The Constitutionality of Chemical Test Presumptions of Intoxication in Motor Vehicle Statutes

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Most states have enacted statutes in which a person is presumed to be intoxicated if his blood alcohol concentration is greater than some specific percentage (usually 0.10 percent). This article examines these presumptions in light of recent Supreme Court decisions on the constitutionality of presumptions, and concludes that most of them are violative of the due process clause.

INTRODUCTION

[There is no table of weights and measures for ascertaining what constitutes due process.]

Modern criminal justice is premised upon the requirement that a criminal defendant be proved guilty beyond a reasonable doubt before punishment can be meted out. This standard of proof is severe; its severity is based upon a collective societal judgment that the risk of error be borne by the state. As fundamental and

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2. There is always in litigation a margin of error, representing error in factfinding, which both parties must take into account. Where one party has at stake an interest of transcending value—as a criminal defendant his liberty—this margin of error is reduced as to him by the process of placing on the other party the burden . . . of persuading the factfinder at the conclusion of the trial of his guilt beyond a reasonable doubt. Speiser v. Randall, 357 U.S. 513, 523-26 (1958); see also In re Winship, 397 U.S. 358
unquestionable as this principle may seem, it is frequently tested when the interests of society appear urgent, immediate, and identifiable. In these instances, society often creates policies and systems which threaten the presumption of innocence. A current illustration of this tension is found in state criminal laws creating presumptions of intoxication based upon the results of chemical tests of drivers.

There is little question that the practice of driving while under the influence of alcohol is a primary cause of serious traffic accidents in the United States; between 1979 and 1980 alcohol was reported in approximately forty-three percent of fatal vehicle accidents and twenty-nine percent of serious injury accidents. While all states have laws prohibiting driving while under the influence of alcohol, successful prosecution using only the tools of personal observation and physical performance testing (whether the driver can walk a straight line, etc.) can be difficult, for the conditions indicating intoxication vary dramatically from person to person. Even a determination for one single person of his diminished competence to drive borders on being subjective.

To aid in prosecutions, statutory presumptions have been enacted in all states, using medicolegal determinations of intoxication based upon the interrelationship between the level of alcohol in the suspect's blood, the level in his breath, and the extent of driving impairment. These relationships stem from medical ex-

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4. The phrase "under the influence of alcohol" actually represents the element of the offense, with a legal definition. It is the term used by the Uniform Vehicle Code. U.V.C. § 11-902(a)(2) (Supp. III 1979). Not all states phrase the offense in the same manner; some states may prohibit driving "while intoxicated," "while impaired by alcohol," or some other similar alcohol-related condition. For purposes of this article, the terms "intoxicated" and "under the influence" will be used interchangeably.

5. Other body fluids have been the sources of presumptions of intoxication. However, for the purposes of this article only blood and breath testing will be considered, as there are problems with the other tests that even law enforcement officials recognize.

Urine analysis, once used fairly routinely, would be the most common alternative. However, the inaccuracy of urine tests, except under highly controlled conditions, renders such testing uncommon today. The National Highway Traffic Safety Administration has recognized the limitation of urine tests for intoxication:

Because of various problems in the interpretation of the results of analysis of urine for alcohol which cannot be readily overcome in law enforce-
planations for the phenomenon of acute alcohol intoxication—drunkenness—and its physiological effects.

When alcoholic beverages are consumed, ethanol (ethyl alcohol) is rapidly absorbed from the stomach and intestines into the bloodstream, which eventually causes some accumulation in the brain. Its initial effect in the brain is to depress the inhibitory center of the cortex, causing an easing of tensions and an impairment of some sensory functions, such as vision and hearing, as well as altering reflexes, mood, recall, judgment, and concentration. Some of the ethanol in the bloodstream passes through the pulmonary arteries of the lungs, where it diffuses into the lungs and is exhaled.

Based upon these relationships, a series of statutory presumptions and inferences has been created over the last forty years. The principal presumption has assumed that a person with a blood alcohol concentration (BAC) greater than some specific percentage, usually 0.10 percent, is under the influence of alcohol and should not be driving. Further, states have permitted the BAC to be indirectly estimated by measuring breath alcohol concentrations, and then calculating BAC from the resulting breath level values. Some states have enacted modifications, allowing the presumption of intoxication to flow from the breath levels directly; some states have even gone so far as to criminalize the act of driving when the blood or breath level exceeds a specified value.

While these steps may streamline the adjudication of alcohol
traffic offenses, they must meet the standards of a constitutional system that guarantees due process of law. In *In re Winship*, the Supreme Court held that the state, in a criminal prosecution, must prove each element necessary for conviction beyond a reasonable doubt. To the extent that presumptions and inferences may not be accurate, the constitutional guarantees of *Winship* are jeopardized.

Until 1979, the pronouncements of the Supreme Court in the realm of presumptions in criminal cases have been less than definite. In two cases in 1979, *County Court of Ulster County v. Allen* and *Sandstrom v. Montana,* the Supreme Court set out a system of analysis for determining the strength of the necessary relationship between presumed and proven facts in a criminal trial.

The purpose of this article is to apply the *Ulster County/Sandstrom* standards to the chemical test presumptions set out in state traffic statutes involving intoxication. First, the paper will briefly discuss the case law leading to *Ulster County* and *Sandstrom,* and will outline the standards established by these cases. Then, four specific presumptions or inferences will be extracted from the general statutory schemes, and the constitutionality of those presumptions tested against the *Ulster County/Sandstrom* standards. These presumptions involve the relationships between BAC and driving impairment, between breath levels and BAC, and between breath levels and driving impairment; a fourth statutory system, the per se criminalization of the blood or breath level, is also analyzed for the reason that such a system arguably may function as a conclusive presumption of intoxication. The conclusion drawn from this analysis is that there are serious constitutional concerns with each of the four, and particularly with any system that employs breath testing to compute blood alcohol levels.

This analysis will serve two purposes. First, it is an illustration of one application of the *Ulster County/Sandstrom* criteria to a set of fairly well-defined and limited presumptions. Second, it analyzes the validity of the various presumptions by which an individual may be ultimately found guilty of some type of alcohol-related traffic offense. It is by no means the conclusion of this author that drunk driving does not represent a serious problem in the United States today, or that serious countermeasures should not be taken. This article is merely a statement that the enforcement of presumptions based upon anything short of direct with-

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drawal of blood may have to find justification in the societal interest in highway safety rather than in constitutional principles of due process.

**Presumptions and the Due Process Clause**

As set out by the Supreme Court in *In re Winship*,\(^\text{11}\) the due process clause of the fourteenth amendment requires the state to prove guilt “beyond a reasonable doubt” in order to sustain a criminal conviction. This standard requires, at the very least, proof beyond a reasonable doubt for each element of the offense.\(^\text{12}\) A state cannot require the defendant in a criminal action to disprove an element of the crime for which he is charged,\(^\text{13}\) nor can the state prove guilt by some lesser quantum of proof.\(^\text{14}\)

The most obvious method available to a state to satisfy the *Winship* requirement is to produce evidence that directly establishes beyond a reasonable doubt the existence of each element. Proof that a defendant was, for example, driving a motor vehicle may be established by the testimony of a witness who observed the defendant driving the vehicle. In certain circumstances, however, the state is given the benefit of evidentiary devices which enable it to prove one fact from proof of another distinct fact. These evidentiary devices are collectively referred to as presumptions.

The explanation for the operation of presumptions in criminal cases can be generalized to a certain degree. The facts which compose the elements of an offense are the “ultimate” or “ele-
mental" facts. It is these facts which must be established beyond a reasonable doubt. Presumptions, however, permit some of these facts to be established by proof of other facts, termed "evidentiary" or "basic" facts. Thus, if proof of elemental fact X is allowed by proof of basic fact Y, a presumption has been employed which enables the proponent of fact X to enjoy the privilege of having that fact presented to the factfinder for resolution.

The class of devices termed presumptions, however, is not homogeneous. The nature and the value of the presumptions depend upon "the strength of the connection between the particular basic and elemental facts involved and the degree to which the device curtails the factfinder's freedom to assess the evidence independently." These factors of strength and degree operate to classify presumptions into three general categories, with one of the categories further subdivided.

The first category includes all presumptions which require the factfinder to find the existence of an elemental fact upon proof of a basic fact. Such presumptions are commonly called "conclusive" presumptions. When a conclusive presumption is invoked, proof of the basic fact is conclusive proof of the elemental fact regardless of whatever evidence is introduced to disprove the elemental fact.

The second category of presumptions includes all presumptions which require the factfinder to find the existence of an elemental fact from proof of the basic fact, "unless the defendant has come forward with some evidence to rebut the presumed connection between the two facts." These presumptions are termed "mandatory" presumptions. Because the quantum of evidence necessary to rebut a mandatory presumption may vary, mandatory presumptions can be subdivided into two sub-categories. Some mandatory presumptions require the defendant merely to come forward with "some evidence" refuting the elemental fact; the effect of these presumptions is to shift the burden

15. The terminology used in this article will be that terminology employed by the Court in Ulster County, 442 U.S. at 156. This is done for two reasons. First, since Ulster County's holding is of critical importance to the analysis here, it only makes sense to adopt the same terms for the various presumptions used by Justice Stevens. In addition, the Ulster County terminology is fairly clear, bringing a degree of clarity to the discussion of presumptions that is often absent. One court even described the topic of presumptions as a "semanticist's nightmare." State v. Pendry, 227 S.E.2d 210, 221 (W. Va. 1976).
16. 442 U.S. at 156.
17. Id.
20. Id.
of production of evidence to the defendant. Other mandatory presumptions require the defendant to disprove the presumed fact by some quantum of the evidence; the practical effect of these mandatory presumptions is to place the burden of proof on the defendant to disprove that elemental fact.

