OUTLINE

PROCEDURES OF THE TOXICOLOGIST POST MORTEM EXAMINERS COMMISSION STATE OF MARYLAND REGARDING EVIDENTIAL TESTS OF BREATH FOR ALCOHOL (ETHANOL)

I. EVIDENTIAL TESTS OF BREATH FOR ALCOHOL

A. Breath Test Instruments

The Toxicologist shall approve all instruments to be used in the State for the purpose of testing breath for alcohol content pursuant to Sections 10-302 and 10-304 Courts and Judicial Proceedings Article, Annotated Code of Maryland. Manufacturers shall not offer for sale to police agencies, and police agencies may not purchase instruments that have not been approved. Also, manufacturers shall notify the CTAU of sales of all approved instruments sold in the State. The CTAU will then advise the Toxicologist of such acquisitions.

B. Certification of Approval of Instruments

The Toxicologist or his representative shall certify approval of each instrument prior to being used in the State. On at least an annual basis the Toxicologist or his representative shall recertify approval for instrument. The Toxicologist shall issue a letter recertifying instrument approval. Instruments that are repaired by a certified Breath Test Maintenance Technician may be returned to service without being recertified by the Toxicologist.

C. Inspection

All approved equipment and related records shall be available for inspection by the Toxicologist or his representative at all times.

D. Alcohol Reference Solution/Alcohol Gas Standard

The Toxicologist shall approve Alcohol Reference Solution or Alcohol Gas Standard to be used as a validation standard for performing breath tests.

E. Maintenance

A Certified Breath Test Maintenance Technician shall perform diagnostic maintenance tests on each instrument at least once each month. These tests shall be conducted using an approved Alcohol Gas Standard or Alcohol Reference Solution. The results of these tests shall not be more than plus or minus 10 percent of the stated concentration. Instruments not meeting this requirement after maintenance shall be removed from service until these test conditions are satisfied.

F. Personnel – Training

1. Breath Test Operator

a. Requests for the training of Breath Test Instrument Operators shall be submitted in writing to the CTAU Supervisor

b. Initial Certification as a “Qualified Person” defined in Section 10-304 Courts and Judicial Proceedings Article, Annotated Code of Maryland

(1) A Breath Test Operator must be a full time law enforcement officer, a full time Laboratory Technician of an agency approved to conduct breath tests, or employee of the Toxicologist, or any individual designated by the Toxicologist.

(2) The individual must successfully complete the Basic Breath Test Operator Course approved by the Toxicologist. Initial certification shall be valid for a period of 15 months.

c. Renewal of Certification

(1) Each Operator must exhibit competence in the performance of all duties as a Breath Test Operator.

(2) Each Operator must successfully complete the Breath Test Operator Certification Renewal Course approved by the Toxicologist prior to the expiration of initial certification or each subsequent renewal certification period. Successful completion will extend certification for an additional period of 13 months.

d. Reinstatement of Expired Certification

(1) Any Operator whose certification to conduct breath tests has expired may be reinstated within three years since the time of expiration under the following conditions.

(a) If the Operator's certification has expired and not more than ninety (90) days have elapsed since the time of such expiration, the CTAU Supervisor may reinstate the Operator.

(b) If more than ninety (90) days but less than three (3) years have elapsed, the CTAU Supervisor shall contact the Toxicologist or his representative about reinstatement. The necessity for the Operator to demonstrate proficiency to the Toxicologist or his representative by written and/or practical examination will be considered on an individual basis.

(2) Any Operator who applies for reinstatement more than three years following his expiration must again complete the Basic Breath Test Operator Course to be re-qualified.

e. Suspension and Revocation of Certification

(1) Any Operator that fails to meet the requirements as described in COMAR Subtitle 35 section 10.35.02 for continuing certification shall be suspended by the CTAU Supervisor. Operators so suspended may be reinstated within one hundred twenty (120) days following such suspension without consultation with the Toxicologist after satisfactorily fulfilling the requirements for recertification. If more than one hundred twenty (120) days have elapsed, such Operator's Certification shall be revoked. The operator will return all certificates and manuals to the CTAU Supervisor.

(2) Suspension for cause

- (a) The Toxicologist or his representative, may at any time require an Operator to demonstrate an ability to properly operate the breath testing instrument on which the Operator is certified.
- (b) An Operator's certificate may be revoked by the Toxicologist based on information acquired by him, his representative, or furnished by the Operator's Supervisor that the Operator's performance is unsatisfactory. If revoked, the Operator shall return all certificates and manuals to CTAU Supervisor.
- (c) The CTAU Supervisor may suspend the certificate of any Operator and recommend revocation to the Toxicologist when in the Supervisor's judgment the Operator's performance is unsatisfactory.
- (d) The CTAU Supervisor shall immediately notify the Toxicologist in writing of any such suspension and furnish a copy of such notice to the suspended Operator, who shall not be permitted to operate breath testing instruments until such time as the suspension is removed.
- (e) The Toxicologist, upon receipt of the notification of suspension, will initiate an inquiry culminating in either revocation of the Operator's certificate or removal of the suspension.

2. Breath Test Maintenance Technician

The Breath Test Maintenance Technician must have successfully completed required operator and maintenance courses, which are approved by the Toxicologist, for breath testing instrumentation. The Technician shall demonstrate proficiency to the CTAU Supervisor, or an approved Instructor, who will recommend certification of qualified individuals to the Toxicologist.

3. Breath Test Instructor

A Breath Test Instructor must have successfully completed required operator and maintenance courses approved by the Toxicologist. In addition, a course for instructors of Alcohol Test programs approved by the Toxicologist shall also be successfully completed. The person should have instructional experience and should display special aptitude and interest for the position. The person shall have assisted in at least one Basic Breath Test Operator Course and be recommended by the CTAU Supervisor. The person shall be examined and approved by the Toxicologist or his representative. The Breath Test Instructor is authorized to perform any instrument maintenance and repair as needed.

4. Breath Test Principal Instructor

Breath Test Principal Instructor shall meet all requirements for the Instructor. The person shall also be a member of the Maryland State Police and assigned on a full time basis as CTAU Supervisor. A Breath Test Principal Instructor shall be approved by the Toxicologist.

G. Breath Test Operator Training Courses

1. Basic Breath Test Operators Certification Course

(a) The course shall be comprised of a minimum of 35 hours of lecture and laboratory instruction including:

- (1) A study of the mathematics of the metric system.
- (2) A study of the properties, human physiology and pharmacology of alcohol.
- (3) A study of the theory, operating principles and maintenance requirements of the Breath Test Instruments.
- (4) A review of Maryland Statutes, Regulations and cases affecting DWI Enforcement and Testing.
- (5) Laboratory experiments on human subjects using approved instrumentation.

(b). A written examination consisting of no less than fifty questions shall be given at the conclusion of the course. In addition, the person shall satisfactorily demonstrate his/her ability to use the instrumentation. The cumulative passing score shall be ninety (90) percent.

2. Breath Test Operator Certification Renewal Course

(a) The course shall be comprised of 6 hours of instruction including a review of Breath Testing theory, method and procedures, as well as a review of current and contemporary issues.

(b) A written examination consisting of no less than 25 questions shall be given at the conclusion of the course. The passing score shall be eighty (80) percent.

H. Personnel – Duties

1. Breath Test Operators

a. Perform Breath Tests for alcohol according to guidelines set forth in these training procedures.

b. Perform at least one test per month. This test may be either subject or simulation test. Simulation test shall be recorded as "Simulation Test (Operator)". Information on all tests performed by a Breath Test Operator must appear in both the Alcohol Testing Program Log and the Breath Test Operators Log. Operators failing to perform at least one test per month must provide a reason in their Breath Test Operators Log, and the CTAU Supervisor.

c. If the Breath Test operator will be on extended leave from the agency, the CTAU Supervisor shall be notified by the agency breath test supervisor. Other exceptions shall be approved by the CTAU Supervisor on an individual basis.

d. Notify the CTAU of the following:

(1) Test results that deviate greater than plus or minus 10 percent of the stated concentration of the Alcohol Reference Solution or Alcohol gas Standard.

(2) Mechanical problems with the Breath Test Instrument.

e. Complete all required reports.

2. Breath Test Maintenance Technician

a. It shall be the responsibility of the Technician to set up all instruments in the field. The Technician shall conduct an inspection of the Breath Testing Instruments assigned to his region at least once a month. The Technician should allocate sufficient time for the inspection so that instruments can be maintained as is necessary and the related records checked.

b. Additionally the Technician shall:

(1) Complete all required reports.

(2) Conduct a Breath Test Instrument inspection in accordance with Breath Test Instrument Field Inspection Report. The original report shall be maintained by the agency housing the instrument and a copy shall be maintained by CTAU.

(3) At least once a month, the Technician shall test each instrument with an approved alcohol gas standard or alcohol reference solution and record the results of these tests in the Alcohol Testing Program Log, as "Simulation Test Maintenance)". If the results of these tests are not plus or minus 10 percent of the stated concentration the Technician shall remove the instrument from service until these test conditions are satisfied. The Breath Test Instrument Equipment Repair Report shall then be completed. The original report shall be maintained by the agency housing the instrument and a copy shall be returned to CTAU by the Technician. If these test conditions cannot be satisfied in the field, then the instrument shall be returned to CTAU for additional service work.

I. Required Records

1. Alcohol Testing Program Log

Each agency is required to keep a permanent log at each location where a Breath Test Instrument is housed. The CTAU shall notify agencies as to the type of log that shall be used. All tests to determine an individual's breath alcohol concentration, (i.e. Arrests, License Restrictions, Administrative tests, Court ordered, etc.) shall be entered in the Log. If an individual fails to provide an adequate breath specimen or otherwise refuses the test, the Operator shall record the test as a refusal in the Alcohol Testing Program Log. In addition, all Simulation Tests (Operator and Maintenance) shall be entered in the log. The log shall be available for inspection by the Toxicologist or his representative at all times.

2. Breath Test Operators Log

Each operator is required to maintain a permanent Breath Test Operators Log. All tests to determine an individual's breath alcohol concentration (i.e. Arrests, License Restrictions, Administrative tests, Court ordered, etc.) shall be entered in the Log. In addition, all Simulation Tests (Operator) and reasons for not performing at least one monthly test shall be entered in the Log. The Log shall be available for inspection by the Toxicologist or his representative at all times.

3. Alcohol Influence Summary Report

Each agency's Breath Test Supervisor shall complete an Alcohol Influence Summary Report on a monthly basis. The report shall be submitted directly to the CTAU, by the 10th of each month for the preceding month.

4. Breath Test Instrument Field Inspection Report Form

A Breath Test Instrument Field Inspection Report recording the results of Maintenance Tests shall be completed. Any repairs to the instrument shall be recorded on a Breath Test Instrument Equipment Repair Report. The originals of both forms shall be maintained by the agency where the instrument is housed and copies shall be forwarded to CTAU.

J. Agency Requirements

1. Minimum Requirements

a. All agencies requesting approval to conduct evidentiary Breath Tests shall:

(1) Offer 24 hour Police Service;

(2) Be housed in a facility exclusive for its use. Such facility shall have an area designated exclusively for the storage and use of the Breath Test Instrument and related supplies. This area must be environmentally controlled and the facility shall have a dedicated phone line installed exclusively for use with the Breath Test Instrument.

(3) Shall provide expendable supplies needed for personnel to operate the equipment.

(4) Shall have minimum of 20 full-time sworn police officers.

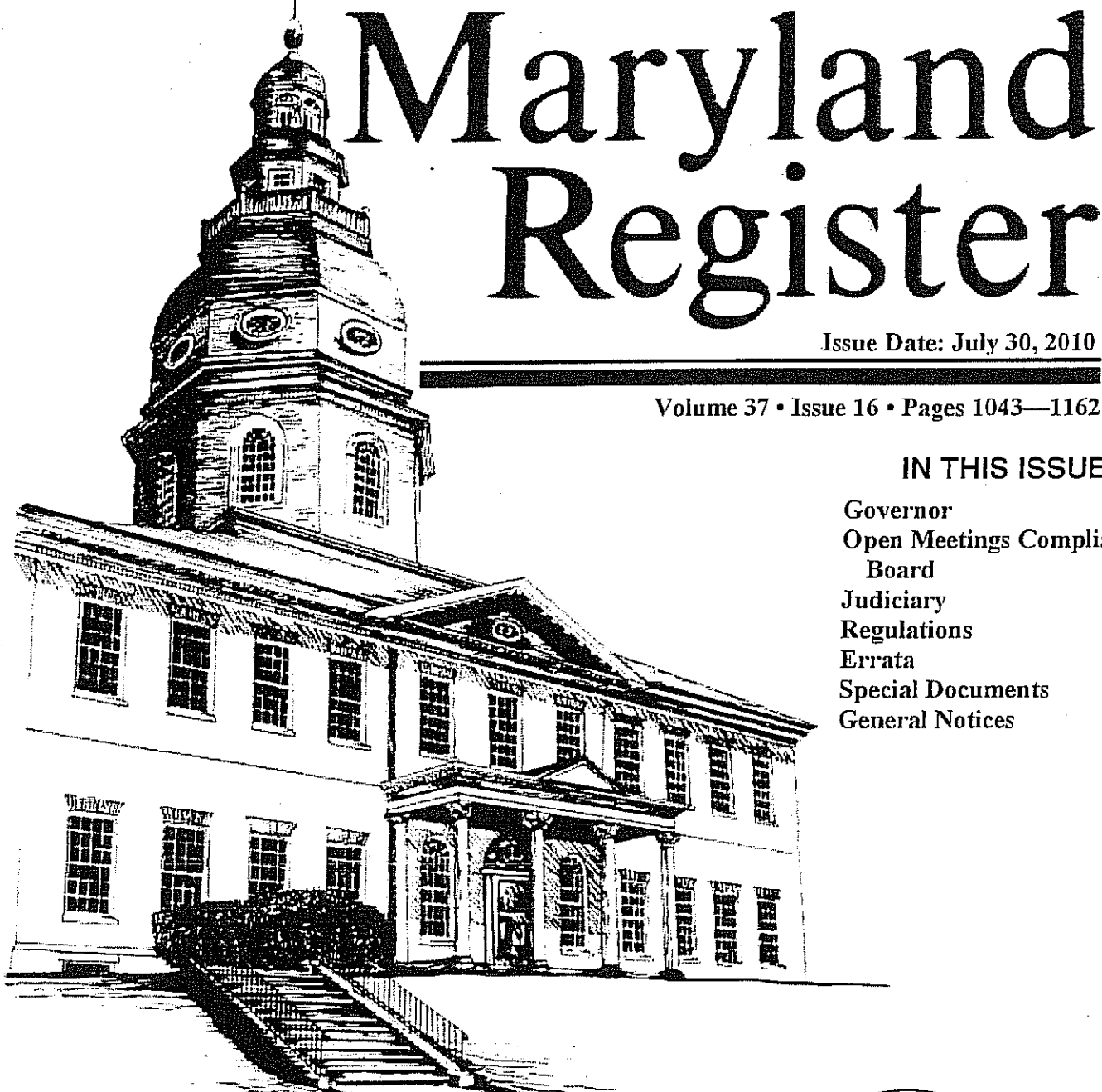
b. Approved agencies may be removed from the Alcohol Testing Program by the Toxicologist or his representative based on an unacceptable record of compliance with Regulations or based on the needs of the Alcohol Testing Program.

c. Agencies that desire to be approved to conduct evidentiary Breath Tests shall make written formal request to the Toxicologist. Agencies shall be approved on an individual basis based on the needs of the Alcohol Testing Program.

2. Agency Breath Test Supervisor

Each agency shall have its own Breath Test Supervisor. An Agency Breath Test Supervisor shall administer and coordinate the agency's Alcohol Program with CTAU and the Toxicologist. The Supervisor shall be responsible for maintaining accurate records. The Supervisor shall maintain the required expendable supplies needed to operate the program within his/her agency. The Supervisor shall be a Breath Test Operator and have knowledge and understanding of the Alcohol Testing Program.

- a. The Alcohol Influence Summary shall be completed by the Breath Test Supervisor by the 10th of each month for the preceding month and submitted directly to the CTAU.



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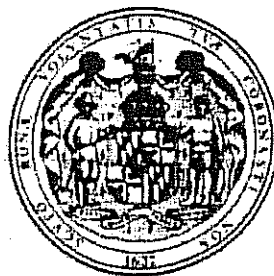
IN THIS ISSUE

Governor
Open Meetings Compliance
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Pursuant to State Government Article, §7-206, Annotated Code of Maryland, this issue contains all previously unpublished documents required to be published, and filed on or before July 12, 2010, 5 p.m.

Pursuant to State Government Article, §7-206, Annotated Code of Maryland, I hereby certify that this issue contains all documents required to be codified as of July 12, 2010.

Gail S. Klakring
Acting Administrator, Division of State Documents
Office of the Secretary of State



.07 Auricular Detoxification Specialist.

A. (text unchanged)

B. Registration. Before registering with the Board as an auricular detoxification specialist, an applicant shall:

(1) Provide documentation of successful completion of a training program that:

(a) Consists of a minimum 70-hour basic training of which 40 hours are clinical training which includes the following training and subject matter:

(i)—(ix) (text unchanged)

(x) Methods [of appropriately responding to needle shock, needle sickness, aggressive behavior, pregnancy, or other crises if they occur] *to modify treatment appropriately and to respond to adverse clinical situations should they occur;*

(xi) [First aid] Sensitivity, compassion, and respect for clients; and

(xii) [Addiction] *Understanding of addictions from the perspective of basic concepts of Chinese medicine;*

[b] Meets or exceeds the National Acupuncture Detoxification Association standards;] or

[c] (b) (text unchanged)

(2)—(4) (text unchanged)

(5) Work within a Board-approved [clinical] *professional* setting; and

(6) Pay the registration fee in COMAR 10.26.01 [; and

(7) Provide a competency form completed by the supervising acupuncturist after a 30-day temporary registration period].

C. The Board may approve a Maryland licensed acupuncturist for supervision of an individual registered to perform auricular detoxification if the licensee:

(1) [Has been a licensed acupuncturist for at least 2 years] *Holds a valid license to practice acupuncture in Maryland;*

(2) Has completed a training program in auricular detoxification as set forth in §B of this regulation; [and]

(3) *Has completed an auricular detoxification specialist supervisor training course that consists of:*

(a) *Maryland law and regulations;*

(b) *Management skills, including but not limited to:*

(i) *Appropriate record keeping;*

(ii) *Ordering supplies;*

(iii) *Scheduling; and*

(iv) *Daily operation requirements;*

(c) *Auricular detoxification methodologies, including but not limited to:*

(i) *Point location;*

(ii) *Clean needle technique; and*

(iii) *Environmental hazards;*

(d) *Teaching and leadership skills;*

(e) *Patient safety and risk management;*

(f) *Occupational Safety and Health Administration (OSHA) requirements;*

(g) *Health Insurance Portability and Accountability Act (HIPAA) requirements;*

(h) *Auricular detoxification program development; and*

(i) *Ethics, including but not limited to:*

(i) *Complaint resolution; and*

(ii) *Professional boundaries; and*

[(3)] (4) (text unchanged)

D. Supervisor Responsibilities. A supervisor shall ensure that:

(1) [New auricular] *Auricular* detoxification specialists are sufficiently competent in the areas listed in [Regulation .07B(1) of this chapter] *§B(1) of this regulation;* [and]

(2) [Medical] *Auricular* detoxification treatment records for patients of auricular detoxification specialists are maintained in a

manner appropriate for and consistent with current and reasonable community standards of care; and

(3) *An on-site visit with the auricular detoxification specialist occurs at least once every 2 months.*

[E.] (proposed for repeal)

[F.] *E.* (text unchanged)

[G.] *F.* Setting. The clinical substance abuse program or [program] *professional* setting where an individual performs auricular detoxification on patients with documented substance abuse concerns shall meet reasonable community standards.

[H.] *G.* (text unchanged)

JOHN M. COLMERS
Secretary of Health and Mental Hygiene

Subtitle 35 POST MORTEM EXAMINERS COMMISSION

10.35.02 Testing Blood and Breath for Alcohol

Authority: Health-General Article, §§5-307 and 5-311; Courts and Judicial Proceedings Article, §§10-304 and 10-306; Annotated Code of Maryland

Notice of Proposed Action

[10-225-P]

The Secretary of Health and Mental Hygiene proposes to adopt new Regulations .01—.09 under a new chapter, COMAR 10.35.02 **Testing Blood and Breath for Alcohol.**

This action was considered by the Post Mortem Examiners Commission at a public meeting held on April 13, 2010, notice of which was given by publication in 37:8 Md. R. 659 (April 9, 2010) and on the Department of Health and Mental Hygiene's Internet Page at http://www.dhnh.state.md.us/html/hotissues_notice.htm, pursuant to State Government Article, §10-506(c), Annotated Code of Maryland.

Statement of Purpose

The purpose of this action is to establish training and certification of personnel performing tests of breath and blood for the purpose of determining the alcohol content of individuals suspected of driving while under the influence of alcohol and for the prior certification of equipment to conduct such tests.

Comparison to Federal Standards

There is a corresponding federal standard to this proposed action, but the proposed action is not more restrictive or stringent.

Estimate of Economic Impact

The proposed action has no economic impact.

Economic Impact on Small Businesses

The proposed action has minimal or no economic impact on small businesses.

Impact on Individuals with Disabilities

The proposed action has no impact on individuals with disabilities.

Opportunity for Public Comment

Comments may be sent to Michele A. Phinney, Director, Office of Regulation and Policy Coordination, Department of Health and Mental Hygiene, 201 West Preston Street, Room 512, Baltimore, MD 21201, or call 410-767-6499, or email to regs@dhnh.state.md.us, or fax to 410-767-6483. Comments will be accepted through August 30, 2010. A public hearing has not been scheduled.

.01 Scope.

This chapter establishes training and certification criteria of personnel performing tests of breath and blood for the purpose of

determining the alcohol content of drivers suspected of driving while impaired or under the influence of alcohol and approval and certification criteria for equipment used in conducting these tests.

.02 Definitions.

A. In this chapter, the following terms have the meanings indicated.

B. Terms Defined.

(1) "Agency" means any law enforcement agency approved to test breath or blood for alcohol content.

(2) "Alcohol" means ethyl alcohol (ethanol).

(3) "Alcohol gas standard" means a container of compressed gas containing a specific concentration of alcohol.

(4) "Alcohol reference solution" means a water solution containing a specific concentration of alcohol.

(5) "Breath sample" means the amount of breath delivered by the individual being tested that is an adequate volume to be analyzed by the breath testing instrument.

(6) "CTAU" means the Chemical Test for Alcohol Unit within the Department of Maryland State Police.

(7) "CTAU supervisor" means the individual designated by the Commander or Director of CTAU and approved by the Toxicologist to supervise the CTAU.

(8) "Preliminary breath testing (PBT) device" means a portable, roadside screening device approved by the Toxicologist, pursuant to Transportation Article, §16-205.2, Annotated Code of Maryland, for use on individuals stopped for suspicion of driving while impaired or under the influence of alcohol.

(9) "Qualified medical person" means an individual permitted by any state to withdraw blood from humans.

(10) "Qualified person" has the meaning stated in Courts and Judicial Proceedings Article, §10-304, Annotated Code of Maryland.

(11) "Representative of the Toxicologist" means any employee supervised by the Toxicologist or an employee of CTAU designated by the Toxicologist to act as the authorized representative of the Toxicologist.

(12) "Toxicologist" means the Chief Toxicologist or State Toxicologist in the Office of the Chief Medical Examiner under the Post Mortem Examiners Commission.

(13) "Validation test" means a test of specific alcohol concentration used to verify the calibration of a breath testing instrument.

.03 Alcohol Tests — General.

A. Alcohol Concentration of Breath. The alcohol concentration of breath shall be reported as grams of alcohol per 210 liters of breath (g/210L).

B. Alcohol Concentration of Blood. The alcohol concentration of blood shall be reported as grams of alcohol per 100 milliliters of blood (g/100 mL).

C. Uncertainty.

(1) For breath tests for alcohol content, the accepted scientific uncertainty in measurement is plus or minus 0.005 g/210L or 10 percent of the average of measurements, whichever is greater.

(2) For blood tests for alcohol content, the accepted scientific uncertainty in measurement is plus or minus 0.005 g/100 mL or 10 percent of the average of measurements, whichever is greater.

.04 Preliminary Tests of Breath for Alcohol.

A. PBT Devices.

(1) The Toxicologist shall:

(a) Approve the make and model of PBT devices used in the State; and

(b) Maintain a list of approved make and model PBT devices.

(2) At the time of approval by the Toxicologist, the make and model PBT device shall be on the most recently updated Conforming

Products List of Evidential Breath Alcohol Measurement Devices published in the Federal Register by the National Highway Traffic Safety Administration of the Department of Transportation.

(3) Each PBT device approved for use pursuant to Transportation Article, §16-205.2, Annotated Code of Maryland, shall be registered with the CTAU supervisor or designee via an identification number.

(4) Calibration Check.

(a) The calibration of a PBT device shall be checked by a PBT device operator, trained in accordance with §B(1) of this regulation, once a month by using an approved alcohol reference solution or alcohol gas standard.

(b) The results of the calibration check shall be within plus or minus 10 percent inclusive of the alcohol concentration of the alcohol reference solution or alcohol gas standard.

(c) A PBT device that does not achieve the result specified in §A(4)(b) of this regulation shall be withdrawn from use until it has been recalibrated.

B. Training Programs.

(1) PBT Device Operator Training Program.

(a) The Toxicologist shall approve a PBT device operator training program.

(b) A preliminary breath test of an individual suspected of being impaired or driving under the influence of alcohol or drugs shall be conducted only by a law enforcement officer who has completed and passed this training.

(c) A written exam consisting of at least 25 questions shall be given at the conclusion of the program.

(d) The cumulative passing score shall be 70 percent or above.

(e) A roster of students successfully completing the course shall be forwarded to the CTAU on completion of the program.

(2) PBT Device Instructor Training Program.

(a) All PBT device operator classes shall be instructed by individuals who have successfully completed a PBT device instructor training program from CTAU.

(b) CTAU shall provide instructor training for all agencies.

(c) An agency desiring training shall request this training from the Superintendent of the Department of Maryland State Police.

(d) The PBT device instructor training program shall:

(i) Include at least 16 hours of instruction; and

(ii) Be approved by the Toxicologist.

(3) CTAU shall issue a certificate after the successful completion of either program outlined in §B(1) or (2) of this regulation.

.05 Evidentiary Tests of Breath for Alcohol: Testing Agencies and Training Programs.

A. Testing Agencies.

(1) An agency desiring approval to conduct evidentiary breath tests shall make a written request to the Toxicologist.

(2) An agency requesting approval to conduct breath tests shall:

(a) Offer 24-hour law enforcement service;

(b) Provide an environmentally controlled area and a phone line exclusively for the breath testing instrument;

(c) Provide expendable supplies needed for personnel to operate the equipment; and

(d) Have a minimum of 20 full-time sworn law enforcement officers.

(3) An agency shall have a breath test supervisor who shall administer and coordinate all alcohol testing related activities with CTAU and the Toxicologist.

(4) The breath test supervisor shall be a breath test operator.

(5) An agency's approval to conduct breath testing may be withdrawn by the Toxicologist or his representative based on:

- (a) A substantial failure to comply with this chapter; or
- (b) Inadequate State resources.

B. Training Programs.

(1) Basic Breath Test Operator Certification Course.

- (a) All basic breath test operator courses shall be:
 - (i) Approved by the Toxicologist; and
 - (ii) Directed by approved breath test instructors.
- (b) The course shall include a minimum of 35 hours of lecture or laboratory instruction covering:
 - (i) A study of the mathematics of the metric system;
 - (ii) A study of the properties, human physiology, and pharmacology of alcohol;
 - (iii) A study of the theory, operating principles, and maintenance requirements of the breath test instruments; and
 - (iv) A review of relevant Maryland statutes, regulations, and cases affecting enforcement and testing of an individual suspected of driving while impaired or under the influence of alcohol.
- (c) A written examination consisting of at least 50 questions shall be given at the conclusion of the course.
- (d) The cumulative passing score on the written examination shall be 90 percent or above.
- (e) The individual shall demonstrate to the instructor satisfactory ability to use the instrument.

(2) Breath Test Operator Certification Renewal Course.

- (a) A breath test operator certification renewal course shall be:
 - (i) Approved by the Toxicologist; and
 - (ii) Directed by approved breath test instructors.
- (b) The course shall be comprised of a minimum of 6 hours of instruction, including a review of:
 - (i) Breath testing theory;
 - (ii) Method and procedures; and
 - (iii) Current and contemporary issues.
- (c) A written examination consisting of at least 25 questions shall be given at the conclusion of the course.
- (d) The passing score on the written examination shall be 80 percent or above.

(3) Breath Test Maintenance Technician Course.

- (a) The breath test maintenance technician course shall be approved by the Toxicologist.
- (b) This course shall include a minimum of 70 hours of training, covering:
 - (i) A review of breath testing theory, methods, and developments;
 - (ii) Operation, takedown, and maintenance of instruments;
 - (iii) Gas cylinder replacement; and
 - (iv) Simulator takedown, maintenance, and solution changing.
- (c) A written or oral exam shall be administered by the Toxicologist or his representative before certification.
- (4) CTAU shall issue a certificate after the successful completion of any course outlined in §B(1)—(3) of this regulation.

.06 Evidentiary Tests of Breath for Alcohol: Personnel — Training.

A. Breath Test Operator.

(1) Initial Certification as a Qualified Person.

- (a) To become a qualified breath test operator, a qualified person shall be:
 - (i) A full-time law enforcement officer of an agency approved to conduct breath tests;
 - (ii) A full-time laboratory technician of an agency approved to conduct breath tests;
 - (iii) An employee of the Toxicologist; or
 - (iv) Any individual designated by the Toxicologist.

(b) CTAU shall issue an initial certificate after the successful completion of a basic breath test operator course as described in Regulation .05B(1) of this chapter.

(c) An initial certification shall be valid for a period of 15 months.

(2) Renewal of Certification.

(a) Before expiration of the initial certification or each subsequent renewal certification period, a breath test operator shall:

(i) Exhibit competence in the performance of all duties as a breath test operator as described in Regulation .07A(1) of this chapter; and

(ii) Successfully complete a breath test operator certification renewal course as outlined in Regulation .05B(2) of this chapter.

(b) CTAU shall issue a renewal certificate after the breath test operator complies with §A(2)(a) of this regulation.

(c) A renewal certificate shall extend certification for an additional period of 13 months.

(3) Reinstatement of Expired Certification.

(a) If the breath test operator's certification expires and not more than 90 days has elapsed since the time of expiration, the CTAU supervisor may reinstate the operator.

(b) If more than 90 days, but less than 3 years has elapsed, the CTAU supervisor:

(i) Shall confer with the Toxicologist or his representative about reinstatement; and

(ii) May require a demonstration of proficiency before reinstatement of the expired certification.

(c) A breath test operator who applies for reinstatement more than 3 years following expiration of certification shall complete the basic breath test operator course as provided in Regulation .05B(1) of this chapter to be requalified.

(4) Suspension and Revocation of Certification.

(a) An individual who fails a breath test operator certification renewal course shall be immediately suspended by the CTAU as a breath test operator.

(b) The CTAU supervisor may issue a renewal certificate to an individual if the breath test operator certification renewal course is successfully completed within 120 days of the initial failure.

(c) The CTAU supervisor may suspend or revoke a certificate of a breath test operator if, in the supervisor's judgment, the individual's performance is unsatisfactory.

(d) If the individual's certificate is revoked, the individual shall return all certificates and manuals to the CTAU supervisor.

B. Breath Test Maintenance Technician.

(1) To become a breath test maintenance technician, an individual shall:

(a) Be an employee of CTAU;

(b) Have successfully completed an approved operator and maintenance course for breath testing instrumentation as describe in Regulation .05B(3) of this chapter; and

(c) Demonstrate proficiency in the use of breath testing instrumentation to:

(i) The CTAU supervisor; or

(ii) An approved instructor.

(2) CTAU shall issue a certificate if:

(a) The individual complies with §B(1) of this regulation; and

(b) The Toxicologist approves of the issuance of the certificate.

(3) Certification of a breath test maintenance technician may be suspended or revoked for the following reasons:

(a) Failure to properly maintain breath testing instruments;

or

(b) Failure to adhere to this chapter.

C. Breath Test Instructor.

(1) To become a breath test instructor, an individual shall:

(a) Successfully complete the training programs described in Regulation .05B of this chapter;

(b) Have prior experience in training law enforcement officers;

(c) Assist in at least one basic breath test operator course as referenced in Regulation .05B(1) of this chapter; and

(d) Be approved by the Toxicologist.

(2) A breath test instructor may perform any instrument maintenance and repair as needed.

.07 Evidentiary Tests of Breath for Alcohol: Personnel — Duties.

A. Breath Test Operator.

(1) A breath test operator shall:

(a) Perform breath tests for alcohol in accordance with training;

(b) Perform at least one test per month, either a subject or simulation test;

(c) Notify CTAU of the following:

(i) Test results that deviate greater than plus or minus 10 percent of the stated concentration for any validation test; or

(ii) Mechanical problems with the breath testing instrument; and

(d) Complete all required reports.

(2) A breath test operator who fails to perform at least one test per month as required in §A(1)(b) of this regulation shall provide a reason for this failure to the CTAU supervisor.

(3) If a breath test operator will be on extended leave from the agency, the CTAU supervisor shall be notified by the breath test operator or the agency breath test supervisor.

B. Breath Test Maintenance Technician. A breath test maintenance technician shall:

(1) Set up all instruments in the field;

(2) Conduct an inspection of the assigned breath testing instruments at least once a month;

(3) Conduct all scheduled maintenance procedures;

(4) Change the alcohol gas cylinder or alcohol reference solution as needed;

(5) Test each instrument with approved alcohol gas standard or alcohol reference solution at least once a month;

(6) Remove an instrument from service if the result of the test in §B(5) of this regulation is not plus or minus 10 percent of the stated concentration;

(7) Repair the instrument as needed; and

(8) Complete all required reports.

.08 Evidentiary Tests of Breath for Alcohol: Instruments and Testing Procedures.

A. Breath Testing Instruments.

(1) The Toxicologist shall approve all instruments to be used in the State for the purpose of testing breath for alcohol content pursuant to Courts and Judicial Proceedings Article, §§10-302 and 10-304, Annotated Code of Maryland.

(2) An agency shall only use an instrument that has been approved by the Toxicologist.

(3) An individual may receive a copy of the list of the manufacturers and models of currently approved instruments from the Office of the Chief Medical Examiner at no charge.

B. Certification of Approval of Instruments.

(1) The Toxicologist shall certify approval of each instrument before it is used in the State.

(2) At the time of approval by the Toxicologist, the instrument shall be on the most recently updated Conforming Products List of Evidential Breath Alcohol Measurement Devices published in the Federal Register by the National Highway Traffic Safety Administration of the Department of Transportation.

(3) On at least an annual basis, the Toxicologist or his representative shall recertify approval of each instrument.

(4) Following successful testing, an instrument that is repaired by a certified breath test maintenance technician may be returned to service without the recertification of approval by the Toxicologist.

C. Inspection. Approved equipment and related records shall be available for inspection by the Toxicologist or representative at all times.

D. Validation Tests.

(1) The Toxicologist shall approve the alcohol reference solution or alcohol gas standard to be used as validation tests.

(2) Validation tests shall be performed contemporaneously with each evidentiary breath test using an approved alcohol reference solution or alcohol gas standard.

E. Initial Certification of Instrument Approval.

(1) Precision and Accuracy Testing.

(a) Vapor containing 0.020 g/210L, 0.040 g/210L, 0.080 g/210L, and 0.160 g/210L ethanol concentrations shall be introduced through the breath tube of the instrument.

(b) Each concentration shall be repeated 4 times.

(c) As an indication of precision, the combined average standard deviation shall be not greater than 0.0042 g/210L.

(d) As an indication of accuracy, systematic variations at each ethanol concentration will be calculated and shall be not more than 5 percent or 0.005 g/210L, whichever is greater.

(e) An instrument not meeting the precision and accuracy requirements may not be approved.

(2) Acetone Detection Testing.

(a) Vapor containing 0.020 g/210L ethanol and 100 microliters of acetone per 500 mL solution shall be introduced through the breath tube of the instrument.

(b) Each concentration shall be repeated 4 times.

(c) The instrument shall read between 0.015 and 0.025 g/210L.

(d) An instrument not meeting the requirement for acetone detection may not be approved.

(3) Blank Testing.

(a) Four samples of vapor containing no ethanol or other solvents shall be introduced through the breath tube of the instrument.

(b) No reading shall exceed 0.005 g/210L vapor.

(c) An instrument not meeting the blank detection requirement may not be approved.

(4) If conditions outlined in §E(1)—(3) are met:

(a) The instrument shall be approved; and

(b) The Toxicologist shall issue a letter certifying instrument approval.

F. Periodic Recertification of Approval.

(1) Instrument approval shall be recertified at least annually.

(2) The Toxicologist shall issue a letter recertifying instrument approval.

G. Evidentiary Breath Test Method.

(1) For at least 20 minutes before a breath sample is taken, an individual may not:

(a) Eat or drink;

(b) Have any foreign substance in the individual's mouth or respiratory tract; or

(c) Smoke.

(2) The individual shall be observed and mouth checked.

(3) Observation of the individual shall be performed by:

(a) A breath test operator;

(b) Other uniformed or civilian law enforcement personnel;

or

(c) Any combination of a breath test operator and uniformed or civilian law enforcement personnel.

(4) The testing procedure shall begin with a blank test to ensure that no alcohol is present in the breath path of the breath testing instrument.

(5) A validation test shall be run before the individual begins the testing process.

(6) If the breath testing instrument fails to obtain a reading plus or minus 10 percent of the stated alcohol concentration on the validation test, then the subject test shall be discontinued.

(7) The individual shall be instructed to take a breath and then deliver a breath sample into the instrument by blowing into the mouthpiece and breath tube until instructed to stop.

(8) After each subject breath sample, a blank check shall be performed to ensure that no alcohol is present in the breath path.

(9) Two breath samples shall be collected and analyzed by the breath testing instrument.

(10) A third breath sample shall be collected only if the absolute difference between the results of the first and second samples exceeds 0.020 g/210L.

(11) A validation test of known alcohol concentration shall be run after the individual has given the required number of breath samples.

(12) If the instrument fails to obtain a reading plus or minus 10 percent of the stated concentration on the validation test, then the subject test is invalid.

(13) The lower of the two or lowest of the three results of the subject test shall be truncated to the second decimal place and reported as the result of the breath test.

.09 Evidentiary Tests of Blood for Alcohol

A. Laboratories and Procedures for Analysis.

(1) Laboratories.

(a) The Department of Maryland State Police Forensic Sciences Division is an approved laboratory to conduct tests of blood for alcohol.

(b) Approval by the Toxicologist of any other laboratory is required before it may perform any test of blood for alcohol in accordance with of the Courts and Judicial Proceedings Article, §10-304, Annotated Code of Maryland.

(c) An individual may receive a copy of the list of currently approved laboratories from the Office of the Chief Medical Examiner at no charge.

(2) Equipment and Procedures for Analysis.

(a) The Toxicologist shall approve all equipment and analytical procedures for the testing of blood for alcohol.

(b) Approved equipment shall be calibrated with alcohol calibration solution or solutions provided by or otherwise approved by the Toxicologist.

(c) The calibration shall be checked using an alcohol control solution:

(i) Provided by or otherwise approved by the Toxicologist; and

(ii) Analyzed adjacent to each evidentiary test of blood.

(d) Alcohol control solution test results may not deviate greater than plus or minus 0.010 g/100 mL from its stated concentration.

(e) The laboratory shall perform evidentiary tests of blood for alcohol in duplicate and the duplicate results may not deviate greater than plus or minus 0.010 g/100 mL.

(f) For subject tests, the lower of the duplicate results shall be truncated to the second decimal place and reported as the result of the blood test.

B. Personnel.

(1) **Qualified Medical Personnel.** Any qualified medical person is approved to withdraw blood for the testing of blood for alcohol content.

(2) **Analyst.**

(a) The Toxicologist shall certify an analyst performing tests of blood for alcohol content as a qualified person.

(b) The Toxicologist shall:

(i) Review the credentials of the analyst;

(ii) Direct a program of training as necessary; and

(iii) Set standards for maintenance of proficiency.

(c) The Toxicologist shall recertify the analyst on a regular basis.

(d) A certified analyst shall perform at least one batch of subject specimens or proficiency specimens annually.

C. Procedures for Administering an Evidentiary Test of Blood for Alcohol.

(1) The blood specimen shall be withdrawn by qualified medical personnel.

(2) Blood sampling equipment shall be approved by the Toxicologist.

(3) The arresting officer or another law enforcement officer may witness the withdrawal of the blood.

(4) The law enforcement officer shall:

(a) Fill out all forms contained in the approved blood sampling equipment kit; and

(b) Be certain all seals are signed and properly affixed.

(5) The sample shall be delivered by messenger or mail to the Department of Maryland State Police in containers provided with the sampling equipment.