The final category of presumptions includes those which are merely permissive in nature; these presumptions are termed "permissive inferences" or "permissive presumptions." A permissive presumption does no more than provide the factfinder with the opportunity, but not the obligation, to find the existence of the elemental fact from proof of the basic fact. Such a presumption would not place any requirement whatsoever upon the defendant; it essentially "leaves the trier of fact free to credit or reject the inference, and does not shift the burden of proof." The use of mandatory and permissive presumptions in many criminal statutes poses the problem of the relationship between such presumptions and the command of Winship, for due process requires that every element of an offense be proven beyond a reasonable doubt regardless of whether or not a presumption is utilized. If a legislature enacts a criminal statute that contains several elements, and then permits the state to prove one of those elements by proof of some other fact totally unrelated to the element in human experience, one could legitimately question whether the state had established each element beyond a reasonable doubt.

The constitutional requirement for the strength of the relationship in a presumption has been considered in a line of Supreme Court decisions that began in 1911. In Mobile, Jackson & Kansas

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21. Id. at 157 n.16.
22. Id.
23. Id. at 157.
24. Id.
The nature of the rational relationship, however, was not set out; there was no indication, for example, as to what type of rational relationship had to exist, or whether the relationship even needed to state some recognition of the principles of cause and effect. Thus, while the rationality of some presumptions were upheld because they were based upon correlations generally found in human experience, other presumptions were found rational because they placed the burden of producing evidence upon the party with the easiest access to it, or because the legislature could have criminalized the basic fact in the first place. To the extent that the focus of rationality was not upon the strength of the correlation, but rather upon some collateral policy consideration, the degree of proof necessary to convict a defendant was arguably diluted.

In *Tot v. United States*, the Court clarified the test, stating that a statutory presumption was not in accordance with due process "if the inference of the one from proof of the other is arbitrary because of the lack of connection between the two in common experience." The *Tot* Court rejected entirely the idea that a presumption could be rational if the state had the power to

26. 219 U.S. 35 (1910). In *Turnipseed*, the presumption involved presuming negligence from the fact of injury by the operation of a train. The presumption was upheld as rational.

27. 219 U.S. 219 (1911). *Bailey* involved a statute which made it unlawful to enter into an employment contract with intent to breach the contract, and then to in fact subsequently breach the contract and keep the wages paid. The statute also created a presumption that breach of the contract was prima facie evidence of fraudulent intent. The presumption was struck down as irrational. It should be noted, however, that in so doing the Court was influenced by the positive mandate of the thirteenth amendment and its effect on the practical operation of the presumption, which may have been the promotion of involuntary servitude. *Id.* at 241-45.


32. 319 U.S. 463 (1943). The defendant in *Tot* was convicted under a statute which prohibited persons convicted of violent crimes from carrying firearms which had been shipped in interstate commerce. The presumption which the statute created was that mere possession by such a convicted felon was presumptive evidence that the firearm was obtained by him in interstate commerce.

33. *Id.* at 467-68.
criminalize the basic fact, and relegated the idea of comparative convenience to the status of a mere corollary to the main holding.

After the decision in Tot, it was clear that the rationality of presumptions in criminal cases turned on whether proof of the basic fact made the existence of the elemental fact probable according to human experience. In United States v. Gainey, the Court upheld as rational a presumption permitting a jury to conclude from proof of presence at an illegal still that the defendant was carrying on the business of a distiller. According to the Court, human experience makes rational the conclusion that one present at an illegal still was doing something to further its illegal operation, and that was all that the elemental fact required. However, mere presence would not rationally lead to the conclusion that the defendant had possession, custody or control of the still; such a presumption was struck down as arbitrary in United States v. Romano. While these two decisions focused upon the strength of the statement of probability made by the presumption, neither case described what minimum probability was necessary to make a presumption accord with due process.

In Leary v. United States the Court took a stab at setting out the degree to which the two facts in a criminal presumption must relate. In Leary the mere possession of marijuana created a presumption both that the marijuana was illegally imported, and that the defendant knew it to be illegally imported. The Court found the presumption of knowledge of illegal importation to be invalid because that presumption was not even more probable than not. After reviewing prior cases, the Court concluded:

The upshot of Tot, Gainey, and Romano is, we think, that a criminal statutory presumption must be regarded as "irrational" or "arbitrary", and hence unconstitutional, unless it can be at least said with substantial assurance that the presumed fact is more likely than not to flow from the proved fact on which it is made to depend.

This statement in Leary appeared to state the constitutional test.

34. Id. at 472. The Court reasoned that, regardless of what the legislature might have done, it could only look to what the legislature in fact did.
35. Id. at 467.
37. Id. at 68.
40. Id. at 37.
41. Id. at 36.
for criminal presumptions. In fact, the Court was merely recognizing that the Tot presumption did not even meet the “more probable than not” standard of proof, the most lenient standard under consideration. The Court pointed out in a footnote that, because the presumption in the case failed to meet this lower standard, it was unnecessary to consider the question of whether a presumption in a criminal case must also meet the higher “reasonable doubt” standard.42

Subsequent cases confirmed the Court’s uncertainty as to which standard to apply. In Turner v. United States43 the Court had before it a presumption allowing a finding that heroin was illegally imported to be based upon mere possession of the heroin. After concluding from a review of data that an overwhelming percentage of heroin found in the United States is imported illegally, the Court concluded that the presumption would meet either the reasonable doubt standard or the lesser preponderance standard.44 But while illegal importation may be the source of practically all heroin in the United States, it would not necessarily be the source of cocaine; a large quantity of cocoa leaves were found to be legally imported for medical purposes. The Turner Court thus found a similar presumption of illegal importation from mere possession of cocaine to be not even “more likely than not” true.45

Both standards were also concurrently applied in Barnes v. United States.46 In Barnes the Court considered the presumption that unexplained possession of recently stolen property gave rise to an inference that the one possessing it knew it to have been stolen. The Court upheld the constitutionality of the presumption under both standards, noting that “if a statutory inference submitted to the jury as sufficient to support conviction satisfies the reasonable doubt standard ... as well as the more-likely-than-not standard, then it clearly accords with due process.”47 While once again resolving the constitutional question by upholding a presumption that met the most stringent possible test, the Court failed to conclusively decide which test should govern.

It is for this reason that the decision in County Court of Ulster County v. Allen48 is significant, for in Ulster County the Court enunciated the precise method for establishing which standard should apply to a presumption in a criminal case. The presump-

42. Id. at 36 n.64.
44. Id. at 416-17.
45. Id. at 418-19.
47. Id. at 843.
tion in Ulster County involved a statute providing that the presence of a firearm in an automobile is presumptive evidence of its possession by all occupants. Writing for the majority, Justice Stevens first announced the basic test for evidentiary devices:

[1]n criminal cases, the ultimate test of any device's constitutional validity in a given case remains constant: the device must not undermine the factfinder's responsibility at trial, based on evidence adduced by the State, to find the ultimate facts beyond a reasonable doubt.49

After setting out in detail a description of permissive and mandatory presumptions, Justice Stevens proceeded to discuss the relative due process standards for each. Permissive presumptions, which allow but do not require the factfinder to infer the elemental fact from proof of the basic fact, were seen by the Court as placing absolutely no burden upon the defendant. However, a party challenging such a presumption had to prove its invalidity as applied to him.50 Moreover, in examining the validity of a permissive presumption, other evidence of record which supports the probability is relevant to the consideration of the presumption's constitutionality.51 Finally, for a permissive presumption to be valid it need only meet the "more-likely-than-not" standard, for the precise reason that it is merely considered as evidence by the factfinder.52 Only when the presumption is the "sole and sufficient basis for a finding of guilt"53 would the majority decision require that it meet the reasonable doubt standard.

Mandatory presumptions, on the other hand, require the factfinder to find the elemental fact in the absence of some rebuttal by the defendant. To the extent that the factfinder is not free to reject the conclusion on his own, the presumption is analyzed on its face, and the higher standard of the reasonable doubt test was required by the Court.54 Further, the presence in the record of other evidence supporting guilt would be irrelevant in analyzing the validity of a mandatory presumption, for the factfinder may have ignored that other evidence and relied solely upon the presumption in reaching a conclusion of guilt.55

The Ulster County Court concluded that the presumption in the

49. Id. at 156.
50. Id.
51. Id. at 160.
52. Id. at 165-67.
53. Id.
54. Id. at 167.
55. Id. at 159-60.
case before it was merely permissive. Because the lower court had considered the likelihood of the presumption's validity in the abstract, and not as applied, the majority reversed and remanded with instructions that as applied to the Ulster County defendants the presumption of possession of a firearm from presence in their car was more likely true than not.56 Justice Powell, in a dissent joined by Justices Brennan, Stewart and Marshall, agreed that the presumption was permissive, and thus needed only to meet the preponderance standard. The dissenters, however, would have required the presumption to be analyzed on its face rather than as applied to the facts of the case on appeal.57

The decision in Ulster County set out the constitutional framework for one-half of the spectrum of presumptions, namely permissive presumptions and mandatory presumptions that shifted only the burden of production. The remainder of the spectrum was filled in by the Court's decision two weeks later in Sandstrom v. Montana.58 In Sandstrom the Court considered the jury instruction that "the law presumes a person intends the ordinary consequences of his voluntary acts." The Court concluded that, while a reasonable juror could have interpreted the instruction as creating merely a mandatory presumption shifting the burden of production, a reasonable juror could also have interpreted the instruction in two other ways, both of which were constitutionally unacceptable. First, a juror could have interpreted the instruction as creating a conclusive presumption of intent. Alternatively, a juror could have considered the instruction as creating a mandatory presumption that shifted the burden of persuasion to the defendant to refute the element of the offense by some quantum of evidence. Either interpretation, according to the Court, would have violated the requirement of Winship that the state prove each element of the offense beyond a reasonable doubt.59 Because there was a possibility that a jury could have interpreted the instruction in a constitutionally unacceptable manner, the Court set aside the conviction.60

56. Id. at 163-65.
57. Id. at 168-77.

The Court relied upon Mullaney v. Wilbur, 421 U.S. 684 (1975), in finding that mandatory presumptions which shifted the burden of persuasion were unconstitutional. 442 U.S. at 520-24.
60. 442 U.S. at 519, 525-27.
When read in conjunction, *Ulster County* and *Sandstrom* cover the due process standards for the entire spectrum of presumptions. Permissive presumptions, or inferences, are acceptable if the conclusion is more likely than not to flow from the premise, unless the permissive presumption is the sole proof of the particular element of the offense. Mandatory presumptions which merely shift the burden of production to the defendant are acceptable if they meet the reasonable doubt standard on their face. Mandatory presumptions which shift the burden of persuasion to the defendant, as well as conclusive presumptions, are constitutionally unacceptable.