JOHN M. COLMERS

Secretary of Health and Mental Hygiene

Subtitle 37 HEALTH SERVICES COST REVIEW COMMISSION

10.37.10 Rate Application and Approval Procedures

Authority: Health-General Article, §§19-207, 19-214.1, and 19-214.2, Annotated Code of Maryland

Notice of Proposed Action

[10-232-P]

The Health Services Cost Review Commission proposes to amend Regulation .26 under COMAR 10.37.10 Rate Application and Approval Procedures. This action was considered and approved for promulgation by the Commission at a previously announced open meeting held on June 9, 2010, notice of which was given pursuant to State Government Article, §10-506(c), Annotated Code of Maryland. If adopted, the proposed amendments will become effective on or about October 4, 2010.

Statement of Purpose

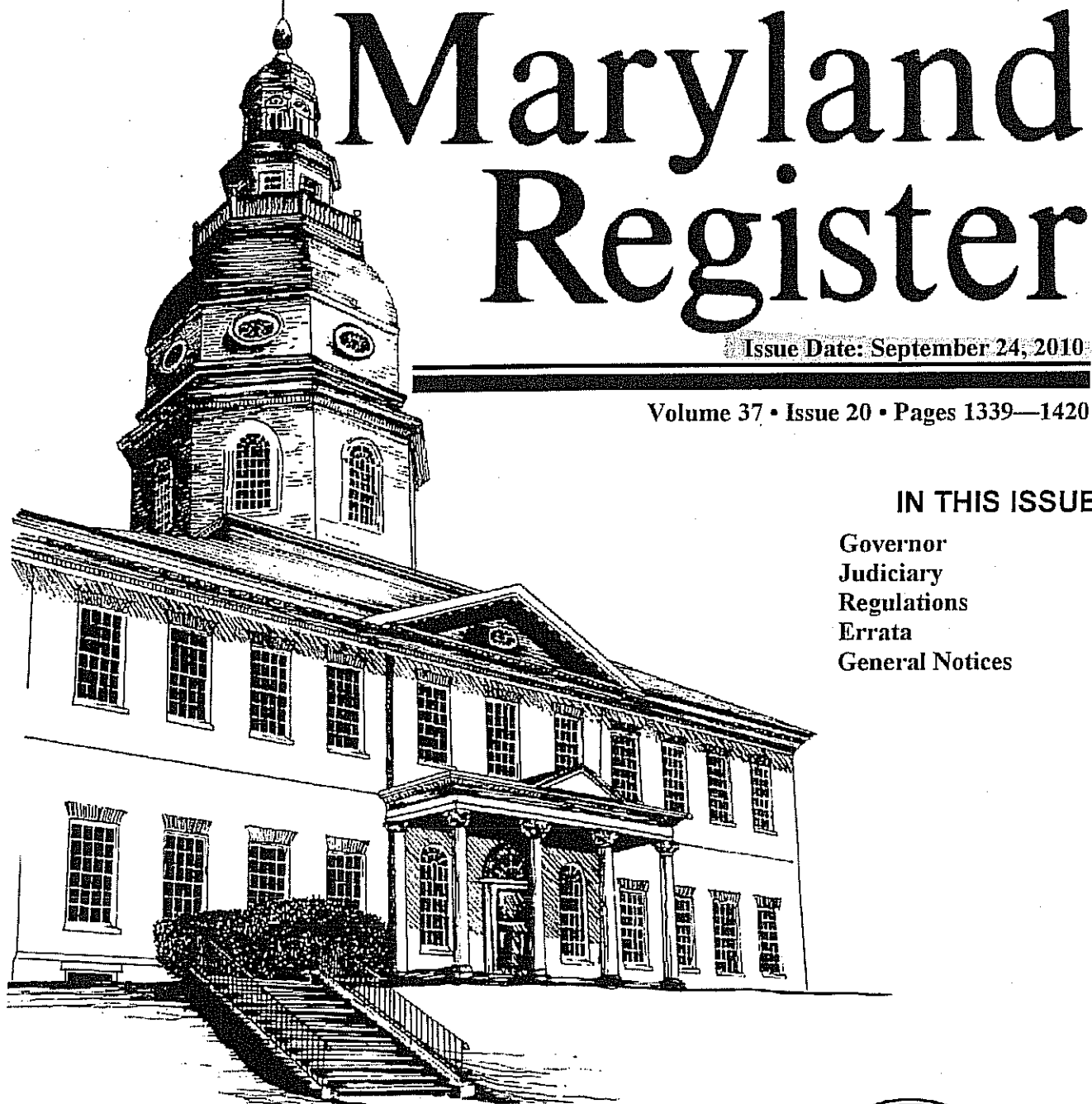
The purpose of this action is to alter the requirements for hospital financial assistance and debt collection policies and to make the requirements applicable to chronic care hospitals that are subject to HSCRC rate-setting. These proposed amendments conform to recently enacted legislation (Chs. 60 and 61, Acts of 2010) and to Commission-approved recommendations for providing incentives to hospitals to provide free and reduced-cost care and certain protections to patients without means to pay their hospital bills.

Comparison to Federal Standards

There is no corresponding federal standard to this proposed action.

Estimate of Economic Impact

I. Summary of Economic Impact. Implementation of the action proposed will expand the provision of hospital care to patients, protect their rights, and identify their obligations with regard to reduced-cost, medically necessary care due to a financial hardship.



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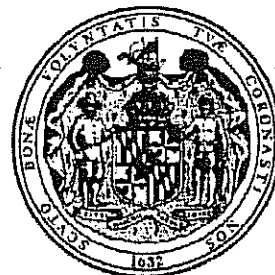
IN THIS ISSUE

Governor
Judiciary
Regulations
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General Notices

Pursuant to State Government Article, §7-206, Annotated Code of Maryland, this issue contains all previously unpublished documents required to be published, and filed on or before September 7, 2010, 10:30 a.m.

Pursuant to State Government Article, §7-206, Annotated Code of Maryland, I hereby certify that this issue contains all documents required to be codified as of September 7, 2010.

Gail S. Klakring
Acting Administrator, Division of State Documents
Office of the Secretary of State



Subtitle 22 DEVELOPMENTAL DISABILITIES

10.22.18 Community Supported Living Arrangements Payment System

Authority: Health-General Article, §§2-104(b), 7-306.1, 7-714, 7-910(c), 15-105, 15-107, and 16-201, Annotated Code of Maryland

Notice of Final Action

[10-191-F]

On September 15, 2010, the Secretary of Health and Mental Hygiene adopted amendments to Regulation .04 under COMAR 10.22.18 Community Supported Living Arrangements Payment System. This action, which was proposed for adoption in 37:15 Md. R. 1012—1014 (July 16, 2010), has been adopted as proposed.

Effective Date: October 4, 2010.

JOHN M. COLMERS
Secretary of Health and Mental Hygiene

Subtitle 54 SPECIAL SUPPLEMENTAL NUTRITION PROGRAM FOR WOMEN, INFANTS, AND CHILDREN (WIC)

10.54.02 Local Agency

Authority: Health-General Article, §§18-107(a) and 18-108, Annotated Code of Maryland

Notice of Final Action

[10-196-F]

On September 9, 2010, the Secretary of Health and Mental Hygiene adopted amendments to Regulation .18 under COMAR 10.54.02 Local Agency. This action, which was proposed for adoption in 37:15 Md. R. 1014—1015 (July 16, 2010), has been adopted as proposed.

Effective Date: October 4, 2010.

JOHN M. COLMERS
Secretary of Health and Mental Hygiene

Subtitle 34 BOARD OF PHARMACY

10.34.20 Format of Prescription Transmission

Authority: Health Occupations Article, §12-205(a)(3)(ii), Annotated Code of Maryland

Notice of Final Action

[10-157-F]

On September 8, 2010, the Secretary of Health and Mental Hygiene adopted amendments to Regulations .01—.04 under COMAR 10.34.20 Format of Prescription Transmission. This action, which was proposed for adoption in 37:12 Md. R. 805—806 (June 4, 2010), has been adopted as proposed.

Effective Date: October 4, 2010.

JOHN M. COLMERS
Secretary of Health and Mental Hygiene

Title 12 DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES

Subtitle 14 COMMISSION ON CORRECTIONAL STANDARDS

12.14.01 Administrative Procedures

Authority: Correctional Services Article, Title 8, Subtitle 1, Annotated Code of Maryland

Notice of Final Action

[10-094-F]

On April 23, 2010, the Secretary of Public Safety and Correctional Services, in cooperation with the Commission on Correctional Standards, adopted amendments to Regulation .02 under COMAR 12.14.01 Administrative Procedures. This action, which was proposed for adoption in 37:5 Md. R. 439 (February 26, 2010), has been adopted as proposed.

Effective Date: October 4, 2010.

GARY D. MAYNARD
Secretary of Public Safety and Correctional Services

Subtitle 35 POST MORTEM EXAMINERS COMMISSION

10.35.02 Testing Blood and Breath for Alcohol

Authority: Health-General Article, §§5-307 and 5-311; Courts and Judicial Proceedings Article, §§10-304 and 10-306; Annotated Code of Maryland

Notice of Final Action

[10-225-F]

On September 14, 2010, the Secretary of Health and Mental Hygiene adopted new Regulations .01—.09 under a new chapter, COMAR 10.35.02 Testing Blood and Breath for Alcohol. This action, which was proposed for adoption in 37:16 Md. R. 1067—1071 (July 30, 2010), has been adopted as proposed.

Effective Date: October 4, 2010.

JOHN M. COLMERS
Secretary of Health and Mental Hygiene

THE STANDARD REFERENCE ANALYSIS

Each breath test administered must be preceded by a standard reference analysis test. This is specifically required by the regulations of the Toxicologist. The purpose of the reference analysis is to show the breath test instrument is working properly. If the reference analysis is within the prescribed range of accuracy limits of ± 0.008 (0.072 to 0.088 inclusive of a 0.080 g / 210 L solution), the instrument will allow the operator to proceed through the subject test sequence.

THE GAS STANDARD

The EC/IR II contains a cylinder which holds a gaseous mixture of Ethanol and an inert gas (Nitrogen) which is approved for use with the instrument. A sample is taken (Validator) before the subject samples are captured and analyzed and another is taken after (Verifier). If the value of either standard falls outside the accuracy limits of .0.072 to 0.088 inclusive, the testing sequence will abort.

The Toxicologist shall approve a 0.080 g/210L Alcohol Gas reference to be used as a calibration and validation standard for performing breath tests. The Toxicologist will maintain a list of the approved Alcohol Gas references.



THE SIMULATOR

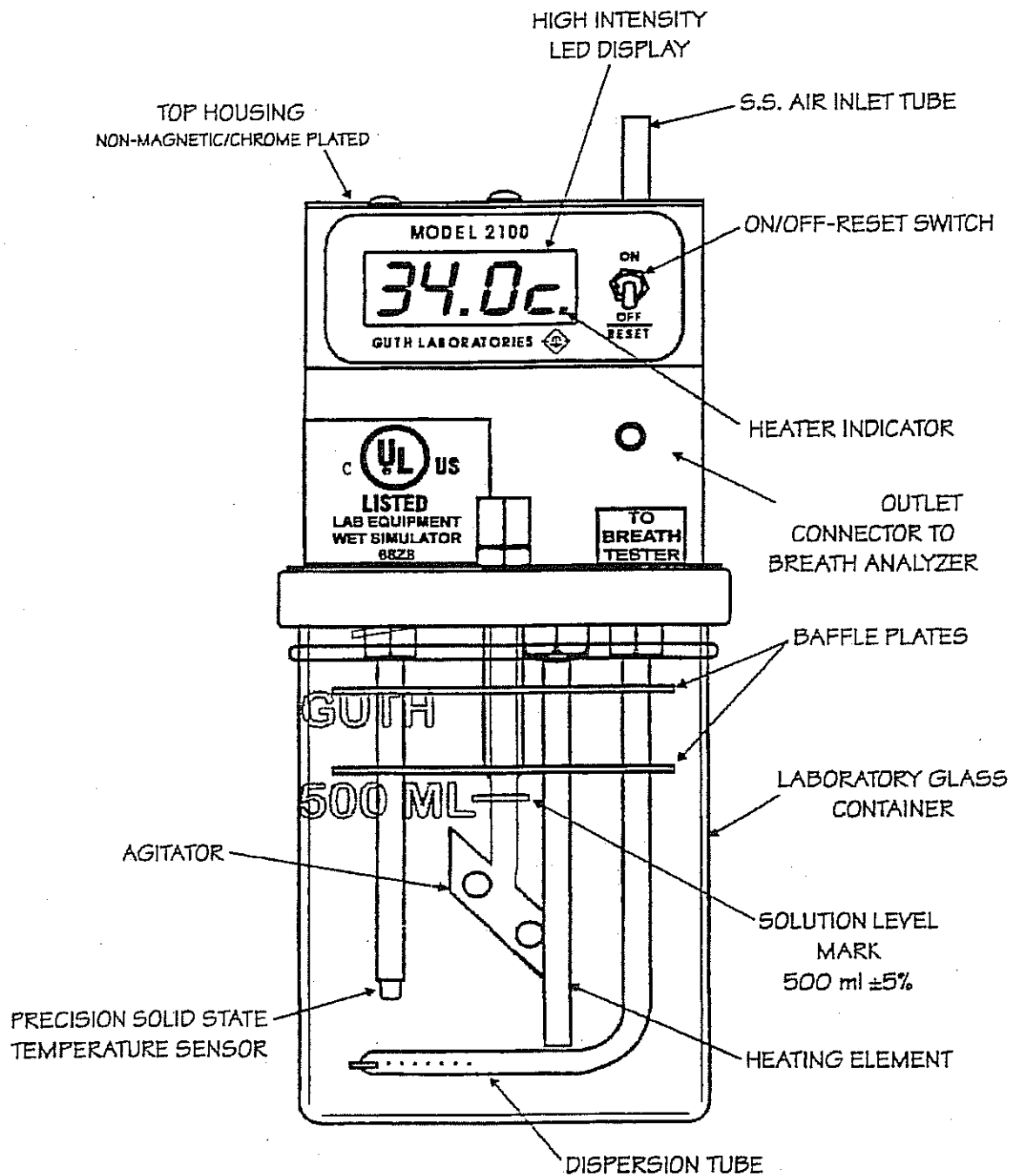
The model simulator used for various maintenance procedures with the Intoximeter EC/IR II is the Guth model 2100. All simulators operate on the same principle. A solution of alcohol in water at a specified concentration will produce a vapor above the solution that has a certain concentration of alcohol. Based upon Henry's law, at a given temperature the amount of alcohol in the vapor will be proportional to the amount of alcohol in the solution.

The Guth simulator operates at 34.0 ± 0.2 degrees C [to simulate exhaled breath temperature (93.2 F)], so that the vapor from the simulator simulates the breath of a drinking subject.

THE SIMULATOR SOLUTION

The Toxicologist shall approve a 0.080 g/210L Alcohol Reference Solution to be used as a calibration and validation standard for performing breath tests. The Toxicologist will maintain a list of the approved Alcohol Reference Solutions.

GUTH MODEL 2100 SIMULATOR



FRONT PANEL AND KEYBOARD CONTROLS AND INDICATIONS

The Intox EC/IR II has two primary components: the analytical instrument itself, contained in a single cabinet that also houses a thermal printer, and a detachable keyboard. Except for advancing paper, operator commands from the keyboard control all instrument functions. A two line display provides operator instructions and status information. Indicators on the built-in printer light when the instrument is on and also show off line/on line status. Below is a view of the front panel.



The Two-Line Display

This instrument is designed to be in "scrolling mode" which is the default display. The display lists such things as date and time of day, instrument serial number, agency and an instruction to press the **Enter** key to start a Subject Test. The display can also show on-line help, operating conditions and menu selections. The instrument automatically adjusts for Daylight Savings Time.

Instrument Power The Intox EC/IR II will remain on continuously and is connected to a UPS (uninterruptable power supply). This allows the system to be ready for testing at all times. When the instrument is within operating temperature, a scrolling set of messages (time, date, instrument serial # and location) is displayed indicating that the instrument is ready to run tests.

Using the Keyboard The keyboard supplied with the Intox EC/IR II works just as any personal computer keyboard works. (Hint: Make sure the NUM LOCK key is depressed and the red indicator lit if you wish to use the numeric key pad.)

Enter Key This key has two functions.

- 1) When the Intox EC/IR II is ready and the display is scrolling, pressing **Enter** starts a Subject Test Sequence.
- 2) After answering questions and entering data displayed on the Intox EC/IR II, press **Enter** to send the current answer or data to the instrument and move to the next question or prompt.

After the completion of data entry the instrument display will prompt **Space=Begin Enter=Verify**. Pressing the **SPACE** bar will begin the automated Maryland protocol testing sequence. If you press **Enter** at this prompt, the display will scroll through all of the data entries and answers to prompts. With this feature you can verify correct spelling, license number, etc. before you begin the testing sequence. It takes only seconds to verify your entries and all you need do is press the **Enter** key at each screen to advance through them.

Escape Key

This key also has the following functions.

The **Escape ("Esc")** key is used to "soft" reset the instrument when it is not in the scrolling mode. If you find the instrument in an unusual state, pressing the **Escape** key should restore normal operation.

If you press the **Escape ("Esc")** key while making data entries, prior to the prompt "**Space=Begin Enter=Verify**" the Intox EC/IR II will exit the current function and return the instrument to the scrolling mode. No data will be stored in the instrument.

If you use the **Escape ("Esc")** key anytime after pressing the **SPACE** bar and the automated testing sequence commences, the instrument aborts the test and indicates "Operator Abort" on the display and the printout.

SUBJECT TEST – BASICS**DUAL ANALYSIS SYSTEM**

The EC/IR II utilizes a dual analysis system with primary detection using an ethanol specific fuel cell (EC=electrochemical oxidation) which provides the quantitative (numerical) value of the sample under analysis. The secondary detector is a miniaturized IR bench (Utilizing non-dispersive infrared molecular absorption) which qualifies (confirms) that the sample contains ethanol. It operates in real time and is also used for detection of mouth alcohol as the subject blows into the instrument.

SAMPLING SYSTEM

Under the Maryland testing protocol the instrument is programmed to sample once two conditions are met. First, the sample must reach a threshold volume of 1,500 cc's and then continues to monitor the breath flow rate until the flow rate drops by 20%. Then and only then does the sampling assembly activate. This ensures that a true deep alveolar sample is taken for analysis. Both conditions must be met for the instrument to capture a sample.

3 minute time-outs and refusals

Under Maryland's testing protocol, the subject is required to give a minimum of 2 valid breath samples and possibly a 3rd. The instrument starts the 3 minute timer once the prompt; **"Please blow"** appears. If the subject has not attempted to provide a breath sample within that time, at the end of 3 minutes, a prompt is displayed inquiring if the subject is refusing the test, **"Test Refused" Y/N**. The instrument will then prompt based on the operator's response. If you respond **Y (yes)**, the testing sequence terminates and **Test Refused** is printed on the test strip. If you answer **N (no)** the program will perform a purge / blank cycle and then re-prompt **"Please blow"**. The subject is given 3 attempts to provide each **valid breath sample**.

Insufficient Breath Sample

If the subject does not provide a sufficient amount of breath and/or the subject stops blowing, the instrument displays **"INSUFFICIENT SAMPLE"**. The instrument will go through another purge/blank cycle. After this cycle, the "Please blow" message appears again. At this point, instruct the subject again on how to provide a proper breath sample.

If the subject does not provide enough breath for a valid sample after 3 consecutive attempts, the instrument aborts the process. The Instrument will print out a test strip indicating **Insufficient sample**.

PRINTER FUNCTIONS

Printer ON-LINE Status

The EC/IR II will not let you start a test with the printer OFF-LINE. If the printer is off line the instrument will prompt you when the ENTER key is pressed to start a subject test. Simply press the LINE/LOCAL button and proceed.

Printer Controls and Displays The printer has two push buttons and three status indicators:

Advancing Paper:

- 1) Press the LINE/LOCAL push button until the ON-LINE indicator goes off.
- 2) Press the PAPER ADVANCE push button to advance the paper out of the printer when it is off-line.

Be sure to return the printer to ON-LINE mode.

Printer Status Indicators:

- The POWER indicator lights amber when the printer has power supplied to it.
- The ON-LINE indicator lights green when the printer is ready to print.
- The ERROR indicator lights red or flashing red when there is a printer fault: paper empty, door open or paper jam.

Recovery from Printer Errors

If the printer is inadvertently taken off line or the door latch opens during the testing sequence: at the end of the test, the display shows "**Internal Printer Error: Printer Offline**". Correct the problem by closing the door latch and pressing the LINE / LOCAL switch. If the printer is out of paper, "**Internal Printer Error: Paper out**" is displayed. Install a new roll of paper to correct this. In either case, after correcting the problem, set the printer on line by pressing the LINE/LOCAL push – button. The instrument will print the test results as soon as the problem is corrected and the printer is again on line. (Green on line LED illuminated)

Changing the Paper Roll

To replace the paper roll in the internal printer:

1. Unlock the printer door by pressing the open circles printed on the latches on either side of the door and pull up on the latches to raise the door and gain access to the interior.
2. Slide the paper carrier out by pulling out on the paper holder handle. Slip the empty paper roll tube off the spindle.
3. Slip the spindle through the tube of the new paper roll. Install the roll on the holder so that paper feeds OVER the top of the roll toward the front and under the handle. Feed a few inches of paper from the roll so that the paper will extend out the door after you replace the carrier. There is a silver sticker on the side of the carrier showing the correct orientation of the paper roll in the carrier.
4. Insert the paper roll carrier back into the printer and close the door. Press the solid circles to lock the latches.
5. Tear off excess paper by pulling up and to the side.
6. Using the PAPER ADVANCE button advance the paper approximately $\frac{1}{2}$ to $\frac{3}{4}$ inch beyond the cutter and press the LINE/LOCAL switch to put the printer back on line.

Thermal Paper Reminders

The thermal print paper roll will only print on one side. If you've changed a paper roll and the printer no longer prints, check the orientation of the roll and correctly reinstall the paper roll in the carrier.

CAUTION: The thermal paper supplied with the INTOX EC/IR II is of course heat sensitive but should last several years if stored properly (away from light, solvents, and excessive heat).

SUBJECT TESTS

STATE OF MARYLAND PROTOCOL

The following outlines the testing procedures using the State of Maryland protocol. The Maryland protocol is: **Standard Check, Subject Sample, Subject Sample and Standard Check**). If the result of the two subject tests does not correlate within 0.02, the instrument will automatically run a conditional third **Subject Sample** prior to the final **Standard Check**.

Conducting a Subject Test

Once the system has been turned on and the warm-up cycle completed the display will be in the scrolling mode. Follow the steps below noting the **DISPLAY**, **KEYBOARD ENTRY**, and **EXPLANATION** at each step. Always use a new originally packaged mouthpiece for each subject test. Use care when opening the mouthpiece package. Residual pieces of plastic wrap may cling to the mouthpiece which may get blown into the sample assembly causing restriction and possible blockage.


Use the ENTER key after making an entry or answering a prompt to move to the next screen.


<u>DISPLAY</u> (Normal Scrolling Mode)	<u>KEYBOARD ENTRY</u>	<u>EXPLANATION</u>
Intoximeters, Inc EC/IR II Instrument Ready Press ENTER to start Subject Test CTAU (Instrument Location) SN 011713 Thu Mar 3 2011 11:19 EST Database 42 / 4094 (1%)	Press the Enter key	The Enter key starts the data entry portion of the test that will be performed. After data entry you will be prompted Space=Begin Enter=Verify . Pressing the SPACE bar will begin the automated Maryland protocol testing sequence. If you press Enter at this prompt, the display will scroll through all of the data entries and answers to prompts and then return to Space=Begin Enter=Verify .
Operator Name:	Enter you Operator Name	Your name MUST be entered exactly as provided for code generation
Operator Code:	Enter your 4 digit alpha-numeric Operator Code	Operator assigned code by CTAU
Fatality Involved (Y/N)?:	Press Enter key to accept N (default) or press Y followed by the Enter key.	Make appropriate entry

Subject Last Name:	Enter last name	Up to 20 Characters, including spaces and hyphens
Subject First Name:	Enter first name	Up to 20 Characters, including spaces and hyphens
Subject Middle Initial:	Enter middle initial	Only 1 letter allowed
Subject Sex:	Press Enter key to accept Male (default) or press the SPACE bar to toggle to Female and press Enter	Enter as required
Subject D.O.B.:	Enter the subject date of birth followed by the Enter key. MUST USE 4 DIGIT YEAR	Enter the subject Date of Birth by MM/DD/YYYY (slashes added automatically).
D.L. State of Issue:	Enter DL State (2 letter standard abbreviation)	Enter as required
D.L. Number:	Enter the DL number	If you entered MD in the previous screen, it will auto-format for Maryland Soundex. Other states-20 characters letters, numbers, dashes spaces.
DUI Citation:	Enter DUI Citation number	Enter the citation number - 20 characters letters, numbers, dashes spaces.
Arresting Officer Name/ID:	Enter the Arresting Officer's name and ID #	Name and ID (Rank optional)
County Code:	Enter the County Code	Use the 2 digit MAARS County Code
Department Code:	Enter the Department Code	Use the 4 digit Agency Code from the reference list
Case Number:	Enter the local case number	Enter as required

Time Expired (Y/N)?: No	Press Enter key to accept default (no) or Y then the Enter key.	Enter as required
Drug Arrest (Y/N)?: No	Press Enter key to accept default (no) or press Y followed by the Enter key.	Enter Y (yes) only if charging under 21-902 c or 21-902 d
Blood Test (Y/N)?: No	Press Enter key to accept default or press Y followed by the Enter key.	For a breath test it will always be No. Blood tests are captured here if known
Refusal (Y/N)?: No	Press Enter key to accept default or press y followed by the Enter key	Enter as required
Observation Start Time:	Enter the Obs. Start Time in Standard Military notation	Use 4 digits. The prompt will auto-format the colon
Starting Test Sequence: SPACE=Begin ENTER=Verify	Press SPACE or ENTER	At this point you will be prompted Space=Begin Enter=Verify . Pressing the SPACE bar will begin the automated Maryland protocol testing sequence. If you press Enter at this prompt, the display will scroll through all of the data entries and answers to prompts and then return to Space=Begin Enter=Verify .
BEGINNING OF AUTOMATED MARYLAND TESTING PROTOCOL SEQUENCE		
Test Number:38	Information only. No data entry required.	Internal EC/IR II data reference.
System Check:	Information only. No data entry required.	The instrument is performing an internal electronic system self check.
Purging Remove Mouthpiece	Information only. No data entry required.	The instrument is purging the breath path with ambient air.

Blank Check	Information only. No data entry required.	The instrument will automatically run a check of the breath path to ensure there is no alcohol present. The automatic blank check must result in a zero reading before the instrument will advance to the next step in the testing protocol. If the blank result is >.000 the test is aborted
Blank Check: .000 g/210l	Information only. No data entry required.	Confirmation of zero blank after purging.
Please wait...	Information only. No data entry required.	Internal instrument processes are in progress. Wait for next prompt
Standard Check	Information only. No data entry required.	The instrument is performing an automated Standard Check utilizing the Gas Standard
Evaluating Sample	Information only. No data entry required	The instrument is evaluating the sample.
Standard Passed	Information only. No data entry required.	The Gas Standard is within the accepted range of 0.072 to 0.088 inclusive
Purging	Information only. No data entry required.	The instrument is purging the breath path with ambient air.
Blank Check	Information only. No data entry required.	The instrument will automatically run a check of the breath path to ensure there is no alcohol present. The automatic blank check must result in a zero reading before the instrument will advance to the next step in the testing protocol. If the blank result is > .000 three times the test is aborted.

Blank Check: .000 g/210l	Information only. No data entry required.	Confirmation of zero blank after purging.
Please wait...	Information only. No data entry required.	Internal instrument processes are in progress. Wait for next prompt
Please blow	(Unit beeps to alert you)	This is where the subject is instructed to blow into the instrument for capture of a valid breath sample
 <p>Keep blowing until the beep</p>	Information only. No data entry required.	Once the subject begins to blow, you will see the flow/pressure bar (top) and the volume bar (bottom). When the bottom bar reaches the right limit (1500 cc minimum volume), it will rescale and continue to show volume. The instrument will then auto sample once there is a 20% drop in breath pressure <u>AFTER</u> the rescale.
Evaluating Sample	Information only. No data entry required	The instrument is evaluating the sample.
Sample Accepted	Information only. No data entry required.	The instrument has captured the first valid breath sample.
Purging Remove Mouthpiece	REMOVE THE MOUTHPIECE!	The instrument is purging the breath path with ambient air.

Blank Check	Information only. No data entry required.	The instrument will again automatically run a check of the breath path to ensure there is no alcohol present. The automatic blank check must result in a zero reading before the instrument will advance to the next step in the testing protocol. If the blank result is > .000 three times the test is aborted.
Blank Check: .000 g/210l	Information only. No data entry required.	Confirmation of zero blank after purging.
Please wait...	Information only. No data entry required.	Internal instrument processes are in progress. Wait for next prompt
Please blow	(Unit beeps to alert you)	This is where the subject is again instructed to blow into the instrument for capture of a valid breath sample
 <p>Keep blowing until the beep</p>	Information only. No data entry required.	Once the subject begins to blow, you will see the flow/pressure bar (top) and the volume bar (bottom). When the bottom bar reaches the right limit (1500 cc minimum volume), it will rescale and continue to show volume. The instrument will then auto sample once there is a 20% drop in breath pressure <u>AFTER</u> the rescale.
Evaluating Sample	Information only. No data entry required	The instrument is evaluating the sample.

Sample Accepted	Information only. No data entry required.	The instrument has captured the second valid breath sample. <i>NOTE:</i> If the first two breath sample results do not correlate within 0.02 of each other, the instrument will purge / blank and request another sample known as the <i>Conditional 3rd</i> at this point.
Purging Remove Mouthpiece	<i>REMOVE THE MOUTHPIECE!</i>	The instrument is purging the breath path with ambient air.
Blank Check	Information only. No data entry required.	The instrument will again automatically run a check of the breath path to ensure there is no alcohol present. The automatic blank check must result in a zero reading before the instrument will advance to the next step in the testing protocol. If the blank result is > .000 three times the test is aborted.
Blank Check: .000 g/210l	Information only. No data entry required.	Confirmation of zero blank after purging.
Please wait...	Information only. No data entry required.	Internal instrument processes are in progress. Wait for next prompt
Standard Check	Information only. No data entry required.	The instrument is performing the second automated Standard Check utilizing the Gas Standard
Evaluating Sample	Information only. No data entry required	The instrument is evaluating the sample.

Standard Passed	Information only. No data entry required.	The Gas Standard is within the accepted range of 0.072 to 0.088 inclusive
Final Result: .079 g/210l Observed[Y]?	PRESS THE "Y" KEY ONLY! (Unit beeps to alert you)	This is where you are to observe the lowest result of the test to determine if a DRE is to be notified. You MUST press the Y key to advance to the next prompt
Was DRE Notified[Y/N]?	Press Y or N as required	Your response here is if a DRE is to be notified. It is not confirmation that one responded, just the determination that one was to be called.
Database Update: Success	Information only. No data entry required.	When this screen appears you will have in hand an auto-print of 4 copies of the subject test sequence. If it is a valid test the word "Success" is printed at the bottom of each copy.

TROUBLE SHOOTING

THE DISPLAY IS BLANK OR NOT SCROLLING.

If you experience the symptoms noted above use the following steps.

- 1) Press the **ESCAPE** key and hold down for a least two seconds and release.
- 2) Turn off the power by using the rocker switch at the rear of the instrument beside the AC power cord. Wait one minute, and then switch the power back on to the instrument. It will take a few minutes for the instrument to re-warm to operating temperature
- 3) If the above procedures fail to reset the instrument, notify **CTAU @ 410-653-4315**. If it's after hours leave a brief message describing the problem.

THE SUBJECT'S NAME IS MISSPELLED OR OTHER INCORRECT INFORMATION IS ENTERED INTO THE INSTRUMENT.

If the data is still in the display, use the BACK SPACE key and then retype the corrected information. If the ENTER key has been pressed before the mistake was noticed, utilize the "**ENTER=Verify**" function prompted at the end of data input to review all entries and make corrections. The review process takes very little time and is easy to utilize.

UNIT DISABLED

The Intox EC/IR II has been programmed to disable if certain situations occur before or during testing. A disabled message will appear and the operator should contact **CTAU** to take corrective steps to re-enable the unit. If a disabled message appears, the Operator will not be able to perform a Subject test until corrective steps are taken to re-enable the instrument.

DISPLAY SHOWS "CHECK AMBIENT CONDITIONS".

- 1) This is an indication of poor air circulation in the room and/or a high number of free ethanol molecules in the ambient air. This can be caused by testing a number of subjects in sequence back to back. (I.E. Subjects from a Check Point or Saturation Patrol)
- 2) Always remember to place the breath tube in upright position or to the front and that the mouthpiece is removed. It may be necessary to remove the subject from the room, allow the room to vent and then re-start the test sequence.

DISPLAY READS "OPERATOR CODE".

Once you've entered your operator name you will enter your unique operator pass code to initiate a test sequence or the instrument will not allow you to begin the test procedure.

DISPLAY READS "Instrument Not Ready – Instrument Warming Up".

This may occur if the instrument has just restarted after a power failure with UPS depletion. It means the unit is heating up and stabilizing. If the unit does not go to scrolling mode within 1 hour, contact CTAU at 410-653-4315

THE GAS STANDARD ABORTS - HIGH or LOW

Restart the test. If there is another test abort, call CTAU.

SUBJECT FAILS TO GIVE A GOOD SAMPLE OR REFUSES TO BLOW PROPERLY.

After the unit completes the purge / blank cycle, re-instruct the subject on how to give a proper sample and then have the subject blow again

SUBJECT IS UNABLE TO GIVE A GOOD SAMPLE (DUE TO MEDICAL REASONS SUCH AS SHORTNESS OF BREATH).

Record the process as a refusal. It will be the defendant's responsibility to show medical documentation to the court and argue such.

SUBJECT TESTS- ABORTS, REFUSALS, CONDITIONAL 3RDS AND OTHER SCENARIOS**ABORTING A TEST**

If you press the Esc key at any point in the test procedure after the **System Check** prompt appears in the display, the instrument aborts the test and indicates on the display and the printout that the test has been an **Operator Abort..**

TIME OUTS AND REFUSALS

The instrument begins the 3 minute timer after the message; **Please blow,** appears. If the subject has not provided a breath sample within that period the instrument will prompt **Refusal Y/N**. Remember, the subject is given 3 attempts for the instrument to capture a valid breath sample. If you reply **Y** at any of the 3 refusal prompts the test sequence aborts and **Test refused** is printed on the test strip. If an issue were to arise (subject becomes ill, combative, etc.) and the **Refusal Y/N** prompt is left on the screen with no response the test will abort and **Time limit exceeded** will be printed on the test strip.

INSUFFICIENT BREATH SAMPLE

If the subject fails to deliver an adequate sample the instrument will display **Insufficient Sample**, it will purge / blank and then prompt "**Please blow**" again for another attempt. Remember, the subject is allowed 3 attempts with 3 minutes allowed per attempt to provide a valid breath sample. And the subject is always required to provide a minimum of 2 and possibly 3 valid breath samples. If the subject tries to blow (where the Operator responds **N** at all of the 3 **Refusal Y/N** prompts and fails all 3 times, the test aborts and **Insufficient sample** is printed on the strip.

READINGS ABOVE 0.500

If any subject value is equal to or greater than 0.500 the test sequence is aborted, on the subject value line **>.500** is printed and **Test result over range** is printed at the bottom of the test strip. This, of course is not a valid test and most if not all participating agencies have protocols in place requiring subject transport to a medical facility in cases of extremely high BrAC readings.

CONDITIONAL 3RD AND 0.02 AGREEMENT

Under Maryland testing protocol, a subject is required to give a minimum of 2 valid breath samples for analysis. If the result of these samples do not agree within a variance of 0.02 (i.e. 0.078 and 0.051) the instrument is programmed to call for a 3rd valid breath sample. Once this sample is analyzed and if it is within 0.02 agreement with either of the first two readings the test is valid and **Success** is printed on the strip. If all 3 readings show that none of them are in 0.02 agreement, the strip will print out but at the bottom **No .02 agreement** will print and this is NOT a valid test.

MOUTH ALCOHOL

The IR system of the EC/IR II performs a real-time analysis of the breath sample as it is introduced into the instrument. This function can detect if there is alcohol present in the oral cavity of the subject. If this occurs, the subject sequence is aborted and **Mouth alcohol** is printed on the test strip. Institute a new 20 minute observation period and run the test again.

"ALCOHOL PRESENT" PRINTED ON TEST STRIP

If any subject result in the testing sequence is 0.080 or higher, "Alcohol present" will be printed just below **Success** on the test strip. This is merely a reminder that the final reported value of the test MAY fall under the "per se" provisions of Maryland law.

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CHIEF MEDICAL EXAMINER

JACK M. TITUS, M.D.
DEPUTY CHIEF MEDICAL EXAMINER

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October 5, 2011

POST MORTEM
EXAMINERS COMMISSION

SANFORD A. STASS, M.D. - Chairman
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OXIRIS BARBOT, M.D.
JOSHUA SHARFSTEIN, M.D.
COLONEL MARCUS BROWN

TO: All Breath Test Operators

SUBJECT: Procedures for filling Out the Alcohol Testing Program Log Pages. (MSP 36B) Rev. 9/2001

- A. All tests to determine an individual's breath alcohol concentration i.e., Arrests, License Restrictions, Administrative Tests, Court Ordered, etc.), shall be entered in the log. If an error is made while making the entry, it shall be corrected by drawing one single line through the entire entry, place officer's initials at the end of the entry, then move down to the next line and re-enter the test data, using the same case number.
- B. Pages in the log are pre-numbered by the Maryland State Police, Chemical Test for Alcohol Unit. The log will not be broken down into sections for the blood, breath or refusal. All entries will be made in sequential order. At the beginning of the new calendar year, the next unused page will be used to start a new year. Log pages are retained for three years after final adjudication, then destroyed.
- C. All entries in the log must be made on a timely basis, i.e., entered legibly at the end of the completion of test or refusal and no further action is to be taken.
Remember only one entry per subject per incident.
- D. All tests are to be recorded at the arresting agency if that agency has a log, otherwise at the testing agency.
- E. Attached is a sample of the Form 36B. The following is an explanation of the information to be entered. For brevity, each column on the log has been numbered to explain the entries. If the information is not applicable, place N/A in column. Slash marks, or dittos and whiteout are not acceptable, for use in the Maryland Alcohol Testing Program Log.

(1) Case Number - This is the local case number or N/A only. Do not leave blank.

(2) Actual date and time of test or refusal.

(3) Accused full name or Simulation Test (Operator) or (Maintenance) - When conducting a simulation test, the following terminology will be used.

(1) Simulation Test (Operator): This will be used when a Breath Test Operator conducts a simulation test as required by the Regulations. The results of the Standard tests will be recorded to the third decimal place, i.e., 0.078.

(2) Simulation Test (Maintenance): This will be used by the Breath Test Maintenance Technician only to identify that he has tested the instrument in accordance with the Regulations. The results of the Standard will be recorded to the third decimal place, i.e., 0.078.

(4) Age The age of the person being tested.

(5) Race/Sex - The following codes for Sex and race must be used:

SEX: M = Male
 F = Female

RACE: must use numeric designator
 1. Black/African American
 2. Caucasian/White
 3. Asian
 4. Native American
 5. Hispanic

(6) Test Refused - Must state either Y or N for subject test only. N/A must be used for Simulation Tests.

(7) Type test - Blood or Breath.

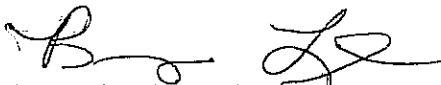
Blood shall be written as "BL".

Breath shall be written as "BR".

Simulation or refusals must be written as N/A.

(8) First Standard - The First Standard is a 0.080 Alcohol Reference which **validates** the breath test of the accused. The results of this test must be ± 0.008 of the 0.080 value or from 0.072 to 0.088 inclusive, to validate the test. Test results outside of the range will cause the test of the person to be voided. The results of the First Standard Test must be recorded to the third decimal place, i.e. 0.078.

- (9) Subject Results - Shall be the breath alcohol concentration of the accused. It is emphasized that the results of the test of the accused must be recorded to the **second decimal place only**. The third decimal place will be dropped and no attempt will be made to round off. A result of 0.299 will be reported as a 0.29. Simulation or Refusals must state N/A.
- (10) Analysis 0.080 Second Standard - The Second Standard is also a 0.080 Alcohol Reference which again validates and **verifies** the breath test of the accused. The results of this test must be ± 0.008 of the 0.080 value or from 0.072 to 0.088 inclusive, to verify the test. Test results from outside of the range will cause the test of the person to be voided. The results of the Second Standard Test must be recorded to the third decimal place, i.e. 0.078.
- (11) Instrument Serial No. - The serial number of the instrument used to perform the test. Must state N/A on refusal.
- (12) License confiscated - On a Subject test column must either Yes or No only. Simulation must be N/A.
- (13) Charged with Alcohol Restriction 16-113 - For subject test it must state either Y or N, only. For Simulation Test Operator or Maintenance, must state N/A. No exceptions.
- (14) Arresting Trooper/Officer and ID Number - Must state name of Arresting Trooper/Officer and ID number or the actual name of the person who requested the test be performed on the subject. Cannot state N/A unless it is a Simulation Test Operator or Maintenance.
- (15) Breath Test Operator and Certification number or medical personnel who withdrew the blood sample - self-explanatory. On a refusal must state N/A.
- (16) Final Disposition. Must be left blank until final adjudication. Then must use codes as indicated in code block on upper left corner of the log page.
- (17) Comments - Self explanatory - Example name of department requesting test, other than testing agency, etc. Must not record "Insufficient Breath" unless it was medically documented and then entry would not be a refusal.