The *Ulster County/Sandstrom* test has been applied by lower federal courts and by state courts to a wide variety of criminal presumptions. In most instances, a finding that the presumption is merely permissive has resulted in the presumption being upheld, while a finding that the presumption is mandatory, with the burden of production shifted to the defendant, has led to the opposite result. This pattern has been generally true with such examples as the presumption that one intends the natural and probable consequences of his voluntary acts, that malice or premeditation can be presumed from the use of a deadly weapon or

61. This presumption, which in its essence was the subject of the *Sandstrom* decision, has caused much trouble for the lower courts. Several courts, while upholding the validity of the presumption when couched in permissive terms, have nevertheless issued warnings that such instructions would be strictly scrutinized in the future. See, e.g., State v. Acheson, 3 Kan. App. 2d 705, 601 P.2d 375 (1979), and cases cited therein.

Courts which have found this presumption to have been stated as a permissive inference have generally upheld it. See United States v. Dziurgot, 664 F.2d 6 (1st Cir. 1981); Nelson v. Solem, 640 F.2d 133 (8th Cir. 1981); United States v. Spiegel, 604 F.2d 961 (5th Cir. 1979); Bellavia v. Fogg, 613 F.2d 369 (2d Cir. 1979); State v. Vasquez, 182 Conn. 242, 283 N.W.2d 319 (Iowa 1979), cert. denied, 444 U.S. 1088 (1980); Parker v. Crist, 614 P.2d 484 (Mont. 1980); Genova v. State, 91 Wis. 2d 595, 283 N.W.2d 483 (1979).

Courts which have found this presumption to have been couched in mandatory language have generally held it to be unconstitutional. See Dietz v. Solem, 640 F.2d 126 (8th Cir. 1981); Austin v. Israel, 516 F. Supp. 461 (E.D. Wis. 1981); Washington v. Harris, 502 F. Supp. 1267 (S.D.N.Y. 1980); State v. Truppi, 182 Conn. 449, 458 A.2d 712 (1980); DeJoinville v. Commonwealth, 381 Mass. 246, 408 N.E.2d 1353 (1980); State v. Wogamon, 610 P.2d 1181 (Mont. 1980); Adams v. State, 92 Wis. 2d 875, 289 N.W.2d 318 (Wis. Ct. App. 1979).

Of course, the phrasing of this presumption as a conclusive presumption would require reversal under *Sandstrom*. See Turcio v. Manson, 186 Conn. 1, 439 A.2d 437 (1982).

62. Courts which have considered presumptions of this type to be permissive have generally upheld them. McInerney v. Berman, 621 F.2d 20 (1st Cir. 1980);
from the circumstances of the event, or that unexplained possession of recently stolen property implies participation in a theft offense, among others. In determining the constitutionality of the presumptions in these cases, courts have first classified the presumptions into the proper category, and then applied the appropriate constitutional standard applicable to that category. This is the mode of analysis that will be applied to the presumptions involved in state vehicle codes which establish the fact of intoxication from the results of chemical testing.

**ANALYSIS OF THE VARIOUS PRESUMPTIONS**

The origin of presumptions in prosecutions for driving while under the influence of alcohol can be traced to studies correlating BAC with driving impairment. Assessing the data available in 1937, including studies by the National Safety Council as well as

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Henderson v. Scurr, 313 N.W.2d 522 (Iowa 1981); Thibodeau v. State, 298 N.W.2d 818 (S.D. 1980). Similarly, courts which have found the presumption mandatory have held it unconstitutional. Baker v. Muncy, 619 F.2d 327 (4th Cir. 1980).


65. Examples of other presumptions which were held acceptable under the more-likely-than-not standard under Ulster County include State v. Gaines, 306 N.W.2d 720 (Iowa 1981) (failure of bailee to return property within 72 hours after due implies misappropriation); State v. Barker, 409 A.2d 216 (Maine 1979) (unlawful furnishing of marijuana presumed from intentional possession).

Examples of mandatory presumptions held invalid after Ulster County under the reasonable doubt standard include People v. Henderson, 109 Cal. App. 3d 59, 167 Cal. Rptr. 47 (1980) (possession of gun with obliterated identification number implies that possessor removed the number); State v. Williams, 400 So. 2d 575 (La. 1981) (intent to defraud presumed from use of credit card more than five days after notice of termination mailed to the user); State v. Bryant, 585 S.W.2d 586 (Tenn. 1979) (masked entry onto property implies intent to commit felony thereon).

For an excellent discussion of the various types of presumptions, and their effect upon due process, see Hammontree v. Phelps, 605 F.2d 1371 (5th Cir. 1979) (presumption of criminal negligence from the violation of an ordinance should have been permissive, but because trial court treated it as a mandatory, burden-of-production-shifting presumption, and because it was not facially true beyond a reasonable doubt, the use of the presumption violated due process).
by private individuals, the House of Delegates of the American Medical Association adopted recommendations that:

1. Persons with a concentration of alcohol of less than 0.05 percent w/v (50 mg/100 ml) in blood or its equivalent in urine, saliva or breath should not be prosecuted for driving while under the influence of alcoholic liquor.

2. All persons show a definite loss of that clearness of intellect and control of themselves which they would ordinarily possess when the concentrations are above 0.15 percent w/v (150 mg/100 ml) in the blood or its equivalent in other body fluids or breath and should, therefore, be considered as under the influence.

3. When the alcohol concentrations are between 0.05 percent w/v (50 mg/100 ml) and 0.15 percent w/v (150 mg/100 ml) in the blood, a great many persons will be under the influence of alcohol, and the Committee recommends prosecution only when the circumstances and results of physical examination give definite confirmation of such influence.\(^6\)

While these levels may be seen theoretically as guidelines, their implementation on a wide scale did not become feasible until breath test measurement devices became commercially available in the late 1930's and early 1940's.\(^6\)

In 1944 the Uniform Vehicle Code introduced a statutory system of presumptions which were based upon blood alcohol levels as determined by chemical analysis of the breath, blood, urine, or other bodily substance. Section 11-902.1(b) of the code provided:

In any criminal prosecution for a violation of subdivision (a) of this section relating to driving a vehicle while under the influence of intoxicating liquor, the amount of alcohol in the defendant's blood at the time alleged as shown by chemical analysis of the defendant's blood, urine, breath, or other bodily substance shall give rise to the following presumptions.

1. If there was at that time 0.05 percent or less by weight of alcohol in the defendant's blood, it shall be presumed that the defendant was not under the influence of intoxicating liquor;

2. If there was at that time in excess of 0.05 percent but less than 0.15 percent by weight of alcohol in the defendant's blood, such fact shall not give rise to any presumption that the defendant was or was not under the influence of intoxicating liquor, but such fact may be considered with other competent evidence in determining the guilt or innocence of the defendant;

3. If there was at that time 0.15 percent or more by weight of alcohol in

\(^6\) COMMITTEE ON MEDICOLEGAL PROBLEMS, supra note 6, at 145. For a discussion of the history of the chemical test presumption statutes, see R. Erwin, supra note 5, § 14.02.

\(^6\) R.N. Harger's studies of breath analysis developed into the deployment of the drunkometer in 1938, the first breath analysis instrument. By 1941 two other instruments had been created, the alcometer and the intoximeter. The analysis of alcohol in breath was a major step in improving enforcement of alcohol traffic statutes because it avoided the problems inherent in taking blood, which often required certified medical personnel. See generally R. Erwin, supra note 5; Comment, Breath Alcohol Analysis; Can It Withstand Modern Scrutiny, 5 N. Ky. L.J. 207, 208-09 (1978).
the defendant's blood, it shall be presumed that the defendant was under
the influence of intoxicating liquor.
4. The foregoing provisions of this subdivision shall not be construed as
limiting the introduction of any other competent evidence bearing upon
the question whether or not the defendant was under the influence of in-
toxicating liquor.68

Between 1942 and 1958 more than thirty states enacted statutes
containing similar presumptions based upon blood alcohol levels.
This acceptance was aided in large part by concurrent adoption of
"implied consent" laws, which decreased the likelihood that driv-
ers would refuse to cooperate with the testing process.69

A growing dissatisfaction with the BAC levels in the presump-
tions, however, soon became apparent. In 1953 the Symposium on
Alcohol and Road Traffic at Indiana University recommended that
the level of blood alcohol indicating the influence of alcohol be
lowered to 0.10 percent.70 Similar recommendations were made in
1960 by the Committee on the Medical Aspects of Automobile In-
juries and Deaths, the Committee on Medicolegal Problems, the
Board of Trustees, and the House of Delegates of the American
Medical Association, as well as the Committee on Alcohol and
Drugs of the National Safety Council.71 In 1962 the 0.10 percent
figure replaced 0.15 in the Uniform Vehicle Code.