Barry Levine, Ph.D., D-ABFT
Toxicologist

S - STET
OD - OTHER AREA NO DISP
O - OTHER (ie WARRANT)
G/A - GUILTY A
G/B - GUILTY B
G/C - GUILTY C
G/D - GUILTY D
N/G - NOT GUILTY
PBJ - PROBATION BEFORE JUDGEMENT
NP - NOLLE PROS

RESULTS OF THE 0.080 STD'S 1 & 2 MUST BE A READING FROM 0.072 TO 0.088 INCLUSIVE.

I/A - GUILTY A S - STET
 G/B - GUILTY B OD - OTHER AREA NO DISP.
 G/C - GUILTY C O - OTHER (ie. WARRANT)
 G/D - GUILTY D
 N/G - NOT GUILTY
 PBJ - PROBATION BEFORE JUDGEMENT
 NP - NOLLE PROS.

STATE OF MARYLAND

ALCOHOL TESTING PROGRAM LOG

000051

MARYLAND STATE POLICE - CTAU

(ACTUAL DEPARTMENT AND LOCATION)													
CASE NUMBER	DATE & TIME OF TEST OR REFUSAL	NAME OF SUBJECT OR OPERATOR OR MAINTENANCE	AGE	SEX/ RACE	TEST REFUSED Y/N	TYPE TEST	1 ST STD	SUBJECT RESULTS	2 ND STD	INST. SER. NO	LICENSE CONFISC Y/N	ALCOH RSTRIC 16-113 Y/N	ARRESTING TROFF AND ID NO
07-01	0130 03-1-07	John Joseph Henry	50	M/I	No	BR	.081	.19	.081	03851	Yes	No	TFC J. Smith
N/A	1530 3-10-07	Simulation Test Operator	N/A	NA	N/A	N/A	.083	N/A	.081	03851	N/A	N/A	N/A
07-02	2210 3-12-07	John Joseph Henry	50	M/I	Yes	N/A	N/A	N/A	N/A	N/A	YES	No	Cpl. T. Jones
07-03	2130 3-15-07	Cindy Ann Crawford	25	F/2	No	BL	N/A		N/A	N/A	No	No	Sgt. W. Right
N/A	0810 3-18-07	Andrew Thomas Sharp	28	M/2	No	BR	.082	.00	.081	03851	No	No	Lt. J. Best
07-04	1931 3-25-07	Song Lee W's	30	F/3	No	N/A	N/A	N/A	N/A	N/A	No	No	Tpr. T. Friced
07-05	2130 3-29-07	(I O) PHONG S. SANCHEZ	19	M/5	No	BR	.081	.25	.080	03851	Yes	Yes	TFC D Long
07-05	2130 3-29-07	Poncho S. Sanchez (LO.)	19	M/5	No	BR	.081	.25	.080	03851	Yes	Yes	1120
07-06	1825 3-29-07	David Henry James	22	M/2	No	BR	.089	.11	.080	03851	Yes	No	OTW Gibbons
07-07	1609 3-30-07	John Henry Doe	23	M/2	No	BR	.089	.10	.080	03851	No	No	DNR Cpl. Johnson
07-08	1500 4-1-07	Henry Jay Johnson	61	M/2	No	N/A	N/A	N/A	N/A	03851	No	No	Cpl. T. Jones
N/A	1515 4-1-07	Simulation Test Operator	N/A	N/A	N/A	N/A	.080	N/A	.079	03851	N/A	N/A	N/A

RESULTS OF THE 6.080 STD'S 1 & 2 MUST BE A READING FROM 0.071 TO 0.088 INCLUSIVE.

MSP FORM 36B REV. 9/2001

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ept. Not
n Program
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instrument
essage

MOST COMMON MISTAKES

Race Codes:

- 1 - Black, African American
- 2 - White, Caucasian
- 3 - Asian
- 4 - Native American Indian
- 5 - Hispanic

REFUSAL

For a refusal there is no instrument number or breath test operator listed.

ALCOHOL RESTRICTION

For alcohol restriction there can only be a Y or N, nothing else is permitted.

Refusals are not entered into your personal log (MSP 36A)

DISPOSITION BOX

- >Disposition blank *MUST* be left blank until the case is disposed of in court.
- >Then fill it in with the appropriate case disposition as noted in the upper left corner of the page.

INSUFFICIENT BREATH

Insufficient breath test is entered same as a refusal. No different.

LIMITATIONS OF BREATH TESTING

The reliability of breath testing devices even in the hands of competent operators and in the face of exhaustive and repeated field trials is regularly challenged. The success of the breath testing program must depend on the competency of the operators, not only to perform the tests correctly but to corroborate this competence under cross-examination in the courtroom.

Operators should:

1. Understand fundamental principles of breath testing.
2. Be aware of possible sources of error.
3. Maintain proper testing methods and procedures.

Operators should concentrate on:

1. Quality of breath sample he is testing.
2. Any materials in the mouth of subject or possibility of regurgitation.
3. Observation of subject's condition.

Factors Influencing Breath Testing**1. Mouth Alcohol**

It is necessary to wait a minimum time after the consumption of an alcoholic beverage before breath testing. This is done in order to prevent contamination of the breath sample by any alcohol remaining in the mouth. Traces of alcohol remaining in the mouth from a recent drink or regurgitation are stated to disappear in 5-10 minutes.

When individuals behave normally (i.e. breathing through mouth occasionally and talking) mouth alcohol dissipates in 5-10 minutes. Mouth alcohol may be prolonged by 5 minutes by keeping the mouth closed and not talking.

Most mouthwashes contain alcohol and recent use of a mouthwash could interfere with a breath analysis in the same way as could a recent drink. The operator must be alert to any possibility of mouth alcohol contamination.

I. Maryland Regulations require a 20 minute observation period be conducted before any testing procedures begin.

During this observation period the individual may not ingest anything by mouth. (regurgitation, vomiting, etc).

The observation of the individual can be performed by:

1. A breath test operator;
2. Other uniform or civilian law enforcement personnel;
3. Any combination of a breath test operator and uniformed or civilian law enforcement personnel

When mouth alcohol is detected by the instrument, the operator will wait an additional 20 minutes prior to administering any subsequent breath testing.

II. Methyl Alcohol

Methyl alcohol could produce a reading by the EC/IR II. Because of the highly toxic characteristics of methyl alcohol, a subject who has been drinking methyl alcohol may complain of visual disturbances or blindness. Should an operator suspect the presence of methyl alcohol, he should secure medical help. No studies have been made on the effect of methyl alcohol and driving because of its great toxicity and none are expected to be made.

III. Acetone

Acetone is present in the breath of all individuals. Higher acetone levels are mostly associated with diabetics and some extreme dieters. Although acetone was a factor in breath testing with previous breath testing instrumentation, it is not a factor in the Intox EC/IR II.

If the acetone level is high enough it will cause severe medical problems and even death. Individuals with this extreme condition will exhibit serious symptoms, for which medical assistance should be sought.

The operator should ask if the person is ill or on medication.

IV. Acetaldehyde

Metabolism of ethyl alcohol:

Ethyl alcohol ---to---acetaldehyde ---to---acetate---to---co₂+h₂O

Antabuse is a drug used with alcoholics which causes a very unpleasant reaction to persons who ingest even small amounts of alcohol. The mechanism of action is that Antabuse inhibits the oxidation of acetaldehyde. This elevated acetaldehyde blood level causes the reaction.

The small quantity of acetaldehyde that might be present in the breath of a person taking Antabuse would not be measured by the instrument. Persons not taking Antabuse will not have measurable quantities of acetaldehyde present in their blood or breath.

V. Drugs

Use or misuse of drugs could cause impairment of driving ability which could be mistaken for driving under the influence of alcohol. They can, however, in no way be measured by the Intoximeter. A person whose reading is 0.00 and their actions are not consistent with this reading, the operator should request the assistance of a Drug Recognition Expert.

VI. Diseases

Epileptics, diabetics nearing coma, heart patients suffering attacks, may also appear to be under the influence. An operator should ensure that they are dealing with an alcohol case rather than an acute physiological condition.

COURT ROOM APPEARANCE

I. Appearance and attitude of policemen has an effect on outcome of case

A. Uniforms cleaned and pressed

1. Worn in uniform manner
 - a. Shoes, leather, brass clean
 - b. Tie straight
 - c. Avoid dark glasses
2. Person fresh and clean
 - a. Shaved
 - b. Hair groomed
 - c. Nails clean
 - d. Teeth
 - e. Avoid chewing anything
3. When wearing civilian clothes
 - a. Avoid extremes
 - (1) Styles and colors
 - (2) Flashy jewelry

B. When called to the stand.

1. Walk to stand in an erect and dignified manner
 - a. Don't walk between the counsel table and the judge.
2. Taking the Stand
 - a. Don't raise hand to take oath until requested to do so
3. Administering oath is a solemn ceremony
 - a. Give it your undivided attention
4. Assume an erect position
5. Attempt to appear unbiased (Just the facts)
 - a. avoid excessive nervousness

C. Upon completing testimony

1. Leave stand promptly
2. Maintain composure and avoid mannerisms that would indicate anything other than a professional.

GUIDE TO QUALIFYING THE BREATH TEST OPERATOR

1. Question: Would you give the court your name, rank, assignment and years of service?

Answer: Answer appropriately.

2. Question: What training have you received in "chemical tests for intoxication or in the use of the Intoximeter EC/IR II?

Answer: I received 40 hours of instruction in chemical testing for alcohol and use of the Intoximeter EC/IR II at the (name of institution) in (location) conducted by the Maryland State Police under a program approved by the Toxicologist of the Post Mortem Examiner Commission.

3. Question: What did this training consist of?

Answer: The Effects of Alcohol, The Theory of the Intoximeter EC/IR II, and Laboratory work which included administering tests of known solutions, unknown solutions and testing individuals who have been drinking.

4. Question: Did you successfully complete this course of instruction?

Answer: Yes. (The certification card to perform Breath Alcohol Tests should be introduced into evidence. It should be emphasized that this certification is issued by the Toxicologist of the State of Maryland and the Maryland State Police and it is issued to the person named on it.)

5. Question: What time did you see the defendant on this occasion?

Answer: The operator should state the exact time he first saw the defendant. (This information should be recorded on the test record.) (Keep good notes)

6. Question: How long was the defendant in your presence?

Answer: This information should be recorded on the form provided.

7. Question: Did the defendant take anything by mouth while he was in your presence?

Answer: (The operator should establish the fact that the defendant did not take anything by mouth from the time he first saw him until the test was administered.)

8. Question: Did you administer a test to the defendant on this occasion?

Answer: Yes (if a test was administered).

9. Question: What instrument was used in administering the test on the defendant?

Answer: The Intoximeter EC/IR II (during cross-examination it may be necessary to describe the Intoximeter EC/IR II by Model No., Manufacturer, etc.).

10. Question: What is the Intoximeter EC/IR II?

Answer: An instrument to determine the weight of alcohol in a persons breath.

11. Question: Is the Intoximeter EC/IR II the type approved for such tests by the Toxicologist of the State of Maryland?

Answer: Yes. (Here evidence should be introduced showing the certification of the instrument.)

12. Question: Was the Intoximeter EC/IR II operated in accordance with the Toxicologist Regulations?

Answer: (The standard operation procedure requires that all tests be administered in compliance with the Regulations of the Toxicologist of the State of Maryland).

13. Question: Was the Intoximeter EC/IR II in proper working order?

Answer: (Here the operator can rely upon the instrument self tests performed prior to the subject test, and afterward).

14. Question: At what time did the defendant actually blow his breath into the instrument?

Answer: (Actual time should be recorded on the test record.)

15. Question: Did you obtain a reading on the Intoximeter EC/IR II as a result of the test given the defendant?

Answer: Yes.

16. Question: What were the results of the test?

Answer: Give answer as recorded on the test record. (Attempt to have the test record introduced into evidence).

CASE LAW

In The Supreme Court of The United States

No. 658. — October Term. 1965.

Armando Schmerber, Petitioner,

v

State of California.

On Writ of Certiorari to the Appellate Department of
Superior Court of California, County of Los Angeles.

[June 20, 1966.]

Mr JUSTICE BRENNAN delivered the opinion of the Court.

Petitioner was convicted in Los Angeles Municipal Court of the criminal offense of driving an automobile while under the influence of intoxicating liquor(1). He had been arrested at a hospital while receiving treatment for injuries suffered in an accident involving the automobile that he had apparently been driving(2). At the direction of a police officer, a blood sample was then withdrawn from petitioner's body by a physician at the hospital. The chemical analysis of this sample revealed a percent by weight of alcohol in his blood at the time of the offense which indicated intoxication, and the report of this analysis was admitted in evidence at the trial. Petitioner objected to receipt of this evidence of the analysis on the ground that the blood had been withdrawn despite his refusal, on the advice of his counsel, to consent to the test. He contended that in that circumstance the withdrawal of the blood and the admission of the analysis in evidence denied him due process of law under the Fourteenth Amendment, as well as specific guarantees of the Bill of Rights secured against the States by that Amendment: his privilege against self-incrimination under the Fifth Amendment; his right to counsel under the Sixth Amendment; and his right not to be subjected to unreasonable searches and seizures in violation of the Fourth Amendment. The Appellate Department of the California Superior Court rejected these contentions and affirmed the conviction. In view of constitutional decisions since we last considered these issues in *Breithaupt v. Abram*, 352 U.S. 432--see *Escobedo v. Illinois*, 378 U.S.478; *Malloy v. Hogan*, 78 U.S. 1, and *Mapp v. Ohio*, 367 U.S. 643--we grant certiorari. 382 U.S. 171 We affirm.

(1) California Vehicle Code §23102(a) provides, in pertinent part, "it is unlawful for any person who is under the influence of intoxicating liquor....to drive any vehicle upon any highway....." The offense is a misdemeanor

(2) Petitioner and a companion had drinking at a tavern and bowling alley. There was evidence showing that petitioner was driving from the bowling alley about midnight, November 12, 1964, when the car skidded, crossed the road and struck a tree. Both petitioner and his companion were injured and taken to a hospital for treatment.

(3) This was the judgment of the highest court of the State in this proceeding since certification to the California District Court of Appeals was denied. See *Edwards v California*, 314 U.S.160.)

1

THE DUE PROCESS CLAUSE CLAIM

Breithaupt was also a case in which police officers caused blood to be withdrawn from the driver of an automobile involved in an accident, and in which there was ample justification for the officer's conclusion that the driver was under the influence of alcohol. There, as here, the extraction was made by a physician in a simple, medically acceptable manner in a hospital environment. There, however, the driver was unconscious at the time the blood was withdrawn and hence had no opportunity to object to the procedure. We affirmed the conviction there resulting from the use of the test in evidence, holding that under such circumstances the withdrawal did not offend "that `sense of justice' of which we spoke in *Rochin v California*, 342 U.S.165." 352 U.S., at 435, *Breithaupt* thus requires the rejection of petitioner's due process argument, and nothing in the circumstances of this case(4) or in supervening events persuades us that this aspect of *Breithaupt* should be overruled.

II.

THE PRIVILEGE AGAINST SELF-INCRIMINATION CLAIM.

Breithaupt summarily rejected an argument that the withdrawal of blood and the admission of the analysis report involved in that case violated the Fifth Amendment privilege of any person not to "be compelled in any criminal case to be a witness against himself," citing *Twining v New Jersey*, 211 U.S. 78. But that case, holding that the protections of the Fourteenth Amendment do not embrace this Fifth Amendment privilege, has been succeeded by *Malloy v Hogan*, 378 U.S. 1, 8. We there held that "[t]he Fourteenth Amendment secures against state invasion the same privilege that the Fifth Amendment guarantees against federal infringement — the right of a person to remain silent unless he chooses to speak in the unfettered exercise of his own will, and to suffer no penalty...for such silence." We therefore must now decide whether the withdrawal of the blood and admission in evidence of the analysis involved in this case violated petitioner's privilege. We hold that the privilege protects an accused only from being compelled to testify against himself, or otherwise provide the State with evidence of a testimonial or

communicative nature(5), and that of withdrawal of blood and use of the analysis in question in this case did not involve compulsion to these ends.

It could not be denied that in requiring petitioner to submit to the withdrawal and chemical analysis of his blood the State compelled him to submit to an attempt to discover evidence that might be used to prosecute him for a criminal offense. He submitted only after the police officer rejected his objection and directed the physician to proceed. The officer's direction to the physician to administer the test over petitioner's objection constituted compulsion for the purposes of the privilege. The critical question, then, is whether petitioner was thus compelled "to be a witness against himself."

(4) We "cannot see that it should make any difference whether one states unequivocally that he objects or resorts to physical violence in protest or is in such condition that he is unable to protest" *Breithaupt v. Abram*, 352 U.S. at 441 (Warren, C.J. dissenting). It would be a different case if the police initiated the violence, refused to respect a reasonable request to undergo a different form of testing or responded to resistance with inappropriate force. Compare the discussion at Part IV *infra*.

(5) A dissent suggests that the report of the blood test was "testimonial" or "communicative," because the test was performed in order to obtain the testimony of others, communicating to the jury facts about petitioner's condition. Of course, all evidence received in court is "testimonial" or "communicative" if these words are thus used. But the Fifth Amendment relates only to acts on the part of the person to whom the privilege applies, and we use these words subject to the same limitations. A nod or headshake is as much a "testimonial" or "communicative" act in this sense as are spoken words. But the terms as we use them do not apply to evidence of acts non-communicative in nature as to the person asserting the privilege, even though, as here, such acts are compelled to obtain the testimony of others.)

If the scope of the privilege coincided with the complex of value it helps to protect, we might be obliged to conclude that the privilege was violated. In *Miranda v. Arizona*, ante, p.22, the Court said of the interests protected by the privilege: "All these policies point to one overriding thought: the constitutional foundation underlying the privilege is the respect a government--state or federal--must accord to the dignity and integrity of its citizens. To maintain a 'fair state--individual balance,' to require the government 'to shoulder the entire load'...to respect the inviolability of the human personality, our accusatory system of criminal justice demands that the government seeking to punish an individual produce the evidence against him by its own independent labors, mouth." The withdrawal of blood necessarily involved puncturing the skin for extraction, and the percent by weight of alcohol in that blood, as established by chemical analysis, is evidence of criminal guilt. Compelled submission fails on one view to respect the "inviolability of the human personality." Moreover, since it enables the State to rely on evidence forced from the accused, the compulsion violates at least one meaning of the requirement

that the State procure the evidence against an accused by its own independent labors."

As the passage in *Miranda* implicitly recognizes, however, the privilege has never been given the full scope which the values it helps to protect suggests. History and a long line of authorities in lower courts have consistently limited its protection to situations in which the State seeks to submerge those values by obtaining the evidence against an accused through "the cruel, simple expedient of compelling it from his own mouth.... In sum, the privilege is fulfilled only when the person is guaranteed the right to remain silent unless he chooses to speak in the unfettered exercise of his own will." *Ibid.* The leading case in this Court is *Holt v. United States*, 218 U.S. 245. There the question was whether evidence was admissible that the accused, prior to trial and over his protest, put on a blouse that fitted him. It was contended that compelling the accused to submit to the demand that he model the blouse violated the privilege. Mr. Justice Holmes, speaking for the Court, rejected the argument as "based upon an extravagant extension of the Fifth Amendment," and went on to say: "The prohibition of compelling a man in a criminal court to be a witness against himself is a prohibition of the use of physical or moral compulsion to extort communications from him, not an exclusion of his body as evidence when it may be material. The objection in principle would forbid a jury to look at a prisoner and compare his features with a photograph in proof." 218 U.S. at 252-254(7).

(6) Many state constitutions, including those of most of the original Colonies, phrase the privilege in terms of compelling a person to give "evidence" against himself. But our decision cannot turn on the Fifth Amendment's use of the word "witness." "[A]s the manifest purpose of the constitutional provisions, both of the States and the United States, is to prohibit the compelling of testimony of a self-incriminating kind from a party or a witness, the liberal construction which must be placed upon constitutional provisions for the protection of personal rights would seem to require that the constitutional guaranties, however differently worded, should have as far as possible the same interpretation...." *Counselman v. Hitchcock*, 142 U.S. 547, 584-585. 8 *Wigmore, Evidence* § 2252 (McNaughton rev 1961).