By 1966, thirty-nine states and the District of Columbia had en-
acted statutes with specified blood alcohol concentrations trigger-
ning presumptions of intoxication. Nineteen states had enacted
implied consent statutes as well.72 The National Highway Safety

68. U.V.C. Act V, § 54 (1944), reprinted in historical note to U.V.C. § 11-
902(b) (1967). The U.V.C.A. was replaced in 1972 by Traffic Laws Annotated, the
work of the National Committee on Uniform Traffic Laws and Ordinances. See in-
tra note 74.
69. "Implied consent" laws simply provide that, when stopped for suspicion of
driving while under the influence of alcohol and requested to take a chemical test,
an individual has two choices. He can either consent or he can refuse, the latter
resulting in a temporary suspension of his license. There are two primary theories
justifying implied consent laws. The first is that license to drive an automobile on
public highways is a privilege, and that a state may attach as a condition to that
privilege the requirement that a person consent to a chemical test when re-
quested. The second is that implied consent legislation is a reasonable regulation
of motor vehicle traffic under a state's police power. See Annot., 88 A.L.R. 2d
1064 (1963); R. Erwin, supra note 5, § 33.01.
70. COMMITTEE ON MEDICOLEGAL PROBLEMS, supra note 6, at 146. The sympo-
sium committee concluded:
As a result of the material presented at this symposium, it is the opinion
of this committee . . . that a blood-alcohol concentration of 0.05 percent
will definitely impair the driving ability of some individuals and, as the
blood-alcohol concentration increases, a progressively higher proportion
of such individuals are affected, until at a blood-alcohol concentration of
0.10 percent all individuals are definitely impaired.
Id.
71. Id.
72. Id. at 130.
Act of 1966 appears to have been the impetus for the addition by 1968 of three states adopting presumption statutes and ten states adopting implied consent statutes.\textsuperscript{73} The Highway Safety Act made it necessary for states, in order to receive full federal funding for highways, to enact statutes for implied consent and to enact presumptions which adopted the 0.10 percent level for presumptive intoxication.

In 1971 the Uniform Vehicle Code was amended to add an additional offense, that of driving with a BAC in excess of 0.10 percent.\textsuperscript{74} This change was meant to create a separate offense, eliminating the need for a presumption of intoxication at levels beyond 0.10 percent. In 1979 this section, as well as the general presumption section of the Uniform Vehicle Code, was amended again to include measurements of alcohol directly in the breath, either as a per se offense or as a method of triggering the presumptions without first converting to the BAC.\textsuperscript{75}

The validity of the chemical test procedures has been the subject of much literature, and no small controversy.\textsuperscript{76} Nevertheless,
all states today have chemical test statutes which create presumptions of intoxication from levels of alcohol in the blood, usually at the 0.10 percent level. Most states have a second presumption, not explicitly stated, that blood alcohol levels can be mathematically calculated from breath alcohol levels. The patrol officer who gives a suspect a breath test and from that determines the suspect's blood alcohol level utilizes this second presumption. There is a third presumption, often implemented in an effort to complement the second, which presumes intoxication directly from certain breath alcohol levels. The last, and ultimate step taken by some states, is simply to criminalize the breath levels themselves, creating in effect a conclusive presumption. The constitutionality of each of these major presumptions will be examined individually.

Presumption One: Elevated Blood Alcohol Levels Imply Intoxication

The primary component of the statutory chemical test scheme outlined in the Uniform Vehicle Code has been the presumption that if an individual's BAC equalled or exceeded a certain level, that person was presumed to be under the influence of alcohol. Presently, thirty-four states have enacted legislation making blood alcohol the sole determinant for the presumption.\(^7\)

\(^7\) Twenty-six states presently retain the basic pre-1971 U.V.C. presumption structure, which presumes intoxication at or above a BAC of 0.10 percent, and presumes a lack of intoxication at BAC levels below 0.05 percent. BAC levels between 0.05 percent and 0.10 percent create no presumptions, but may be considered along with other competent evidence in determining intoxication. ARIZ. REV. STAT. ANN. § 28-692 (Supp. 1982); ARK. STAT. ANN. § 7-1031.1 (1979); COLO. REV. STAT. § 42-2-1202 (Supp. 1981); CONN. GEN. STAT. ANN. § 14-227a (West Supp. 1982); GA. CODE § 40-6-392 (1981); HAWAII REV. STAT. § 291-5 (1976); ILL. ANN. STAT. ch. 95/1, § 11-501 (Smith-Hurd Supp. 1982); IND. CODE § 9-4-1-54 (Supp. 1981); KY. REV. STAT. § 189.520 (1977); LA. REV. STAT. ANN. § 32.662 (West Supp. 1982); MASS. ANN.
these states, the level of BAC is set at 0.10 percent by weight; one who drives with that level or higher can be presumed to have violated the law.

In determining the constitutionality of this presumption, it is first necessary to determine whether it is a permissive inference, or whether it is a mandatory presumption which shifts the burden of production to the defendant.78 Of course, the determination of which type of presumption was actually given in any case depends upon the instructions given to the jury.79 If the jury is told that it may find the fact of intoxication solely from proof of a BAC

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**References**


The Tennessee statutory scheme, while otherwise similar to the above, makes no mention of the significance of values between 0.05 percent and 0.10 percent. Tenn. Code Ann. § 55-10-408 (1980).

Some states, while maintaining the basic structure, have utilized different BAC values. Michigan, for example, sets the lower BAC presumption level at 0.07 percent instead of 0.05 percent. Mich. Stat. Ann. § 9.2324(1) (Callaghan Supp. 1981-1982).

Maryland uses the presumption scheme to define two offenses. At or above 0.13 percent, there is a presumption of intoxication, a more serious offense. At levels of 0.08 percent or higher, there is a presumption of driving while under the influence of alcohol, a lesser offense. At levels between 0.05 percent and 0.08 percent there is no presumption, but the BAC can be considered along with other relevant evidence in determining a violation of either offense. At levels of 0.05 percent or below, a defendant is presumed not guilty of both offenses. Md. Cts. & Jud. Proc. Code Ann. § 10-307 (Supp. 1981).


78. The presumption could not, of course, shift the burden of persuasion to the defendant, nor could it create a conclusive presumption of intoxication. Sandstrom v. Montana, 442 U.S. 510, 520-24 (1979).

79. The threshold inquiry in ascertaining the constitutional analysis applicable to this kind of jury instruction is to determine the nature of the presumption it describes. That determination requires careful attention to the words actually spoken to the jury, for whether a defendant has been accorded his constitutional rights depends upon the way in which a reasonable juror could have interpreted the instruction.
of, for example, 0.13 percent, but that it is not required to do so, the instructions have described a permissive inference. On the other hand, if the jury is told that proof of the BAC of 0.13 percent requires it to find the fact of intoxication in the absence of some rebuttal evidence, a mandatory presumption would have been created. The jury instructions are often the initial source of constitutional error, for while due process may require a given presumption to have no greater than a permissive effect, the charge to the jury may be cast in such language as to make the presumption mandatory. An investigation of the constitutionality of the application of any given presumption should first begin with an examination of the disparity between the statute and the instructions.

The constitutionality of the presumption statutes themselves can be determined by examining the language of the various statutes. It appears from the statutory language of the Uniform Vehicle Code, as well as from the variations in several states, that the presumption created from blood alcohol levels was meant to be a mandatory presumption. Most statutes explicitly state that for a person with a BAC above 0.10 percent, “it shall be presumed” that the person is under the influence of alcohol. The remaining states use such language as “prima facie evidence.” Such phrases appear to create mandatory presumptions on the face of the statutes.

Regardless of the wording of the statutes, state courts have not

\[\text{id. at 514 (footnote omitted); see also County Court of Ulster County v. Allen, 442 U.S. 140, 157-59 (1979).}\]

In a bench trial, the judge will not normally “charge” himself; however, the nature of the presumption can usually be preserved on appeal by requesting a statement of the law which the judge chooses to apply. See State v. Strickland, 398 So. 2d 1062, 1065-66 (La. 1981).

80. See, e.g., Hammontree v. Phelps, 605 F.2d 1371 (5th Cir. 1979).
82. See, e.g., IND. CODE § 9-4-1-54(g)(3) (Supp. 1981); MD. CTS. & JUD. PROC. CODE ANN. § 10-307(c), (d) (Supp. 1981).
83. It would appear that the intent of the committee in using such language in the U.V.C. was to create a mandatory presumption, shifting to the defendant at least the burden of going forward with the evidence once the BAC level was introduced. As Donigan has noted:

Thus in the two presumptive areas established in this type of chemical test [presumptions of innocence below certain BAC levels and of intoxication above other BAC levels], if evidence is introduced that the blood alcohol concentration falls in either zone, it is mandatory the fact finders take into consideration that an inference has been established from the known facts, based upon well recognized standards, even though the inference may be rebuttable and not conclusive.
been in agreement as to the type of presumption created. Prior to Ulster County most courts considered the presumption to be one that shifted the burden of production to the defendant.84 Relatively few states have examined the constitutionality of the chemical test presumptions since the Ulster County decision in 1979. In State v. Daranda85 the Louisiana Supreme Court interpreted that state's chemical test statute as creating a mandatory presumption under the Ulster County rationale.86 The supreme courts of Vermont and Wisconsin, however, have interpreted practically identical statutes to create merely permissive inferences.87

If the presumption of intoxication is merely permissive, then Ulster County requires that in any given case it is more likely than not true that the particular defendant's elevated BAC rendered him under the influence of alcohol. On the other hand, if the permissive presumption is the only evidence on the issue of intoxication, or if the presumption shifts the burden of production to the defendant, then the presumption on its face must represent a statement that is generally true beyond a reasonable doubt.