(7) Compare Wigmore's view, "that the privilege to testimonial disclosures. It was directed at the employment of legal process to extract from the person's own lips an admission of guilt, which would thus take the place of other evidence." 8 *Wigmore, Evidence* § 2263 (McNaughton rev 1961). California adopted the Wigmore formulation in *People v. Trujillo*, 32 Cal. 2d 105, 194 P.2d 681 (1948); with specific regard to blood tests, see *People v. Haeussler*, 41 Cal. 2d 252, 260 P.2d 8 (1953); *People v. Duroncelay*, 48 Cal. 2d 766, 312 P.2d. 690 (1957). Our holding today, however, is not to be understood as adopting the Wigmore formulation.

It is clear that the protection of the privilege reaches an accused's communications, whatever form they might take, and the compulsion of responses

which are also communications, for example, compliance with a subpoena to produce one's papers. *Boyd v. United States*, 116 U.S. 616. On the other hand, both federal and state courts have usually held that it offers no protection against compulsion to submit to fingerprinting, photographing, or measurements, to write or speak for identification, to appear in court, to stand, to assume a stance, to walk, or make a particular gesture(8). The distinction which has often emerged, often expressed in different ways, is that the privilege is a bar against compelling "communications" or "testimony," but that compulsion which makes a suspect or accused the source of "real or physical evidence" does not violate it.

Although we agree that this distinction is a helpful framework for analysis, we are not to be understood to agree with past applications in all instances. There will be many cases in which such a distinction is not readily drawn. Some tests seemingly directed to obtain "physical evidence," for example, lie detector tests measuring changes in body function during interrogation, may actually be directed to eliciting responses which are essentially testimonial. To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, whether willed or not, is to evoke the spirit and history of the Fifth Amendment. Such situations call to mind the principle that the protection of the privilege "is as broad as the mischief against which it seeks to guard." *Counselman v. Hitchcock*, 142 U.S. 547, 562.

In the present case, however, no such problem of application is presented. Not even a shadow of testimonial compulsion upon or enforced communication by the accused was involved either in the extraction or in the chemical analysis. Petitioner's testimonial capacities were in no way implicated; indeed, his participation, except as a donor, was irrelevant to the results of the test, which depend on chemical analysis and on that alone(9). Since the blood test evidence, although an incriminating product of compulsion, was neither petitioner's testimony nor evidence relating to some communicative act or writing by the petitioner, it was not inadmissible on privilege grounds.

(8) The cases are collected in 9 Wigmore, Evidence § 2265 (McNaughton rev. 1961). See also *United States v. Chibbaro*, --F.2d-- (C.A.3d Cir. 1966); *People v. Graves*, --Cal.2d-- , 49 Cal. Rptr. 386, 388 (1966); Weintraub, Voice Identification, Writing Exemplars, and the Privilege Against Self-Incrimination, 10 Vand. L. Rev. 485 (1957).

(9) This conclusion would not necessarily govern had the State tried to show that the accused had incriminated himself when told that he would have to be tested. Such incriminating evidence may be an unavoidable by-product of the compulsion to take the test, especially for an individual who fears the extraction or opposes it on religious grounds. If it wishes to compel persons to submit to such attempts to discover evidence, the State may have to forego the advantage of any testimonial products of administering the test -- products which would fall within the privilege. Indeed, there may be circumstances in which the pain, danger, or severity of an operation would almost inevitable cause a person to prefer confession to undergoing the "search," and nothing we say today should be taken as establishing the permissibility of compulsion in that case. But no such situation is presented in

this case. See text at p. 13 *infra*.

Petitioner has raised a similar issue in this case, in connection with a police request that he submit to a "breathalyzer" test of air expelled from his lungs for alcohol content. He refused the request, and evidence of his "refusal was admitted in evidence without objection. He argues that the introduction of this evidence and a comment by the prosecutor in closing argument upon his refusal is ground for reversal under *Griffin v. California*, 380 U.S. 609. We think general Fifth Amendment principles, rather than the particular holding of *Griffin*, would be applicable

in these circumstances, see *Miranda v. Arizona*, *ante*, at p. 30, p. 37. Since trial here was conducted after our decision in *Malloy v. Hogan*, *supra*, making those principles applicable to the States, we think petitioner's contention is foreclosed by his failure to object on this ground to the prosecutor's question and statements.

III.

THE RIGHT TO COUNSEL CLAIM.

This conclusion also answers petitioner's claim that in compelling him to submit to the test in face of the fact that his objection was made on the advice of counsel, he was denied his Sixth Amendment right to the assistance of counsel. Since petitioner was not entitled to assert the privilege, he has no greater right because counsel erroneously advised him that he could assert it. His claim is strictly limited to the failure of the police to respect his wish, reinforced by counsel's advice, to be left inviolate. No issue of counsel's ability to assist petitioner in respect of any right he did possess is presented. The limited claim thus made must be rejected.

IV

THE SEARCH AND SEIZURE CLAIM.

In *Breithaupt*, as here, it was also contended that the chemical analysis should be excluded from the evidence as the product of an unlawful search and seizure in violation of the Fourth and Fourteenth Amendments. The Court did not decide whether the extraction of blood in that case was unlawful, but rejected the claim on the basis of *Wolf v. Colorado*, 338 U.S. 25. That case has held that the Constitution did not require, in state prosecutions for state crimes, the exclusion of evidence obtained in violation of the Fourth Amendment's provisions. We have since overruled *Wolf* in that respect, holding in *Mapp v. Ohio* that the exclusionary rule adopted for federal prosecutions in *Weeks v. United States*, 232 U.S. 383, must also be applied in criminal prosecutions in state courts. The question is squarely presented therefore, whether the chemical analysis introduced in evidence in this case should have been excluded as the product of an unconstitutional search and seizure.

The overriding function of the Fourth Amendment is to protect personal

privacy and dignity against unwarranted intrusion by the State. In *Wolf* we recognized "[t]he security of one's privacy against arbitrary intrusion by the police" as being "at the core of the Fourth Amendment" and "basic to a free society " 338 U.S., at 27. We reaffirmed that broad view of the Amendment's purpose in applying the federal exclusionary rule to the States in *Mapp*.

The values protected by the Fourth Amendment thus substantially overlap those the Fifth Amendment helps to protect. History and precedent have required that we today reject the claim that the Self-Incrimination Clause of the Fifth Amendment requires the human body in all circumstances to be held inviolate against state expeditions seeking evidence of crime. But if compulsory administration of a blood test does not implicate the Fifth Amendment, it plainly involves the broadly conceived reach of a search and seizure under the Fourth Amendment. That Amendment expressly provides that "[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated...."(Emphasis added.) It could not reasonably be argued, and indeed respondents do not argue, that the administration of the blood test in this case was free of the constraints of the Fourth Amendment. Such testing procedures plainly constitute search of "persons," and depend antecedently upon seizures of "persons," within the meaning of the Amendment.

Because we are dealing with intrusions into the human body rather than with state interferences with property relationships or private papers--"houses, papers, and effects"--we write on a clean slate. Limitations on the kinds of property which may be seized under warrant⁽¹⁰⁾, as distinct from the procedures for search and the permissible scope of search⁽¹¹⁾, are not instructive in this context. We begin with the assumption that once the privilege against self-incrimination has been found not to bar compelled intrusions into the body for blood to be analyzed for alcohol content, the Fourth Amendment's proper function is to constrain, not against all intrusions as such, but against intrusions which are not justified in the circumstances, or which are made in an improper manner. In other words, the questions we must decide in this case are whether the police were justified in requiring petitioner to submit to the blood test, and whether the means and procedures employed in taking his blood respected relevant Fourth Amendment standards of reasonableness.

In this case, as will often be true when charges of driving under the influence of alcohol are pressed, these questions arise in the context of an arrest made by an officer without a warrant. Here, there was plainly probable cause for the officer to arrest petitioner and charge him with driving an automobile while under the influence of intoxicating liquor.⁽¹²⁾ The police officer who arrived at the scene shortly after the accident smelled liquor on petitioner's breath, and testified that petitioner's eyes were "bloodshot, watery, sort of glassy appearance." The officer saw petitioner again at the hospital, within two hours of the accident. There he noticed similar symptoms of drunkenness. He thereupon informed petitioner "that he was under arrest and that he was entitled to the services of an attorney, and that he could remain silent and that anything that he told me would be used against him in evidence.

While early cases suggest that there is an unrestricted "right on the part of

the Government, always recognized under English and American law, to search the person of the accused when legally arrested to discover and seize the fruits or evidences of crime," *Weeks v. United States*, 232 U.S. 383, 392; *People v. Chiagles*, 237 N.Y. 193, 142 N.E.583 (1923) (Cardozo, J.), the mere fact of a lawful arrest does not end our inquiry. The suggestion of these cases apparently rest on two factors -- first, there may be more immediate danger of concealed weapons or of destruction of evidence under the direct control of the accused, *United States v. Rabinowitz*, 339 U.S. 56, 72-73 (Frankfurter, J., dissenting); second, once a search of the arrested person for weapons is permitted, it would be both impractical and unnecessary to enforcement of the Fourth Amendment's purpose to attempt to confine the search to those objects alone. *People v. Chiagles*, 237 N.Y., at 197-198, 142 N.E., at 584.

Whatever the validity of these considerations in general, they have little applicability with respect to searches involving intrusions beyond the body's surface. The interests in human dignity and privacy which the Fourth Amendment protects forbid any such intrusions on the mere chance that desired evidence might be obtained. In the absence of a clear indication that in fact such evidence will be found, these fundamental human interests require law officers to suffer the risk that such evidence may disappear unless there is an immediate search.

(10) See, e.g., *Gouled v. United States*, 255 U.S. 298; *Boyd v. United States*, 116 U.S. 616; contra *People v. Thayer*, 63 Cal. 2d 635, 408 P.2d 108 (1965); *State v. Bisaccia*, 45 N.J.504, 213 A.2d 185 (1965); Note, *Evidentiary Searches: The Rule and the Reason*, 54 Geo. L. J. 593 (1966).

(11) See e.g., *Silverman v. United States*, 365 U.S. 505; *Abel v. United States*, 362 U.S. 217, 235; *United States v. Rabinowitz*, 339 U.S. 56.

(12) California law authorizes a peace officer to arrest "without a warrant...whenever he has reasonable cause to believe that the person to be arrested has committed a felony, whether or not a felony has in fact been committed." Cal. Penal Code § 836.3. Although petitioner was ultimately prosecuted for a misdemeanor, he was subject to prosecution for a felony since a companion in car was injured in the accident, which apparently was the result of traffic law violations. Cal. Vehicle Code § 23101. California's test of probable cause follows the federal standard. *People v. Cockrell*, 63 Cal. 2d 659, 408 P.2d 116 (1965).

Although the facts which established probable cause to arrest in this case also suggested that the required relevance and likely success of a test of petitioner's blood for alcohol, the question remains whether the arresting officer was permitted to draw these inferences himself, or was required instead to procure a warrant before proceeding with the test. Search warrants are ordinarily required for searches of dwellings, and, absent an emergency, no less could be required where intrusions into the human body are concerned. The requirements that a warrant be obtained is a requirement that the inferences to support the search "be drawn by a neutral and detached magistrate instead of being judged by the officer engaged in the often competitive enterprise of ferreting out crime." *Johnson v. United States*,

333 U.S. 10, 13-14, see also *Aquilar v Texas*, 378 U.S. 108, 110-111. The importance of informed, detached and deliberate determinations of the issue whether or not to invade another's body in search of evidence of guilt is indisputable and great.

The officer in the present case, however, might reasonably have believed that he was confronted with an emergency, in which the delay necessary to obtain a warrant, under the circumstances, threatened "the destruction of evidence," *Preston v United States*, 376 U.S. 364, 367. We are told that the percentage of alcohol in the blood begins to diminish shortly after drinking stops, as the body functions to eliminate it from the system. Particularly, in a case such as this, where time had to be taken to bring the accused to a hospital and to investigate the scene of the accident, there was no time to seek out a magistrate and secure a warrant. Given these special facts, we conclude that the attempt to secure evidence of blood-alcohol content in the case was an appropriate incident to petitioner's arrest.

Similarly, we are satisfied that the chosen to measure petitioner's blood-alcohol level was a reasonable one. Extraction of blood samples for testing is a highly effective means of determining the degree to which a person is under the influence of alcohol. See *Breithaupt v Abram*, 352 U.S., at 436, n.3. Such tests are a commonplace in these days of periodic physical examinations⁽¹³⁾ and experience with them teaches that the quantity of blood extracted is minimal, and that for most people the procedure involves virtually no risk, trauma, or pain. Petitioner is not one of the few who on grounds of fear, concern for health, or religious scruple might prefer some other means of testing, such as the "Breathalyzer" test petitioner refused, see n. 9, *supra*. We need not decide whether such wishes would have to be respected.⁽¹⁴⁾

Finally, the record shows that the test was performed in a reasonable manner. Petitioner's blood was taken by a physician in a hospital environment according to accepted medical practices. We are thus not presented with the serious questions which would arise if a search involving use of a medical technique, even of the most rudimentary sort, were made by other than medical personnel or in other than a medical environment -- for example, if it were administered by police in the privacy of the stationhouse. To tolerate searches under these conditions might be to invite an unjustified element of personal risk of infection and pain.

(13) "The blood test procedure has become routine in our everyday life. It is a ritual for those going into the military service as well as those applying for marriage licenses. Many colleges require such tests before permitting entrance and literally millions of us have gone through the same, though a longer, routine in becoming blood donors." *Breithaupt v Abram*, 352 U.S., at 436.

(14) See Karst, Legislative Facts in Constitutional Litigation, 1960 Sup. Ct. Rev 75, 82-83.

We thus conclude that the present record shows no violation of petitioner's right under the Fourth and Fourteenth Amendments to be free of unreasonable searches and seizures. It bears repeating, however, that we reach this judgement only on the facts of the present record. The integrity of an individual's person is a cherished value of our society. That we today hold that the Constitution does not forbid the states minor intrusions into an individual's body under stringently limited conditions in no way indicates that it permits more substantial intrusions, or intrusions under other conditions.

Affirmed.

Mr Justice Harlan, whom Mr Justice Stewart joins,
concurring.

In joining the Court's opinion I desire to add the following comment. While agreeing with the Court that the taking of this blood test involved no testimonial compulsion. I would go further and hold that apart from this consideration the case in no way implicates the Fifth Amendment. Cf. my dissenting opinion and that of MR. JUSTICE WHITE in *Miranda v Arizona*, -- U S. --

MR. CHIEF JUSTICE WARREN, dissenting.

While there are other important constitutional issues in this case, I believe it is sufficient for me to reiterate my dissenting opinion in *Breithaupt v Abram*, 352 U.S. 432, 440, as the basis on which to reverse this conviction.

MR. JUSTICE BLACK with whom MR. JUSTICE DOUGLAS joins,
dissenting.

I would reverse petitioner's conviction. I agree with the Court that the Fourteenth Amendment made applicable to the States the Fifth Amendment's provision that "No person...shall be compelled in any criminal case to be a witness against himself..." But I disagree with the Court's holding that California did not violate petitioner's constitutional rights against self-incrimination when it compelled him, against his will, to allow a doctor to puncture his blood vessels in order to extract a sample of blood and analyze it for alcoholic content, and then analysis as evidence to convict petitioner of a crime.

The Court admits that "the State compelled [petitioner] to submit to an attempt to discover evidence [in his blood] that might be [and was] used to

prosecute him for a criminal offense." To reach the conclusion that compelling a person to give his blood to help the State convict him is not equivalent to compelling him to be a witness against himself strikes me as quite an extraordinary feat. The Court, however, overcomes what had seemed to me to be an insuperable obstacle to its conclusion by holding that

"...the privilege protects an accused only from being compelled to testify against himself, or otherwise provide the State with evidence of a testimonial or communicative nature, and that the withdrawal of blood and use of the analysis in question in this case did not involve compulsion to these ends." (Footnote omitted.)

I cannot agree that this distinction and reasoning of the Court justify denying petitioner his Bill of Rights' guarantee that he must not be compelled to be a witness against himself.

In the first place it seems to me that the compulsory extraction of petitioner's blood for analysis so that the person who analyzed it could give evidence to convict him had both a "testimonial" and a "communicative nature." The sole purpose of this project which proved to be successful was to obtain "testimony" from some person to prove that petitioner had alcohol in his blood at the time he was arrested. And the purpose of the project was certainly "communicative" in that the analysis of the blood was to supply information to enable a witness to communicate to the court and jury that petitioner was more or less drunk.

I think it unfortunate that the Court rests so heavily for its very restrictive reading of the Fifth Amendment's privilege against self-incrimination of the words "testimonial" and "communicative." These words are not models of clarity and precision as the Court's rather labored explication shows. Nor can the Court, so far as I know, find precedence in the former opinions of this Court for using these particular words to limit the scope of the Fifth Amendment's protection. There is a scholarly precedent, however, in the late Professor Wigmore's learned treatise on evidence. He used "testimonial" which, according to the latest edition of his treatise, revised by McNaughton, means "communicative" (8 Wigmore, Evidence § 2263 (McNaughton rev 1961), p. 378), as a key word in his vigorous and extensive campaign designed to keep the privilege against self-incrimination "within limits the strictest possible." 8 Wigmore, Evidence § 2251 (3d. 1940.p.318). Though my admiration for Professor Wigmore's scholarship is great, I regret to see the word he used to narrow the Fifth Amendment's protection play such a major part in any of this Court's opinions.

I am happy that the Court itself refuses to follow Professor Wigmore's implication that the Fifth Amendment goes no further than to bar the use of forced self-incriminating statements coming from a "person's own lips." It concedes, as it must so long as *Body v. United States*, 116 U.S. 616, stands, that the Fifth Amendment bars a State from compelling a person to produce papers he has that might tend to incriminate him. It is a strange hierarchy of values that allows the

State to extract a human being's blood to convict him of a crime because of the blood's content but prescribes compelled production of his lifeless papers. Certainly there could be few papers that would have any more "testimonial" value to convict a man of drunken driving than would an analysis of the alcoholic content of a human being's blood introduced in evidence at a trial for driving while under the influence of alcohol. In such a situation blood, of course, is not oral testimony given by an accused but it can certainly "communicate" to a court and jury the fact of guilt.

The Court itself, at page , expresses its own doubts, if not fears, of its own shadowy distinction between compelling "physical evidence" like blood which it holds does not amount to compelled self-incrimination, and "eliciting responses that are essentially testimonial." And in explanation of its fears the Court goes on to warn that

"To compel a person to submit to testing [by lie-detectors for example] in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, whether willed or not, is to evoke the spirit and history of the Fifth Amendment. Such situations call to mind the principle that the protection of the privilege "is as broad as the mischief against which it seeks to guard." Counselman v Hitchcock, 142 U.S. 547, 562."

A basic error in the Court's holding and opinion is its failure to give the Fifth Amendment's protection against compulsory self-incrimination the broad and liberal construction the Counselman and other opinions of this Court has declared it ought to have.

The liberal construction give the Bill of Rights' guarantee in *Boyd v United States*, supra, which Professor Wigmore criticized severely, see 8 Wigmore, *Evidence*, § 2264 (3d ed. 1940), pp. 366-373, makes that one among the greatest constitutional decisions of the Court. In that case, at pp. 634-635, all the members of the Court decided that civil suits for penalties and forfeitures incurred for commission of offenses against the land,

"...are within the reason of criminal proceedings for all the purposes of ...that portion of the Fifth Amendment which declares that no person shall be compelled in any criminal case to be a witness against himself,...within the meaning of the Fifth Amendment to the Constitution..."*

Obviously the Court's interpretation was not completely supported by the literal language of the Fifth Amendment. Recognizing this the Court announced a rule of constitutional interpretation that has been generally followed ever since, particularly in judicial construction of Bill of rights guarantees:

"A close and literal construction of constitutional provisions for the security of persons and property deprives them of half their efficacy, and leads to

gradual depreciation of the right, as if it consisted more in sound than in substance. It is the duty of courts to be watchful for the constitutional rights of the citizen, and against any stealthy encroachments thereon." *Boyd v. United States*, supra, at p. 635.

The Court went on to say, at page 637, that to require "an owner to produce his private books and papers, in order to prove his breach of the laws, and thus to establish the forfeiture of his property, is surely compelling him to furnish evidence against himself." The Court today departs from the teachings of *Boyd*. Petitioner *Schmerber* has undoubtedly been compelled to give his blood "to furnish evidence against himself," yet the court holds that this is not forbidden by the Fifth Amendment. With all deference I must say that the Court here gives the Bill of Rights' safeguard against compulsory self-incrimination a construction that would generally be considered too narrow and technical even in the interpretation of an ordinary commercial contract.

The Court apparently, for a reason I cannot understand, finds some comfort for its narrow construction of the Fifth Amendment in this Court's decision in *Miranda v. Arizona*, ante, p. . . I find nothing whatever in the majority opinion in that case which either directly or indirectly supports the holding in this case. In fact I think the interpretive constitutional philosophy used in *Miranda*, unlike that used in this case, give the Fifth Amendment's prohibition against compelled self-incrimination a broad and liberal construction in line with the wholesome admonitions in the *Boyd* case. The closing sentence in the Fifth Amendment section of the Court's opinion in the present case is enough by itself, I think, to expose the unsoundness of what the Court here holds. That sentence reads:

"Since the blood test evidence, although an incriminating product of compulsion, was neither petitioner's testimony nor evidence relating to some communicative act or writing by the petitioner, it was not inadmissible on privilege grounds."