The strength of the connection between BAC levels and alcohol-impaired driving is very well established, both causally and empirically. Causally, the connection is strong because the explanation for the phenomenon of intoxication depends in part upon the amount of alcohol in the bloodstream.88 Empirically the connection is also strong; numerous studies have shown that persons with an elevated blood alcohol level have had their driving af-


85. 388 So. 2d 759 (La. 1980).

86. Id. at 762; see also State v. Morrison, 322 So. 2d 1037, 1039 (La. 1980).


88. See supra text accompanying note 7. Once ethanol has reached the bloodstream, distribution of the alcohol to major organs, including the brain, occurs rapidly. See generally C. Courville, Effects of Alcohol on the Nervous System of Man 11-14 (1969); Committee on Medicolegal Problems, supra note 6, at 15-22. It would appear that the greater the BAC, the more ethanol would be distributed, heightening the effect. Thus, the presumption conforms to the scientific explanation for the phenomenon of intoxication.
fected to a measurable degree.89

For these reasons, most courts faced with the question of the validity of this presumption have upheld it. Those courts which determined the presumption to be permissive have gone on to find it more likely than not true in the case before them.90 Those courts holding the presumption to the higher reasonable doubt standard have also upheld it.91

While the consensus is that the driving ability of a person with a BAC of 0.10 percent or higher is impaired beyond a reasonable doubt, there exists nevertheless some dissent.92 In general, while the reasonable doubt standard would represent a formidable hurdle, it would appear that this presumption would have surmounted it, at least for levels at or above 0.10 percent.

**Presumption Two: Certain Breath Alcohol Levels Imply Certain Blood Alcohol Levels**

When a defendant's BAC is measured by a test of his breath, a second presumption is invoked, for such a procedure assumes a mathematical relationship between the concentration of alcohol in the breath and in the blood. At first blush it may not appear

89. There is little remaining doubt that there is a correlation between some level of BAC and impaired driving. Three types of empirical tools can be employed to establish this correlation. Epidemiologic studies attempt to determine the BAC of drivers involved in actual traffic accidents. Driving experiments measure the abilities of a driver with a determined BAC, either under actual or simulated driving conditions. Finally, laboratory studies can measure the effect of certain levels of BAC on the various sensory, motor and psychological processes involved in driving.

The American Medical Association has reviewed 57 studies of these three types, covering a period from 1934 to 1965. Its conclusion was that "there is no evidence . . . to indicate that at levels of 0.10 percent w/v (100 mg/100 ml) and above, there is not a severe, significant and dangerous deterioration in driving abilities." COMMITTEE ON MEDICOLEGAL PROBLEMS, supra note 6, at 35-59. A similar review of seven studies led a former general counsel for the Traffic Institute to conclude that "there is little question that the ability to operate a motor vehicle safely is impaired by the time the blood alcohol level reaches 0.10 per cent." R. DONIGAN, supra note 83, at 173-74; see also Clark, Donkin & Cantwell, Blood Alcohol and Its Effect on Driving, 12 AUSTRALIAN J. FORENSIC SCI. 107, 120-21 (1979-1980). Partners, Alcohol and the Motorist: Practical and Legal Problems of Chemical Testing, 44 Minn. L. REV. 673 (1960).


92. Two commentators, after reviewing the available data, concluded that between 0.08 and 0.15 percent "no judgments based on scientific evidence alone can be made regarding driving ability." W. BOAZ & J. RUDY, PHARMACOLOGY, TOXICOLOGY, AND ANALYSIS OF ETHYL ALCOHOL, cited in Taylor, Blood-Alcohol Presumptions: Guilty Until Proven Innocent, 53 CAL. ST. B.J. 170, 175 (1978).
obvious that this is in fact a presumption; operation of breath test equipment merely involves having a suspect exhale into the device and then receiving a readout of the BAC. Nonetheless, the relationship fits the model of a presumption used in Ulster County. Breath test machines actually measure the concentration of alcohol in the breath sample. Because it is assumed that the ratio of alcohol in blood to breath is a constant, namely 2100:1, the amount of alcohol in the breath is simply multiplied by 2100 to arrive at the extrapolated amount estimated to be in the blood.93 Most breath test machines are designed to automatically make this extrapolation.

However, the result is just that—an extrapolation. It fits the model for a presumption in that proof of one fact (breath alcohol concentration) establishes another fact (BAC). In most states, this presumption is not stated explicitly in the statutory language;94 rather, proof of the BAC is permitted “as determined by a chemical analysis of the person’s blood, breath, urine, or other bodily substance.”95 By providing for breath tests, states have sanctioned the concept of the ratio, usually leaving the precise ratio to be established by the state health or safety authority.96 In

93. The given assumption is that for every 2100 molecules of ethanol (ethyl alcohol) in the blood, there will be one molecule that will diffuse across the pulmonary membranes in the lungs and be exhaled with the breath.
94. But see Mass. Ann. Laws ch. 90, § 24(e) (1981): the presumption arises from the amount of alcohol in the defendant’s blood “as shown by chemical test or analysis of his blood or as indicated by chemical test or analysis of his breath.” Id. (emphasis added). The distinction may imply a second inference or presumption from the indirect measurement of the BAC from breath testing, as opposed to the direct measurement which a blood test would provide.
96. In rejecting an attack upon the reliability of the concept of breath testing, one state appellate court noted that the statutory authority providing for breath testing to measure BAC levels removed the power from trial courts to make threshold decisions as to the admissibility of such evidence based upon its reliability. The court noted that any objection to the 2100:1 ratio would go to the weight and not to the admissibility of the breath tests:

In sum, the court below failed to give recognition to the necessary legislative determination that breath tests, properly conducted, are reliable irrespective that not all experts wholly agree and that the common law foundational evidence has, for admissibility, been replaced by statute and rule; that the legislative delegation was to the Director of Health, not the court, the discretionary authority for adoption of appropriate tests and procedures, including breath test devices. The court in granting the motion to suppress improperly substituted the court’s judgment as to the reliability of the testing procedures for that of the Director of Health. While conceivably the Director of Health could abuse his discretion in the ap-
most states the appropriate state official will list the approved breath test processes and machines by brand name and model number. In some instances, administrative regulations promulgated by the state agency will explicitly require the 2100:1 ratio. A tacit assumption could be made that every state receiving federal highway monies is in compliance with the National Highway Traffic Safety Administration’s standards for devices to measure breath alcohol, which explicitly require the 2100:1 ratio. In only one state, Wisconsin, is the presumption explicitly provided for by statute; the Wisconsin chemical test statute states that “[t]he concentration of alcohol in 2100 cubic centimeters of deep lung or alveolar breath shall be prima facie to be equal to the concentration of alcohol in 1 cubic centimeter of blood when equilibrium has been reached.”

No matter whether it is termed a presumption, a ratio, or merely a part of a process, the breath-to-blood ratio effectively operates as a presumption, and it is the effect as an evidentiary de-

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98. See, e.g., OHIO ADMIN. CODE § 3701-53-02 (1978), which provides in relevant part:

Breathe samples of deep lung (alveolar) air shall be analyzed with instruments specifically designed for the analysis of breath. The calculation of the blood alcohol concentration shall be on the basis of deep lung (alveolar) air to blood ratio of 2,100:1 and of mixed expired air to blood ratio of 3,200:1. Breath samples shall be analyzed according to instructions issued by the director of health.

A similar requirement is found in the Montana Administrative Rules: “The breath analysis of the calculation of the blood alcohol concentration shall be on the basis of alveolar air to blood ratio of 2,100:1 and of mixed expired air to blood ratio [sic] of 3,200:1.” MONT. ADMIN. R. 23-2.10(c)(1)-S100(17)(b) (1978).


100. WIS. STAT. ANN. § 885.235(2a) (West 1982).
vice and not its designation that is controlling. To the extent that it permits a factfinder to conclude that a certain BAC is established, without drawing any blood, the process does operate as a presumption. As such, the Ulster County/Sandstrom standards would apply.

If the constitutionality of the breath-to-blood assumption is examined under the Ulster County/Sandstrom test, the presumption would only be valid if it could meet the higher reasonable doubt standard. This is true for several reasons. If one assumes that the presumption is mandatory, then it would place the burden of production on the defendant to put into issue the validity of the equation. This is a fairly accurate description of the normal scenario. In most instances, if a defendant does not challenge the 2100:1 ratio, the accuracy of the resulting BAC will automatically be assumed. Under these conditions, Ulster County requires that the 2100:1 ratio be true beyond a reasonable doubt for the population generally.

If one assumes the evidentiary device to be permissive, a questionable assumption, it is nevertheless true that the measurement of the breath sample and the resulting extrapolated BAC will rep-

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101. As the majority noted in Ulster County v. Allen, the ultimate test of any evidentiary device's constitutionality is whether or not it undermines the factfinder's ability, based on all of the evidence presented, to find the ultimate or elemental facts beyond a reasonable doubt. 442 U.S. 140, 156 (1979).

102. Even if the operation of the breath/blood ratio of 2100:1 is not that of a presumption, it is nevertheless some form of evidentiary device which would enable the factfinder to conclude the existence of a fact without direct proof of the fact. To the extent that Ulster County governs all evidentiary devices, and not merely presumptions and inferences, the result should be the same. Cf. State v. Ingenito, 87 N.J. 204, 220, 432 A.2d 912, 920 (1981). In Ingenito the defendant was charged with possession of a gun as a convicted felon. The state attempted to prove the fact of possession by introducing a misdemeanor conviction for unlicensed possession arising out of the same incident. The court held that this collateral estoppel doctrine, as used in a criminal case, was an evidentiary device subject to the standards of Ulster County.

103. One writer would go further, finding an irrebuttable presumption:

The statutory scheme, therefore, adopts the scientific assumption that an individual having a given concentration of ethanol in his expired air will have 2100 times that concentration of ethanol in his blood. In practice, this presumption is irrebuttable in that the instrument automatically makes the conversion from breath alcohol measurements to blood alcohol estimations.

Comment, supra note 67, at 214. Even if the ratio were to be challenged by a defendant, the challenge would go to the weight and not the admissibility of the ratio and any calculations made therefrom. State v. Brockway, No. 1066, at 9 (4th App. Dist., Athens Co.), appeal denied, No. 81-1698 (Ohio Jan. 27, 1982).
resent the only evidence of the defendant's actual blood alcohol level. The primary reason for using breath testing is convenience; unless a parallel blood test is mandated by statute, it is unlikely that any other technique will have been utilized to either directly or indirectly measure the defendant's BAC. If the extrapolation from the breath test represents the sole proof of the fact of the BAC, then Ulster County would again require the ratio to meet the reasonable doubt standard even if the ratio is merely a permissive inference.104

The importance of the conclusion that the reasonable doubt standard is required can be seen from the simple fact that the 2100:1 ratio cannot meet this standard; it is simply not true beyond a reasonable doubt that a given breath concentration of X

104. It is true that the BAC may not represent the elemental fact, but is often itself a threshold basic fact triggering in turn a presumption of intoxication. However, to the extent that the entire sequence may operate as a "presumption upon a presumption," the validity of the entire chain would depend upon the requisite connection between each link. As one court noted:

[T]he connection between the two inferences [must be] strong enough to support the proposed intellectual exercise. . . . Where, however, the evidence against pyramiding particular inferences is so strong that reasonable minds cannot draw the second inference from the first, then the court may not turn the jury loose to engage in sheer guesswork.

Alvarez v. Retail Credit Ass'n of Portland, Oregon, Inc., 234 Or. 255, 264-65, 381 P.2d 499, 503-04 (1963). Some courts judge the pyramiding of presumptions or inferences by the totality of the evidence, People v. Helcher, 14 Mich. App. 386, 390-91, 165 N.W.2d 669, 672 (1969), while other courts hold pyramiding acceptable "only when no contrary reasonable interpretation may be indulged." Fideli v. Colson, 165 So. 2d 794, 795 (Fla. 1964). All of these tests are exceptions to the original common law rule that pyramiding of inferences or presumptions was disallowed entirely, United States v. Ross, 92 U.S. 281 (1876), requiring instead that an inference or presumption be based upon proven facts. Admiral Theatre Corp. v. Douglas Theatre Co., 585 F.2d 877 (8th Cir. 1978). The argument of invalid pyramiding was applied to the 2100:1 ratio in one case. In Slagle v. State, 570 S.W.2d 916 (Tex. Crim. App. 1978), the Texas Court of Criminal Appeals rejected the argument on three rather peculiar grounds: (1) the defendant could have requested a blood test; (2) the underlying scientific basis for the ratio is "rational", and (3) the test results themselves are admissible into evidence by statute. Id. at 919. None of these reasons appear to answer the question of whether or not the statutory scheme constitutes the type of pyramiding that should be avoided or, at least, subject to a higher standard of interconnection.

There is an obvious second reason why the reasonable doubt standard would attach, even though the BAC is not always an element of the offense. It is necessary to establish beyond a reasonable doubt the existence of a basic fact (here the BAC) before it can trigger a presumption. Eckman v. State, 600 S.W.2d 337 (Tex. Crim. App. 1980). To the extent that one reaches the basic fact (BAC) only through the correlation from breath levels, then the dictates of Ulster County require the breath-to-blood conversion not to thwart the factfinder's ability to resolve the ultimate facts beyond a reasonable doubt. 442 U.S. at 156; cf. In re Winship, 397 U.S. 358, 364 (1970) (proof beyond a reasonable doubt needed for every fact necessary to constitute the offense charged).

Of course, if a state has adopted a per se law and criminalized the BAC level itself, and further allows proof by breath testing, the direct Ulster County process would apply. See infra text accompanying notes 122-32.
percent means a concurrent BAC of 2100X percent. If the ratio is analyzed in terms of cause and effect, it is generally true that there is an interrelationship between the alcohol in the blood and the alcohol in the breath. As blood containing alcohol passes through the pulmonary arteries, a fractional amount tends to diffuse through the pulmonary membranes and enter the lungs, where it is exhaled. The rate of diffusion is generally governed by a scientific principle known as Henry's Law, which states that a fluid dissolved in a liquid will, over time, partially diffuse into an adjacent gas in a distribution predictable for that fluid. According to Henry's Law, the distribution between the liquid and the gas can be stated in terms of a specific ratio; for ethanol, that ratio is 2100:1.\textsuperscript{105}

While this ratio may be true in theory, there are many variables which in reality cause it to be questionable. Variation in body temperature from one individual to another may affect the ratio,\textsuperscript{106} as may the hematocrit or blood count of an individual\textsuperscript{107} as well as the simple precision of the breath-testing device.\textsuperscript{108} In addition, if the breath measurement is taken before absorption and distribution of the alcohol in the system, a significantly higher calculation of blood concentration is reported than is actually present in the blood.\textsuperscript{109} Any of these factors could, in and of itself,

\begin{footnotesize}
\begin{enumerate}
\item[105.] Henry's law states that a volatile substance will disperse across a gas/liquid interface in predictable fashion. The 2100:1 figure represents the ratio of blood alcohol to alcohol in deep-lung alveolar, which is most commonly used in breath test devices. For mixed-expired air, the ratio is 3200:1.
\item[107.] Hematocrit refers to the amount of solids (such as blood cells) in the blood. Because the ethanol only dissolves in the liquid portion of the blood, a person with a high blood count would have less liquid in a given quantity of blood than a person with a lower hematocrit would have in the same quantity of blood. With less liquid, the alcohol would more likely diffuse into the breath. The problem is that all states using BAC as a measure of intoxication refer to the concentration of alcohol in the blood, and not in the liquid portion thereof. \textit{Chemical Testing}, supra note 76, at 134; \textit{Breath-Alcohol Analysis}, supra note 76, at 25-28.
\item[108.] Any errors in measuring the breath alcohol quantity will be multiplied by 2100 when extrapolating to BAC levels. However, this is one area where technological advancement has made, and can continue to make, significant inroads into removing machine error and increasing the precision of the initial breath measurement.
\end{enumerate}
\end{footnotesize}
alter the ratio of 2100:1; when acting simultaneously, and in the field environment of a police station rather than in a laboratory, the combined effect would make the ratio’s validity speculative.

This uncertainty is further reflected in field studies which have attempted to simultaneously secure breath samples and blood samples, in order to gauge the accuracy of extrapolating the BAC from the breath samples. A surprising range of values for the breath/blood ratio has been actually measured in these field tests over the past fifty years. Values have been observed as low as 1634:1, and as high as 3177:1. The range of averages would appear to be 1900:1 to 2400:1.

The effect this variance would have on any one individual can be demonstrated by example. Assume that a state presumes intoxication from a BAC of 0.10 percent or more, and allows that result to be calculated by breath testing. A defendant is stopped on suspicion of drunk driving, and taken to the station for a breath test. Suppose the readout from the breath testing machine is 0.11 percent, clearly above the presumption minimum. In arriving at that result of 0.11 percent, the breath testing machine has made an assumption about that particular defendant, namely that his breath/blood ratio will be 2100:1. If it is in fact 1900:1, then his true BAC would be 0.099 percent, an amount technically under the presumption level. If, on the other hand, his true ratio is 2400:1, then his true BAC is 0.126 percent, and the breath extrapolation has slightly underestimated his true BAC. If this particular defendant happens to be one of the rare (but possible, as shown by the studies) individuals whose true ratio is 1634:1, then his BAC is in reality 0.085 percent and the machine has grossly overestimated the amount of alcohol in his bloodstream. To complete the example, if this defendant’s true ratio was 3177:1, then his BAC would in fact be 0.166 percent, and the machine would have grossly overestimated his sobriety. Yet in each of these situations, the breath test machine would produce a reading showing that the calculated BAC was 0.11 percent.

The point of this example is obviously to demonstrate the variations that may be caused by differing ratios. The resulting impre-

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110. INSURANCE INSTITUTE FOR HIGHWAY SAFETY, AN EVALUATION OF SOME QUALITATIVE BREATHE SCREENING TESTS FOR ALCOHOL, app. A (1971).

111. Professors Mason and Dubowski surveyed 27 major studies, performed between 1930 and 1974, which attempted to determine the breath/blood ratio. They conclude: “It appears that the true value (with a small inherent biological variation in normal subjects), if indeed there is such, lies somewhere in the range of 1900 to 2400:1.” Breath-Alcohol Analysis, supra note 76, at 24.

It should be noted in this review of studies that values in some earlier studies, such as Haggard and Greenberg in 1934, showed ratios as low as 1117:1. These are not considered here, however, as the subjects were canine and not human. Id.
cision of the extrapolation makes it impossible to state that the calculated BAC in fact represents the true BAC beyond a reasonable doubt. It is interesting to note that breath testing for blood alcohol is used in no other field outside of law enforcement, and thus represents a form of technology with limited scope. It would be pointless, therefore, to inquire whether or not the concept of breath extrapolation to blood concentrations is generally accepted by experts in the field for purposes other than law enforcement, such as medicine.