*A majority of the Court applied the same constitutional interpretation to the search and seizure provisions of the Fourth Amendment over the dissent of Mr. Justice Miller, concurred in by Chief Justice Waite.

Waite.

How can it reasonably be doubted that the blood test evidence was not in all respects the actual equivalent of "testimony" taken from petitioner when the result of the test was offered as testimony, and the jury's verdict of guilt rests in part on that testimony? The refined, subtle reasoning and balancing process used here to narrow the scope of the Bill of Rights' safeguard against self-incrimination provides a handy instrument for further narrowing of that constitutional protection, as well as others, in the future. Believing with the framers that these constitutional safeguards broadly construed by independent tribunals of justice provide our best hope for keeping our people free from governmental oppression, I deeply regret the Court's holding. For the foregoing reasons as well as those set out in concurring opinions of BLACK and DOUGLAS, J.J., in *Rochin v. California*, 342 U.S. 165, 174, 177, and

my concurring opinion in Mapp v Ohio,
367 U.S. 643, 661, and the dissenting opinions in Breithaupt v Abram, 352 U.S.
432, 440, 442, I dissent from the Court's holding and opinion in this case.

Mr JUSTICE DOUGLAS, dissenting.

I adhere to the views of THE CHIEF JUSTICE in his dissent in Breithaupt v Abram, 352 U.S. 432, 440, and to the views I stated in my dissent in that case (id., 442) and add only a word.

We are dealing with the right of privacy which, since the Breithaupt case, we have held to be within the penumbra of some specific guarantees of the Bill of Rights. Griswold v Connecticut, 381 U.S. 479 Thus, the Fifth Amendment marks "a zone of privacy" which the Government may not force a person to surrender. Id., 484 Likewise the Fourth Amendment recognizes that right when it guarantees the right of the people to be secure "in their persons." Ibid. No clearer invasion of this right of privacy can be imagined than forcible blood-letting of the kind involved here.

Mr JUSTICE FORTAS, dissenting.

I would reverse. In my view, petitioner's privilege against self-incrimination applies. I would add that, under the Due Process Clause, the State, in its role as prosecutor, has no right to extract blood from an accused or anyone else, over his protest. As prosecutor, the State has no right to commit any kind of violence upon the person, or to utilize the results of such a test, and the extraction of blood, over protest, is an act of violence. Cf. Chief JUSTICE WARREN'S dissenting opinion in Breithaupt v Abram, 352 U.S. 432, 440.

44 AGO 259

Motor Vehicles -- Construing Admissibility and Weight To Be
Given Results of Blood, Urine, or Breath Tests to
Ascertain Alcoholic Content at Time of Arrest of One
Charged With Driving Under the Influence.

Sec./s/

June 15, 1959

Chief Magistrate Paul A. Dorf,
Traffic Court of Baltimore City

In your recent letter you have asked us to advise you concerning the admissibility of and the effect to be given evidence introduced under the provisions of House Bill No. 132, Chapter 769 of the Laws of 1959, which became effective as law on June 1, 1959. You have also asked that we discuss its constitutionality

House Bill No. 132 adds a new Section 100 to Article 35, Annotated Code of Maryland (1957 Ed.), and provides for any one of three different tests, blood, urine

or breath, to be conducted to ascertain the amount of alcohol in the blood at the time of arrest of any violator charged with a violation of the motor vehicle laws concerning driving or attempting to drive while under the influence of intoxicating liquor. It provides that the results of such tests shall be admissible in evidence in such cases, and sets up certain standards to guide the court or jury in the weight to be given the results of such tests when admitted into evidence.

The weight to be given such evidence is as follows:

(1) If the alcoholic content of the blood, urine or breath falls below a certain percentage set for each test, it shall be presumed that the defendant was not under the influence of intoxicating liquor.

(2) If the alcoholic content of blood, urine or breath falls between certain percentages set for each test, then nothing is to be presumed from the result of the tests, but the result is to be considered with all the other evidence to determine the guilt or innocence of the accused.

(3) If the alcoholic content of blood, urine or breath is found to be above a certain percentage set for each test, the results of the test shall be considered as "prima facie evidence" that the accused was under the influence of intoxicating liquor. The bill further provides that none of the foregoing provisions shall limit the introduction of any other competent evidence bearing upon the question of whether or not the defendant is under the influence of intoxicating liquor.

Under the law certain prerequisites are set up concerning the conduct of the tests and who may see the results:

(1) No person shall be compelled to submit himself or his body to any of the tests provided for in the bill.

(2) No inference or presumption concerning either his guilt or innocence shall arise by reason of his refusal to submit to a test and the fact of his refusal to so submit shall not be admissible into evidence at the trial.

(3) The violator's blood may only be withdrawn by a physician, other qualified medical personnel, or a person acting at the request of a physician upon the request of the police.

(4) All tests made are to be made available upon request to the person charged as a violator before trial.

(5) The person tested shall be permitted to have a physician of his own choosing administer any one of the tests provided for, in addition to the one administered at the direction of the police.

The Legislature of the State of Maryland has the power to prescribe the evidence which may be received in the courts of this State and the provisions of House Bill No. 132 are to be followed by all the courts of this State. *Salsburg v*

State, 346 U.S. 545, 98 L.Ed. 281, *Hubin v. State*, 180 Md. 279. It would violate Article 22 of the Declaration of Rights, Maryland Constitution, to force the alleged violator to submit to the test without his consent. Article 22 provides that no man ought to be compelled to give evidence against himself in a criminal case. See *Allen v. State*, 183 Md. 603; *Spitler v. State* (Ind.), 46 N.E.2d 591. Since House Bill No. 132 does not require the taking of the test, it does not violate the Constitution. If an accused consents to take the test he thereby waves his constitutional privilege. *Spitler v. State*, supra. The evidence provided by the bill is admissible if the prerequisites set up by the bill are first met.

Any Magistrate should be careful to see that all the prerequisites of the bill are complied with, for if they are not, the evidence resulting from any test is inadmissible at the trial. If the provisions of the bill have been complied with, then the evidence is to be admitted, provided the court finds that the person giving the test was duly qualified to do so. The question of whether or not the person who made the test is qualified and may testify as an expert is one which must be determined by the trier of the facts. *People v. Jennings* (Ill.), 96 N.E. 1077, *Gibbs v. Cooper* (N.J.), 90 A. 1112.

The chain of custody of the blood, urine or breath tested must be shown and any one of them must be positively identified as being that taken from the accused and the specimen tested must have been taken from the accused at the time the state of intoxication was claimed to have existed.

Any evidence admitted concerning the results of any of the three tests specified, falling in any of the three categories as to percentages set up in the bill, is only to be considered along with all other evidence to determine the innocence or guilt of the accused. When the results of the tests fall below a certain percentage, there is a presumption of the innocence of the accused, but this may be rebutted by the other evidence introduced in the case, and if the trier of the facts feels that such other evidence is sufficient, he may convict. When the results of the tests fall within the middle ground specified in the statute, there is no presumption of either innocence or guilt, but all other evidence offered must be considered by the trier of the facts along with the results of the test, and the innocence or the guilt of the accused determined.

When the results of the tests fall in the third category and it becomes "prima facie evidence" that the accused was under the influence of intoxicating liquor, such evidence may still be rebutted by other evidence introduced, and the trier of the facts must decide the guilt or innocence of the accused on consideration of the whole evidence. "Prima facie evidence" is synonymous with presumptive evidence and means evidence which, standing alone and unexplained, is sufficient to establish a fact and support a conviction unless the same is rebutted or contradicted. Putting it another way, prima facie evidence is that evidence which would be sufficient to counterbalance the general presumption of innocence and warrant a conviction when standing alone, but when other evidence is offered to contradict it or to prove facts inconsistent with it, the case must be decided on consideration of all the evidence. *People v. Haack* (Cal.), 260 P. 913; *Hill v. Cabral* (R.I.), 2A.2d 482; *State v. Simon* (Minn.), 203 N.W. 989. In *Mahoney v. Byers*, 187 Md. 81, it was held that the Legislature could not prevent one from making a defense to a charge brought against him by substituting an irrefutable presumption

of facts, since such a law would be arbitrary, illegal, capricious and unconstitutional under the provisions of Article 20 of the Declaration of Rights of the Maryland Constitution, which reads as follows:

"That the trial of facts, where they arise, is one of the greatest securities of the lives, liberties and estate of the People."

It is clear, therefore, that all the evidence offered in such cases must be considered by the trier of the facts before reaching his decision.

C. Ferdinand Sybert, Attorney General
Stedman Prescott, Jr., Deputy Attorney General

IMPORTANT COURT DECISIONS RELATING TO DWI ENFORCEMENT

Robert Buck Werkheiser - Court of Appeals to MD

The failure of State to obtain chemical test in fatal motor vehicle collision, although amounting to a violation of due process, does not require dismissal of charges to remedy State's failure. But inference that if a test had been administered results would have been favorable to the defendant.

Coreleann Z. Willis - Court of Appeals of Md. - Sept. Term
1983 Filed 2-22-85.

When 15 months old, sole survivor motor/vehicle accident parents killed.
Over 40 years later she (DWI) kills 2 people.

Two hour countdown commences when the accused is stopped or detained on suspicion of driving or attempting to drive while intoxicated or under the influence. A detention involves some display of force or authority, actual or implied.

Reasonable grounds to believe. Acts upon that information.

APPREHENSION: Functional Equivalent of a stop or detention.

M/V ACCIDENT The collision, not the police, stopped the person.

Jacob Edward Sites - Court of Appeals of MD

Does person arrested for DWI have a right to communicate with counsel before deciding to submit to a chemical test. The court stated that person has a right to communicate with counsel but cautioned that the individual may not delay test. "REASONABLE OPPORTUNITY" will not substantially interfere with timely administration of the testing process, which must be conducted no later than 2 hours of the apprehension. May not delay the test results that would impair the accuracy of the test.

Joseph Austin Briscoe - Court of Special Appeals of MD

Blood alcohol test must conform to other statutory requirements contained in Courts and Judicial Proceedings, 10-302 to 10-309 for the State to enjoy statutory presumption outlined in 10-307

Presumptions inapplicable where the test were conducted in accordance with standard medical procedures. Not pursuant to implied consent provisions.

Edward G. Welsh vs. Wisconsin - U S. Supreme Court.

There is no hot pursuit in a hit and run motor vehicle accident case to allow State to enter dwelling of suspect without a warrant to arrest driver for driving while intoxicated in order to obtain blood alcohol test.

Berkemer vs. McCarty, - U.S. Supreme Court.

Miranda warnings need not be given prior to general on the scene questioning of DWI suspects by police officers. Once a defendant has been placed in custody, however, they must be advised of their Miranda rights prior to any further questioning. Custody does not occur merely because a policeman has an unarticulated plan to arrest the suspect when he makes the stop.

Moon vs. State (Reconsideration of Moon) - MD Ct. of Appeals.

The court holds that the technician conducting alcohol tests for a hospital must testify at trial concerning those test results and procedures, since allowing the admission of such test results under the business records exception of the hearsay rule violates the defendants constitutional right to confrontation.

GLOSSARY

ACETONE: Organic compound that can be found in the blood and breath of untreated diabetics and persons on strict non-carbohydrate diets.

ALCOHOL: In a general sense, group of compounds with similar properties; specifically, the unmodified term refers to ethanol.

ALCOHOL CONCENTRATION: Grams of alcohol per 100 mL of blood or grams of alcohol per 210 liters of alveolar breath.

ATOM: The smallest particle of a given element that has all of that element's properties.

BEER-LAMBERT LAW: The absorption of radiant energy of a given wavelength by a substance is proportional to the concentration of the substance and the sample size.

BLANK SYSTEM ANALYSIS: Purge of instrument's sample chamber with room air

BLOOD ALCOHOL CONCENTRATION: See alcohol concentration.

CERTIFICATE: Document received at time of certification or at subsequent license renewals.

CERTIFICATION: Authority to engage in breath testing, which requires meeting and maintaining the requirements set forth in "The Regulations of The Toxicologist"

CHARLES' LAW: The volume of a given amount of a gas varies directly with the Absolute temperature of the gas.

CHEMICAL TEST: Test of blood, breath, or other bodily substances for alcohol by direct chemical reaction or by physical-chemical analysis measurements employing chemical theories.

DENATURANT: Substance added to alcohol to render it unsuitable for consumption.

DISTILLED SPIRITS: A alcoholic beverage such as Rum, Scotch and Vodka, which are produced by the distillation of fermented slurry

ENZYME: A chemical substance produced in living organisms which can cause changes in other substances, usually by catalytic action.

ETHANOL: Alcohol produced for human consumption. Common names: Grain alcohol, Ethyl Alcohol. (see Neutral Spirits)

ETHYL ALCOHOL: (See ethanol).

HENRY'S LAW: "The weight of any gas that dissolves in a definite volume of a liquid is directly proportional to the pressure that the gas exerts above the liquid."

IMPLIED CONSENT: Consent deemed to have been given by an operator of a motor vehicle to submit to a chemical test of his breath or blood by virtue of his operating a motor vehicle on a public road or highway

SUSPENSION: Voluntary or temporary discontinuance of certification.

INFRARED LIGHT: Light of wavelengths just longer than visible light.

INSTRUMENTS AND ALLIED EQUIPMENT: Any physical equipment or supplies which are used in breath testing.

INTERFERING SUBSTANCE: Substance other than ethanol that is present in the breath of a tested person and that could give a falsely-high result in the analysis of ethanol.

METABOLISM: Process of breaking down organic matter by enzymatic processes into simpler substances or waste matter, thereby producing energy

MISCIBLE: Capable of mixing.

MOLECULE: Group of atoms arranged in a unique structure to give a substance its distinct properties.

NEUTRAL SPIRITS: Ethyl Alcohol distilled and used frequently in alcohol beverage blends.

OXIDATION: Type of chemical reaction that includes the metabolism of ethanol in the liver

PRESUMPTION, STATUTORY: Per Se, all persons with an alcohol concentration of 0.080 g/210 L or greater are presumed under the influence of alcohol.

PYLORIC SPHINCTER: Muscular valve that controls the passage of food particles and other matter from the stomach into the small intestine.

RADIANT ENERGY: Energy issuing from a source in rays.

RECERTIFICATION: Renewal of lost certification.

REFERENCE ANALYSIS: A known alcohol vapor used to test the performance of a breath test instrument.

REFERENCE ANALYSIS DEVICE: A device containing a water-alcohol mixture, at a constant temperature that produces a vapor of known alcohol concentration. (Henry's Law).

RENEWAL OF CERTIFICATION: Continuance of active certification by meeting the requirements stated in "The Regulations of The Toxicologist"

RESIDUAL ALCOHOL: Alcohol present in the oral cavity immediately following the introduction of an alcohol-containing substance, which diminishes below significant levels within fifteen minutes.

REVOCATION: Permanent loss of certification or loss of certification for an indefinite period of time (loss of license).

SPECTROSCOPY: The study of the absorption of energy by various substances at different wavelengths.

SUSPENSION: Immediate cancellation of certification (loss of license).

TOLERANCE, ACQUIRED: Ability of the body to adapt to a toxic substance by continued exposure to the substance.

TOLERANCE, INSTRUMENT: The allowable range of deviation from a given predicted value of measurement.

TOLERANCE, NATURAL: Ability of the body to adapt to a toxic substance without prior exposure to the substance.

WAVELENGTH: The length of one cycle, or wave, of a given radiation.

LIST OF DEPARTMENTS AND CODES

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
(DIAKONIA INC)	4018		0
ABERDEEN POLICE DEPT	7205	12	31
ABERDEEN PROVING GROUND	4000	12	1
ALLEGANY CO SHERIFF'S DEPT	6120	1	0
ANDREWS AIR FORCE BASE	4001	16	2
ANNAPOLIS NAVAL ACAD/NAVAL STATION PD	6222	2	0
ANNAPOLIS POLICE DEPT	6205	2	3
ANNE ARUNDEL CO POLICE DEPT	6200	2	4
ANNE ARUNDEL CO SHERIFF DEPT	6215	2	
BALT CO SHERIFF'S DEPT	4008	3	0
BALT/WASH INT'L AIRPORT	6245	2	0
BALTIMORE CITY POLICE DEPT	6005	24	5
BALTIMORE CO POLICE DEPT	6300	3	6
BARTON POLICE DEPT	6105	1	0
BEL AIR POLICE DEPT	7220	12	0
BERLIN PD	8310	23	0
BERWYN HEIGHTS PD	7603	16	0
BETTERTON POLICE DEPT	7405	14	0
BLADENSBURG PD	7605	16	0
BOWIE STATE COLLEGE	7643	16	0
BRENTWOOD PD	7607	16	0
BRUNSWICK POLICE	7010	10	0
BURKITTSVILLE POLICE	7050	10	0
CALVERT CO CORRECTIONAL OFFICER	4024	4	
CALVERT CO SHERIFF DEPT	6460	4	7
CAMBRIDGE POLICE DEPT	6910	9	8
CAPITOL HEIGHTS PD	7610	16	0
CAPITOL PLAZA POLICE	7611	16	0
CAROLINE CO SHERIFF DEPT	6510	5	0
CARROLL CO SHERIFF'S DEPT	6610	6	0
CECIL CO DETENTION CENTER	4007	7	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
CECIL CO SHERIFF'S DEPT	6720	7	0
CECILTON POLICE	6705	7	0
CENTREVILLE PD	7720	17	0
CHARLES CO DETENTION CENTER	4011	8	0
CHARLES CO SHERIFF'S DEPT	6851	8	9
CHARLESTOWN POLICE	6710	7	0
CHESAPEAKE BEACH POLICE	6420	4	0
CHESAPEAKE CITY POLICE	6715	7	0
CHESTERTOWN POLICE	7410	14	0
CHEVERLY PD	7615	16	0
CHEVY CHASE POLICE	7520	15	0
COLMAR MANOR PD	7620	16	0
COPPIN STATE COLLEGE POLICE	6006	24	0
COTTAGE CITY PD	7623	16	0
CRISFIELD PD	7920	19	0
Crofton Police Dept.	4037	23	
CROWNSVILLE STATE HOSPITAL POLICE	6210	2	0
CUMBERLAND POLICE DEPT	6115	1	10
DELMAR PD	8220	22	0
DENTON POLICE	6525	5	0
DEPT CORRECTIONS HOME DET	4026		
DEPT OF FORESTS & PARKS	6220	2	0
DGS (DEPARTMENT OF GEN. SERVICES PD)	4033	2	
DIRECTOR-DRIVER RECORDS DIV	7100	10	0
DISTRICT COUNT/FREDERICK CO	4014	10	
DISTRICT HEIGHTS PD	7625	16	0
DIVISION OF CORRECTION	4030		
DORCHESTER CO SHERIFF	6900	9	0
EASTERN SHORE HOSPITAL CENTER	4031	20	
EASTON PD	8020	20	0
EDGEWATER POLICE DEPT	6230	2	0
EDMONSTON PD	7630	16	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
ELKTON POLICE	6730	7	0
EMMITSBURG POLICE	7030	10	0
FAIRMOUNT HEIGHTS PD	7635	16	0
FEDERALSBURG POLICE	6535	5	0
FOREST HEIGHTS PD	7638	16	0
FORT MEADE	4002	2	11
FREDERICK CITY POLICE DEPT	7035	10	13
FREDERICK CO SHERIFF'S DEPT	7040	10	12
FROSTBURG POLICE DEPT	6140	1	0
FROSTBURG STATE UNIVERSITY POLICE	6143	1	0
FRUITLAND PD	8230	22	0
FT DETRICK POLICE DEPT	4023	10	
FUNKSTOWN PD	8115	21	0
GAITHERSBURG POLICE	7540	15	0
GARRETT CO SHERIFF'S DEPT	7170	11	28
GIBSON ISLAND POLICE	6225	2	0
GLEN ARDEN PD	7640	16	0
GOLDSBORO POLICE	6550	5	0
GRANTSVILLE POLICE DEPT	7140	11	0
GREAT OAKS RETARDATION CENTER POLICE	7511	15	0
GREENBELT PD	7644	16	0
GREENSBORO POLICE	6545	5	0
HAGERSTOWN CITY PD	8120	21	14
HALETHORPE POLICE	6335	3	0
HAMPSTEAD POLICE	6635	6	0
HANCOCK PD	8125	21	0
HARFORD CO SHERIFF'S DEPT	7221	12	15
HAVRE DE GRACE POLICE DEPT	7245	12	16
HOLLY CENTER	4029	19	
HOOD COLLEGE POLICE	4027	10	
HOUSING AUTH PD/BALT CITY	4009	24	0
HOUSING AUTH PD/BALT CO	4010	3	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
HOWARD CO POLICE DEPT	7330	13	17
HOWARD CO SHERIFF'S DEPT	7350	13	0
HURLOCK POLICE	6940	9	0
HYATTSVILLE PD	7648	16	0
KENSINGTON POLICE	7550	15	0
KENT CO SHERIFF'S DEPT	7401	14	0
LANDOVER HILLS PD	7650	16	0
LAPLATA POLICE	6850	8	0
LAUREL POLICE DEPT	7653	16	18
LAUREL SHOPPING CENTER POLICE	7652	16	0
LEONARDTOWN PD	7850	18	0
LONACONING POLICE DEPT	6145	1	0
LUKE POLICE DEPT	6147	1	0
MANCHESTER POLICE	6650	6	0
MARLOWE HEIGHTS SECURITY POLICE	7656	16	0
MARYDEL POLICE	6555	5	0
MARYLAND PORT ADMINISTRATION POLICE	6050	24	0
MARYLAND STATE POLICE	9000	3	0
MARYLAND TRANSPORTATION AUTHORITY POL	8900	24	32
MASS TRANSIT ADMINISTRATION	6040	24	19
MD DEPT OF FORESTS & PARKS	7250	12	0
MD DEPT OF PAROLE & PROBATION (LES)	4016		
MD NATL CAPITAL PARK POLICE PG.CO.	7530	16	0
MD NAT'L CAPITAL PARK POLICE-MONT CO	7530	15	0
MD SCHOOL FOR DEAF-COLUMBIA	7335	13	0
MD SCHOOL FOR DEAF-FREDERICK	7045	10	0
METRO TRANSIT POLICE MONT CO	8500	15	0
MIDLAND POLICE DEPT	6150	1	0
MILLERSVILLE-HARUNDALE	6250	2	0
MONTGOMERY CO POLICE DEPT	7500	15	20
MONTGOMERY CO SHERIFF'S OFFICE	7560	15	
MONTROSE SCHOOL POLICE	6390	3	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
MORGAN STATE UNIVERSITY POLICE	6055	24	0
MORNINGSIDE PD	7658	16	0
MOUNT LAKE PARK POLICE	7155	11	0
MSP ANNAPOLIS BK	9059	2	59
MSP ASEC	9023	3	0
MSP AVIATION DIV	9022	3	0
MSP BALTIMORE CITY WORLD TRADE CENTER	9098	24	0
MSP BALTIMORE METRO TROOP	9040	3	0
MSP BEL AIR BK	9053	12	53
MSP BERLIN BK	9096	23	96
MSP BWI AIRPORT	9026	2	97
MSP CAMBRIDGE DET	9091	9	91
MSP CAPITAL IMPROVEMENTS DIV	9017	3	0
MSP CARD	9030	3	0
MSP CENTRAL TROOP	9044	0	0
MSP CENTREVILLE BK	9080	17	80
MSP CHAPLAIN DIV	9014	3	0
MSP CHESTERTOWN DET	9092	14	92
MSP COLLEGE PARK BK	9066	16	66
MSP CRCR	9025	3	0
MSP CRIME LAB DIV	9021	3	0
MSP CRIME PREVENTION UNIT	9015	3	0
MSP CUMBERLAND BK	9052	1	52
MSP CVED	9024	3	0
MSP DENTON DET	9093	5	93
MSP EASTERN TROOP	9043	0	0
MSP EASTON BK	9058	20	58
MSP ELECTRONIC SERVICE DIV	9034	13	0
MSP EXECUTIVE PROT DIV	9033	3	0
MSP FIELD OPERATIONS BUREAU	9008	3	0
MSP FINANCE DIV	9007	3	0
MSP FORESTVILLE BK	9061	16	61