This is not to suggest that there is not a growing body of evidence to suggest a reasonably accurate relationship between blood and breath levels at a distribution of 2100:1. Neverthe-

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112. Professors Mason and Dubowski conclude:
It is possible that in normal subjects there is sufficient biological variation in these respiratory parameters that there is no closely regulated blood/breath ratio as might be anticipated from Henry's Law in a system at equilibrium and which is demonstrable for vapor/liquid phase samples from simulators or equilibrators. It is especially likely that a fixed blood/breath ratio does not obtain in field application of breath testing where the various other requirements for obtaining a proper sample for analysis and the subsequent calculations are not presently being met with certainty.

Breath-Alcohol Analysis, supra note 76, at 31.

113. Comment, supra note 67, at 212 n.26. A physician, for example, who needed to determine the BAC of his patient would simply draw blood.

114. The American Medical Association reviewed the basic literature through 1970, concluding that “on a comparison of a variety of techniques used for both blood and breath analysis, there is an excellent correlation of results obtained, and that the breath methods commonly used are entirely reliable when performed by well-trained, competent operators.” COMMITTEE ON MEDICOLEGAL PROBLEMS, supra note 6, at 100-02.

Most of the literature which recommends the use of some ratio nevertheless recognizes some imprecision due to the variables discussed above. See Alha, supra note 76; Bonnicshere & Goldberg, Large-Scale Breath-Blood Comparisons Under Field Conditions: Methods, Evaluation, Techniques and Results, in ALCOHOL, DRUGS & TRAFFIC SAFETY, supra note 76, at 796 (1980); Jones, supra note 76.

Nevertheless, while the statistical correlation may be reasonably acceptable for scientific work, the problem comes in transposing an acceptable margin of error into a legal requirement of proof “beyond a reasonable doubt.” As Professors Mason and Dubowski note:

The first part of one summary statement [in ALCOHOL AND THE IMPAIRED Driver] that “there is an excellent correlation of results obtained . . .,” may well be true from the standpoint of contemporary experimental physiology, but not so when viewed from within the framework of our system of criminal justice. Thus, for example, in trial, the acceptance of a breath test from which the calculated blood concentration was 0.11% w/v in a jurisdiction in which the impairment limit is 0.10% w/v, implies that beyond a reasonable doubt the blood concentration was in excess of 0.10%. This is not the case.

Chemical Testing, supra note 76, at 135 (emphasis in original).
less, reasonable accuracy would not appear to be sufficient for a system which requires proof "beyond a reasonable doubt"; with the 2100:1 ratio, it would be impossible to calculate an actual BAC "without making assumptions having uncertain validities in any given case because they have not been assessed."\(^{115}\)

**Presumption Three: Certain Breath Alcohol Levels Imply Intoxication**

The problems with the breath/blood conversion ratio appeared to many to be amenable to at least one solution: if the statutes were changed to define intoxication in terms of the concentration of alcohol in breath instead of in blood, that simple change would appear to eliminate the necessity for the extrapolation. Just as one might previously have been found intoxicated above 0.10 percent BAC, now one might be convicted if there is more than, for example, 0.10 grams in 210 liters of breath.\(^{116}\) By eliminating BAC as an unnecessary value, such statutes would apparently eliminate the problems inherent to the extrapolation of blood levels from breath levels. The resulting presumption is similar to presumption one. Both assume intoxication from a given concentration of alcohol in a bodily fluid. While presumption one presumes intoxication from blood levels, presumption three presumes intoxication directly from the breath levels.

This third presumption has recently gained some acceptance. In February 1975, the Executive Board of the Committee on Alcohol and Drugs of the National Safety Council recommended parallel presumptions for breath levels and blood levels. At present, four states\(^{117}\) provide for a presumption of intoxication from the

\(^{115}\) Chemical Testing, supra note 76, at 135-36.

\(^{116}\) The actual presumption would need a temperature coefficient as well. Professors Mason and Dubowski note:

In actual figures, for a jurisdiction with a present statutory presumptive limit for impairment of 0.10% w/v blood-alcohol concentration, the offense could be defined as that of having, at the time of the test, a quantity of alcohol in excess of 476 mg/liter of deep-lung air in a sample collected by a procedure designed to provide substantially alveolar air when applied to young adults, and having been delivered at a temperature at the mouth of 34.0 (±0.5)°C (the result obtained for a specimen with a temperature at the mouth of more or less than 34.5°C and 33.5°C, respectively . . . .

Id. at 136 (footnote omitted).

\(^{117}\) The District of Columbia has been utilizing such a system for the longest time. In the District, a defendant is presumed under the influence of intoxicating liquor if “[d]efendant's blood contained ten one-hundredths of 1 per centum or more, by weight, of alcohol, or that an equivalent quantity of alcohol was contained in 2,000 cubic centimeters of his breath (true breath or alveolar air having 5½ per centum of carbon dioxide) . . . .” D. C. CODE ANN. § 40-717(3) (1973). Wisconsin's statute is similar, except that it specifies the amount of alcohol in the breath: “[t]he fact that the analysis shows that there was 0.1% or more by weight of alcohol in the person's blood or 0.1 grams or more of alcohol in 210 liters of the
level of alcohol concentration found in an individual's breath.

While such a solution may appear to be an effective way to circumvent the extrapolation problems discussed in presumption two, it does so only by creating new problems. This can be seen by applying the Ulster County/Sandstrom criteria to this third presumption. The basic fact would be the breath level itself, and the elemental fact would be some level of impaired driving such as being under the influence of alcohol. In order to determine the constitutionality of a presumption upon which the relationship between these two facts is founded, the Ulster County/Sandstrom tests governing the strength of that relationship must be met.

The difference with presumption three is that, unlike presumption one, which is shown above to be probably strong enough to meet the reasonable doubt standard, no such conclusion can be drawn from a similar presumption triggered by breath levels. On the level of cause and effect, it can easily be seen that alcohol in the breath is an indirect by-product, at best, of the process that leads to intoxication; there is no scientific reason to assume that the two should be directly related. It is in this way that presumption three differs from presumption one. If alcohol is present in an individual's bloodstream, it will eventually cause intoxication regardless of whether it was ingested, injected, or taken in by some other means. The strength of this direct relationship thus depends upon the explanation for the phenomenon of intoxication. However, no such direct relationship exists with breath alcohol levels; there are many conceivable ways, at least in theory, that one could accumulate alcohol on one's breath and not be in-
toxicated at all.\textsuperscript{118} Thus, at least on the level of cause and effect the relationship between intoxication and breath alcohol levels is remote. Nor has the relationship been demonstrated on a correlational level in field studies; few studies have attempted to correlate high breath alcohol levels with impaired driving.\textsuperscript{119}

In setting the statutory breath levels, most states have chosen to circumvent this lack of a rational basis by selecting a breath level that is calculated from their BAC level, and thus equivalent to it. For example, in Arkansas and Vermont, the presumption is raised if there is "0.10 percent by weight" of alcohol in the breath.\textsuperscript{120} Wisconsin and the District of Columbia both establish their presumptions by calculating backward from the 2100:1 ratio, and setting figures such as 0.10 grams per 210 liters.\textsuperscript{121} In either case it can be seen that the strength of the relationship between breath levels and intoxication must depend, in part, on the established levels of blood alcohol and the corresponding impairment. This solution, however, merely adopts the original problem it set out to correct. These laws are only rational if the BAC/impairment relationship on which they are premised is also rational. If a state is trying to presumptively criminalize the driving of a car while the driver has a certain breath alcohol level, and the only rational basis for using breath levels (aside from convenience) is their mathematical relationship with BACs and known equivalent levels of driver impairment, then the ability of the breath test machine to produce equivalent breath test standards depends once again on some conversion factor, such as 2100:1. The problem of the accuracy of the ratio reappears.

If, under field test circumstances, certain breath levels are recorded while the driver's abilities are assessed, and if this is done without any reference to BACs, the result may indicate a strong enough correlation to meet either the preponderance standard or the reasonable doubt standard. With less than this information, it cannot be concluded to any meaningful degree of certainty that a person whose breath contains a specified concentration of alcohol will be affected in his driving.

\textsuperscript{118} An extreme example may help to illustrate this point. If one were to rinse his mouth with ethanol, he would probably retain an elevated breath-alcohol level for some time. Yet the breath levels shown for him at any given time would not "measure" how "intoxicated" he is, and the mere rinsing with alcohol should not impair the person's driving ability. This concededly extreme example should help to explain why, at least in theory, the breath/impairment relationship is not direct.

\textsuperscript{119} Most studies of driving have involved attempts to correlate BACs with breath levels. See supra notes 110, 113.

\textsuperscript{120} See supra note 116.

\textsuperscript{121} Id.
Presumption Four: Certain Blood or Breath Levels Conclusively Imply Intoxication (Per Se Laws)

One possible method of eliminating the problems associated with presuming the influence of alcohol from a breath or blood level is to simply criminalize the level itself, creating the new offense of driving with a BAC at or exceeding a given level such as 0.10 percent. This alternative, proposed in the 1971 amendments to the Uniform Vehicle Code, was first adopted by the state of New York. To date, some fifteen states have added to the basic crime of driving while under the influence of alcohol a second crime of driving with an elevated blood alcohol content of 0.10 percent or higher. Such statutes are commonly referred to as “per se” statutes. Most states creating these per se laws have eliminated the presumption of being under the influence at BAC levels of 0.10 percent or higher, as such presumptions would be unnecessary. Also, these states still allow the crime of driving while under the influence of alcohol to be established by some other method, such as non-presumption evidence.