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
MSP FREDERICK BK	9051	10	51
MSP GLEN BURNIE BK	9065	2	65
MSP GOLDEN RING BK	9067	3	67
MSP HAGERSTOWN BK	9064	21	64
MSP IDENTIFICATION DIV	9031	3	0
MSP INTELLIGENCE DIV	9018	3	0
MSP INVESTIGATION DIV	9020	3	0
MSP JFK HIGHWAY	9062	3	62
MSP JFK HIGHWAY	9062	7	62
MSP JFK HIGHWAY	9062	12	62
MSP K-9 UNIT	9028	13	0
MSP LEGAL COUNSEL UNIT	9003	3	0
MSP LEONARDTOWN BK	9082	18	82
MSP LICENSING DIV	9029	3	0
MSP LOGISTICAL SERVICES BUREAU	9010	3	0
MSP MCHENRY BK	9094	11	94
MSP MOTOR VEHICLE DIV	9016	13	0
MSP NORTH EAST BK	9055	7	55
MSP NORTHEAST TROOP	9042	0	0
MSP PERSONNEL MANAGEMENT DIV	9006	3	0
MSP PLANNING & RESEARCH DIV	9002	3	0
MSP PORT AUTHORITY	9027	24	0
MSP PRINCE FREDERICK BK	9083	4	83
MSP PRINCESS ANNE BK	9095	19	95
MSP PUBLIC INFORMATION UNIT	9005	3	0
MSP RESIDENT TROOPER UNIT	9012	3	0
MSP ROCKVILLE BK	9063	15	63
MSP SALISBURY BK	9054	22	54
MSP SOUTHERN TROOP	9045	0	0
MSP SPECIAL OPERATIONS BUREAU	9009	3	0
MSP STAFF INSPECTIONS UNIT	9004	3	0
MSP STEU	9036	3	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
MSP SUPERINTENDENT	9001	3	0
MSP SUPPLY DIV	9013	13	0
MSP TELE-COMM DIV	9032	3	0
MSP TRAFFIC PROG PLANNING UNIT	9011	3	0
MSP TRAINING DIV	9019	3	0
MSP WALDORF BK	9057	8	57
MSP WASHINGTON TROOP	9041	0	0
MSP WATERLOO BK	9050	13	50
MSP WESTERN TROOP	9046	0	0
MSP WESTMINSTER BK	9056	6	56
MT RAINIER PD	7660	16	0
NATL INSTITUTE OF STANDARDS POLICE DEPT	4034	15	0
NATURAL RESOURCES POLICE DEPT	4006	2	0
NEW WINDSOR POLICE	6655	6	0
NORTH BEACH POLICE	6455	4	0
NORTHEAST POLICE	6750	7	0
OAKLAND POLICE DEPT	7165	11	0
OCEAN CITY PD	8350	23	21
OCEAN PINES SPECIAL PD	8353	23	0
OXFORD PD	8050	20	0
OXON HILL PD	7661	16	0
P G CO FIRE DEPT/INV	4021		
PATAPSCO STATE PARK	7340	13	0
PATUXENT NAVAL AIR STATION	4004	18	22
PERKINS STATE HOSPITAL POLICE	7345	13	0
PERRYVILLE POLICE	6755	7	0
POCOMOKE CITY PD	8355	23	0
PORT DEPOSIT POLICE	6760	7	0
PRESTON POLICE	6560	5	0
PRINCE GEORGE'S CO PD	7600	16	23
PRINCE GEORGE'S CO SHERIFF'S DEPT	7621	16	0
PRINCESS ANNE PD	7960	19	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
PUBLIC BUILDINGS & GROUNDS POLICE	6015	24	0
QUEEN ANNE CO SHERIFF'S DEPT	7730	17	0
QUEENSTOWN PD	7725	17	0
RIDGELY POLICE	6570	5	0
RISING SUN POLICE	6770	7	0
RIVERDALE PD	7670	16	0
ROCK HALL POLICE	7470	14	0
ROCKVILLE CITY POLICE DEPT	7570	15	24
ROSEDALE	6370	3	0
ROSEWOOD STATE HOSPITAL-OWINGS MILLS	6345	3	0
SALISBURY PD	8270	22	0
SALISBURY STATE UNIV POLICE	4013	22	
SEAT PLEASANT PD	7675	16	0
SHADY GROVE ADVENTIST HOSP SECURITY PD	7512	15	0
SHEPPARD PRATT HOSPITAL POLICE	6340	3	0
SILVER SPRING POLICE	7575	15	0
SMITHSBURG PD	8150	21	0
SNOW HILL PD	8370	23	0
SOMERSET CO SHERIFF DEPT	7910	19	
SOMERSET COUNTY DETENTION	4028	19	
SPARROWS POINT	6375	3	0
SPRING GROVE STATE HOSPITAL	6380	3	0
SPRINGFIELD STATE HOSPITAL	6665	6	0
SPRINGFIELD STATE HOSPITAL POLICE	665	6	
ST MARY'S CO SHERIFF'S DEPT	7810	18	25
ST MICHAELS PD	8075	20	0
STATE FIRE MARSHAL'S OFFICE	4020		
STATE OF MD DEPT OF CORRECTIONS	4019		
SYKESVILLE POLICE	6670	6	0
TAKOMA PARK PD- P.G. CO.	7680	16	0
TAKOMA PARK POLICE - MONTG.CO	7580	15	0
TALBOT CO SHERIFF'S DEPT	8010	20	0

DEPARTMENT NAME	AGENCY CODE	COUNTY CODE	ALCOHOL PROGRAM CODES
TANEYTOWN POLICE	6675	6	0
THURMONT POLICE DEPT	7080	10	0
TOWSON COURT CHIEF CLERK	6386	3	0
TOWSON STATE UNIVERSITY POLICE	6350	3	0
TRAPPE POLICE DEPT	8080	20	0
U S ARMY	4015		
U S PARK RANGER	4036	0	0
U.S. D.O.T./COAST GUARD YARD POLICE	4038	24	
UNION BRIDGE POLICE	6680	6	0
UNITED STATES DISTRICT COURT	8225	22	0
UNITED STATES DISTRICT COURT	7646	16	0
UNITED STATES DISTRICT COURT	8105	21	0
UNITED STATES DISTRICT COURT	6025	24	0
UNITED STATES MARSHAL-BALTIMORE CITY	6010	24	0
UNITED STATES PARK POLICE-ANNE ARUNDEL	7645	2	0
UNITED STATES PARK POLICE-MONTGOMERY	7645	16	0
UNITED STATES PARK POLICE-PRINCE GEORG	7645	17	0
UNIV MD POLICE-EASTERN SHORE	7965	19	0
UNIV OF MD-BALT CO UMBC POLICE	6333	3	0
UNIVERSITY OF BALTIMORE POLICE	6020	24	0
UNIVERSITY OF MD BALTIMORE PD	6060	24	0
UNIVERSITY OF MD COLLEGE PARK PD	7682	16	30
UNIVERSITY PARK PD	7685	16	0
UPPER MARBORO PEOPLES COURT	7690	16	0
UPPER MARLBORO SHERIFF'S DEPT	7691	16	0
VETERANS ADMINISTRATION POLICE DEPT	4035	24	0
WASHINGTON CO SHERIFF'S DEPT	8121	21	27
WESTERNPORT POLICE DEPT	6195	1	0
WESTMINSTER CITY POLICE DEPT	6695	6	29
WICOMICO CO SHERIFF OFF	8210	22	0
WICOMICO HEALTH DEPT	4017	23	
WILLARDS PD	8275	22	0

DEPARTMENT NAME

AGENCY CODE

COUNTY CODE

ALCOHOL PROGRAM CODES

WORCESTER CO SHERIFF'S DEPT

8375

23

0

**MARYLAND STATE POLICE
CHEMICAL TEST FOR ALCOHOL UNIT
PIKESVILLE, MARYLAND**

Welcome to the Maryland State Police Chemical Test for Alcohol Unit. It is our desire to make your training period both comprehensive and enjoyable. While you are attending class, it is necessary that certain rules and procedures be followed. We ask your cooperation in observing the following procedures.

I. Classroom Procedures.

1. Classes start at 9:00 AM each day with a lunch break at approximately 12 noon. The lunch break floats dependent upon the completion of a block of instruction. Your instructor will advise when to return to class. PLEASE BE ON TIME. Classes conclude at 5:00 PM.
2. No smoking will be permitted in the building. Beverages may be permitted in the classroom.
3. At the close of each day, please clean up your area.

II. Attendance.

1. Attendance will be taken each morning and afternoon. You are required to attend all classes.
2. Due to the course requirements, you may not miss any of the classes. Should any classes be missed, you will be dropped from the course.

III. Parking.

Please do not park in any space with a yellow curb or any spaces with reserved signs (See Attached Map)

IV. Meals

1. Students are reminded that there is no cafeteria on the premises. Students should be reminded that the schedule only allows for a 30 minute lunch break. Therefore students should consider packing a lunch. Eating in the classroom is permitted.
2. Students are not required to remain on the grounds for lunch. The Instructor can direct you to several eating establishments in the area.

V. Attire

1. Students are asked that proper attire should be worn at all times unless directed by a member of the faculty. Business casual attire or uniform of the day should be worn.

General Information.

1. No alcoholic beverages or unauthorized persons are allowed on the grounds.
2. The Chemical Test for Alcohol Unit telephone number is 410-653-4315. FAX: 410-653-4324

Your cooperation in all of the above matters will be greatly appreciated.

Note Taking

GOOD NOTES

1. Are a valuable source of information.
2. Are a good practice of mental discipline and focus.
3. They help to organize all the points of a lecture.

General Pointers

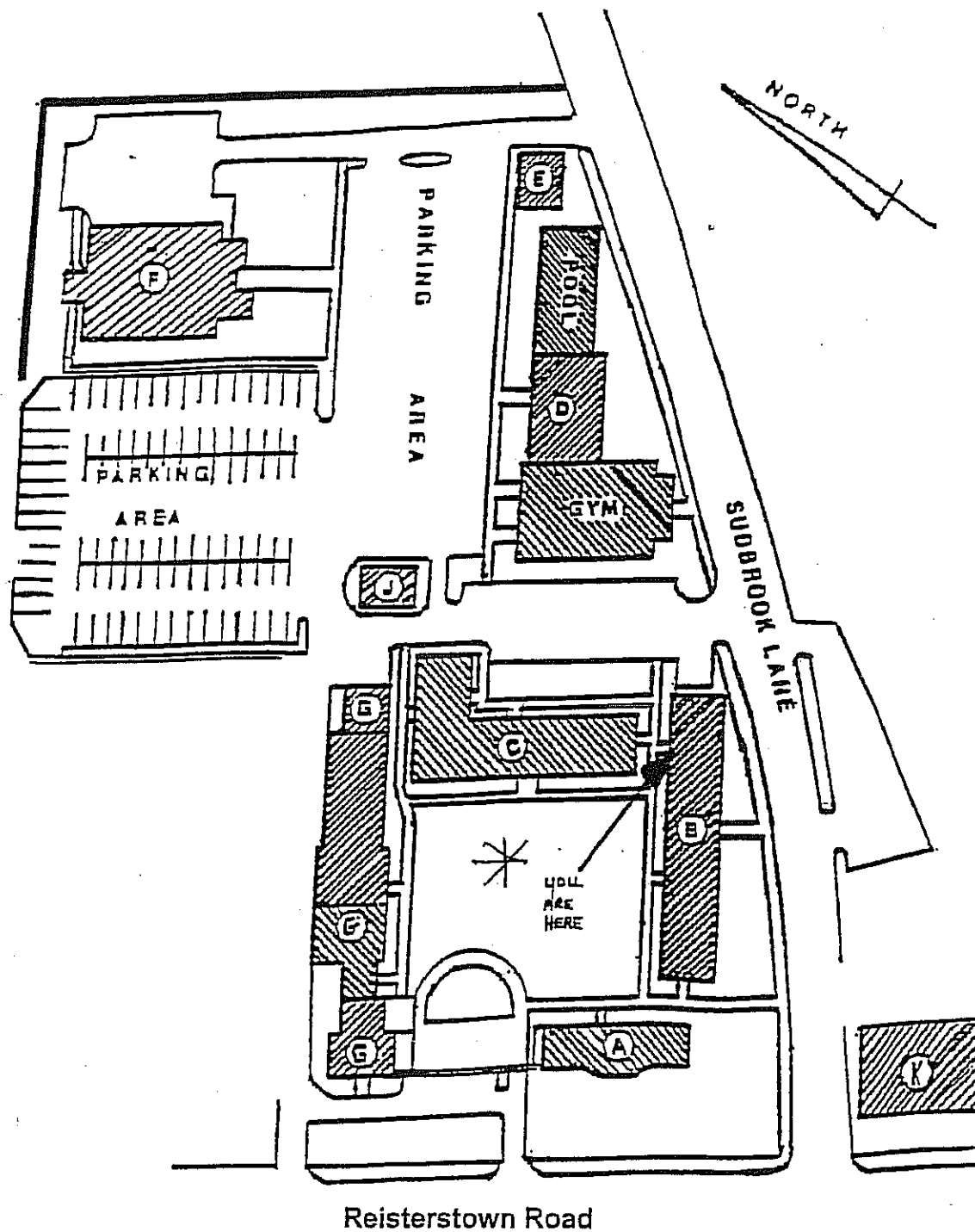
1. There is no set rule for keeping or taking notes. Use the kind that works best for you, the outline form or narrative form. The following hints are just that...suggestions.
2. Don't try to write down everything the lecturer says verbatim.
3. Be sure to get the main points, the ideas and the principles the lecturer is trying to get across. You will find that key points may be repeated by the lecturer.
4. Stay a little behind the lecturer with your note taking. Doing this will make the subject clearer to you. As the subject unfolds and develops, write it down.
5. Make your notes brief. Use your own words, as they will convey the meaning of your notes much clearer at some later date. Get the idea and write it down the way you understand it. This will help you retain much more material for a longer period of time.
6. Definitions are the exception to the above rule. When a definition is given to you, write it down word for word.
7. Develop your own abbreviations or short-hand to speed up your note taking. Be sure to make them sensible so you know what they mean when you refer to them later during study. Not much use in keeping notes if you won't be able to understand them.
8. Using a large size 3 ring note book with college ruled loose leaf paper seems to work best. This makes collating and organizing your notes far easier than using a wire bound notebook. Again, use what works best for you.

9. Organize your notes in such a way that will make your study time easier and complete topics are together in a logical order.
10. Review your notes at the end of the day. This serves as a refresher and helps to reinforce the subject in your mind.
11. Set up your notes based on the main points: adding the secondary points to fill out the details. You can use the standard format for an outline: Roman numerals and capital letters for majors sections and headings; with Arabic numerals and small letters for subordinate sections and detail items.
12. Revise your notes before they become cold and add any new material. The practice of touching up and rounding out notes will make them more valuable for later reference.
13. Apply your notes to practical problems. Whenever confronted by a particular situation in the field, consult your notes to find a possible solution. You can also refer to books, guides or references which were cited in the lecture which you may have in your notes. If you still can't find what you're looking for, feel free to contact the instructors here at CTAU. We are glad to help with unique situations and then incorporate them into future training to help everyone.

NOTE: There may be times where an instructor will ask you to briefly hold your questions on a particular topic they are lecturing on. Just jot it down and hold it until the end of the block of instruction. Often times your question will be answered by the instructor later in the lecture. Most of the time the instructors are open to questions as they arise... Just follow the instructor's lead.

Maryland State Police Headquarters
1201 Reisterstown Road
Pikesville, Md. 21208

Parking Lot Map



BASIC INTOXIMETER INTOX EC/IR II OPERATOR SCHOOL

Monday		Tuesday		Wednesday		Thursday		Friday	
09:00	////////////////////	QUIZ		QUIZ		QUIZ		QUIZ	
09:30	ORIENTATION								
10:00	HISTORY OF BREATH TESTING	SIMULATOR THEORY		FORMS AND PROCEDURES		LABORATORY DRINKING SUBJECTS		PRACTICAL LABORATORY EXAMINATIONS	
10:30	INTRODUCTION TO EC/IR II	INTOXIMETER INTOX EC/IR II PRINCIPLES OF OPERATION		FACTORS INFLUENCING BREATH TESTING					
11:00	MATHEMATICS AND METRIC SYSTEM								
11:30									
12:00									
	LUNCH	LUNCH		LUNCH		LUNCH		LUNCH	
12:30									
13:00	ALCOHOL & SCIENTIFIC PRINCIPLES THEORY OF FUEL CELL / IR	FUNCTION MESSAGES AND LAB REVIEW OF OPERATING PROCEDURES		LABORATORY UNKNOWN SOLUTIONS		EXPERIMENTS WITH OTHER SUBSTANCES		FINAL WRITTEN EXAMINATIONS	
13:30									
14:00	TOXICOLOGY OF ALCOHOL	LABORATORY KNOWN ALCOHOL SOLUTIONS				COURT TESTIMONY			
14:30									
15:00									
16:00	TOXICOLOGISTS REGULATIONS			MID COURSE REVIEW		LEGAL ISSUES			
16:30									
17:00									