At first blush it appears that a per se statute creates no presumption at all, but rather merely defines the new statutory offense of driving with an elevated BAC. Several courts have indeed classified the offense as a distinct crime, and discussed whether or not it was, for example, a lesser included offense to the charge of driving while under the influence of alcohol.


State legislatures are constantly revising their statutory schemes. For example, the Ohio Legislature recently created its own per se rule. See Amended Substitute S.B. 432 (amending OHIO REV. CODE ANN. §§ 4511.19 and 4511.191, effective Mar. 1, 1983). Under the new law, Ohio now has a per se offense in addition to the crime of driving under the influence of alcohol.

123. The comments to § 11-902.1(b)(3) of the U.V.C., the section creating a presumption of intoxication at or above 0.10 percent, note that the section is unnecessary if a per se offense is also adopted in the jurisdiction. Vermont, nevertheless, has retained both sections. See supra note 116.

124. Courts have split on the question of whether the per se offense was a distinct offense, and not a lesser included offense to the basic offense of driving while in some form of intoxication. Compare State v. Watts, 601 S.W.2d 617 (Mo. 1980)
However, the new approach of per se legislation can also be seen as creating a conclusive presumption of intoxication, a clearly unconstitutional strategy under *Sandstrom*. In *State v. Weidner* the Supreme Court of Nebraska considered a statutory scheme which made it against the law to operate a motor vehicle while either (1) under the influence of alcohol; (2) under the influence of any drug; or (3) having a BAC of 0.10 percent or greater. The Nebraska court concluded that this scheme did not create three separate offenses, but rather a single offense which resulted from one of three conditions. The court found that the Nebraska Legislature “intended that having ten-hundredths of one percent or more by weight of alcohol in the body fluid appreciably impairs the ability to operate a motor vehicle.” Given this reasoning, it appears that the Nebraska Legislature has created not a per se law but rather a conclusive presumption of impaired driving ability.

A similar conclusion was reached concerning Minnesota’s per se statute which, in addition to outlawing driving while under the influence of alcohol, also prohibited driving with a BAC of 0.10 percent or greater. One commentator has noted:

> The effect of the legislation is to create a statutory presumption .... [I]t appears that the presumption is not rebuttable. That is, a defendant may not admit the blood alcohol level but deny that he was not under its influence.

To the extent that an irrebuttable presumption has been created, the statute would be unconstitutional.

If, on the other hand, the statutes represent new and distinct offenses, then they need only satisfy the basic due process standard of rationality; this is the rationale under which per se laws have actually been upheld in the few decisions where their validity was questioned. However, such a per se statute may create new

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(126) *Id.* at 167, 219 N.W.2d at 746.
(127) *Id.* at 166, 219 N.W.2d at 745.
(128) See *Tuseth v. Thoreson, Inc.*, 287 N.W.2d 633 (Minn. 1979).
(130) Coxe *v. State*, 281 A.2d 606, 607 (Del. 1971) (found state’s per se law to represent “a legislative determination that such quantity of alcohol has sufficient adverse effect upon any person to make his driving a definite hazard to himself and others,” a determination which the court found to be rational); Roberts *v. State*, 329 So. 2d 296 (Fla. 1976) (held per se statute to be a reasonable exercise of the state’s police power); see also *State v. Hazma*, 342 So. 2d 80 (Fla. 1977). See generally *State v. Torrey*, 35 Or. App. 439, 574 P.2d 1138 (1978) (per se law not a conclusive presumption); *State v. Clark*, 35 Or. App. 851, 583 P.2d 1142 (1978) (Johnson, J., dissenting) (statute represents legislative determination that all persons are definitely impaired at BAC levels of 0.10 percent or more).
problems of its own. Such statutes may be vulnerable to charges of unconstitutional vagueness, in that an individual has no way of knowing his BAC while driving and, thus, cannot comport his conduct to comply with the law. His BAC may be 0.04 percent or 0.11 percent, and while the individual may feel differently under these conditions, he cannot reasonably know the point at which his BAC exceeds the legal limit, until he is pulled over and given a chemical test. The statute would be analogous to one which made it an offense for one to appear in a public place with a common cold. In the few instances where state courts have confronted this question, the statutes have been found to be specific enough to pass constitutional muster. Nevertheless, the vagueness of the operation of the statute remains a very real concern.

Moreover, the second presumption discussed above, that which presumes a 2100:1 ratio, may come into play even more forcefully in per se statutes. All but three of the fourteen states with per se statutes define the crime in terms of a 0.10 percent blood alcohol concentration. To establish this illegal BAC, these states per-

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131. In Greaves v. State, 528 P.2d 805 (Utah 1974), the Utah Supreme Court rejected a vagueness attack on the Utah per se statute. The court held the statute not unconstitutionally vague, for the reason that the statute "states with sufficient clarity and conciseness the two elements necessary to constitute its violation," namely a BAC of 0.10 percent and concurrent operation of a motor vehicle. The court then pointed out: "We can see no reason why a person of ordinary intelligence would have any difficulty in understanding that if he has drunk anything containing alcohol, and particularly any substantial amount thereof, he should not attempt to drive or take control of a motor vehicle." Id. at 808. A similar conclusion was reached in Roberts v. State, 329 So. 2d 296 (Fla. 1976).

This resolution of the vagueness question probably misses the point. The purpose of the vagueness doctrine is to inform those subject to a law as to what conduct on their part will render them accountable. Connally v. Gen. Constr. Co., 269 U.S. 385 (1926); United States v. L. Cohen Grocery Co., 255 U.S. 81 (1921). Legislatures which choose to enact per se statutes are not attempting to outlaw all situations in which a person drinks and then drives, but rather only some of them (those where enough is consumed to raise the driver's BAC to prohibited levels). To avoid vagueness, there must be some way that a reasonable person can tell in advance whether his conduct is prohibited. The Utah Supreme Court's conclusion that anyone should know that they should not drive after consuming "any substantial amount" of alcohol seems to highlight the very vagueness of the statute. But see Boyce Motor Lines v. United States, 342 U.S. 337, 340 (1951) ("one who deliberately goes perilously close to an area of proscribed conduct takes the risk of crossing the line and violating the law").

132. Alaska outlaws the operation of a motor vehicle by a person "when there is 0.10 percent or more of alcohol in his blood or 100 milligrams or more of alcohol per 210 milliliters of his blood, or when there is 0.10 grams or more of alcohol per 210 liters of his breath . . . ." ALASKA STAT. § 28.35.630(2) (Supp. 1981). Minnesota makes it illegal to drive "when the person's alcohol concentration is 0.10 or more."
mit breath testing, thus invoking all of the problems involved with the breath/blood ratios. In addition, with per se statutes the Ulster County test may be more squarely applied, for here the BAC is in fact the element of the offense. If a breath test produces the only evidence of the BAC, then Ulster County clearly requires that extrapolation to meet the reasonable doubt standard, a task demonstrated above to be overwhelming. It is perhaps this application of Ulster County to per se statutes which, for all practical purposes, would eliminate all tests but blood tests from being used to establish the BAC, a result which, if it were to occur, would be the ultimate death knell for per se statutes.

CONCLUSION

The Ulster County and Sandstrom decisions provide a framework for analyzing the validity of evidentiary devices in criminal cases. Conclusive presumptions are forbidden, as are any mandatory presumptions which shift to the defendant the burden of disproving any element of the offense. Presumptions which merely shift the burden of production to the defendant are acceptable, provided that the presumption is true generally beyond a reasonable doubt. If a presumption represents the sole proof of an element, it too must meet the reasonable doubt standard. Only if a presumption is permissive, representing an inference which the factfinder may draw but is not required to draw, will the presumption be tested by the less demanding more-likely-than-not standard of proof, as applied to the facts of the particular case. In any situation, the evidentiary device must not thwart the factfinder's ability to find each element of the offense beyond a reasonable doubt.

The chemical test presumptions for intoxication function as evidentiary devices that must meet these standards. The presumption of intoxication from proof of a BAC of 0.10 percent or higher probably meets the preponderance standard for any given defendant, and in all probability is true beyond a reasonable doubt for the population at large. The use of breath alcohol concentrations, either to calculate BAC levels or directly to trigger presumptions of intoxication, are more problematic. In neither case are the results accurate beyond a reasonable doubt, and yet in most instances Ulster County will require this higher standard for breath tests. Per se statutes probably do not represent conclusive presumptions, but such statutes face constitutional problems of

MINN. STAT. ANN. § 169.121(d) (West Supp. 1982). Nebraska prohibits driving with an alcohol concentration of 0.10 percent "in his or her body fluid." NEB. REV. STAT. § 39-669.07 (Supp. 1980).
vagueness, and incorporate the problems inherent in breath testing if breath test machines are used to calculate the per se BAC levels. Thus, presumptions based upon anything short of direct withdrawal of blood are probably unconstitutional under any of the standards of Ulster County/Sandstrom.

Given these conclusions, one has to question why the results of chemical tests, especially breath tests, continue to be admissible in court. There is no doubt that the results of chemical tests yield valuable information about the sobriety of a driver, and serve to relegate to secondary importance the type of subjective evidence that is far less accurate. The problem arises when these chemical tests are used, not merely as evidence, but to trigger presumptions which may short-circuit accurate factual determinations in any given case.

There is also little doubt that the chemical test presumptions, the use of breath testing, and per se legislation have made the judicial system function more efficiently. Further, breath testing is more convenient and less physically intrusive than the withdrawal of a blood sample for blood testing. Clearly, the present structure of the Uniform Vehicle Code and of most state statutes represents a scheme designed to dispose of drunk driving cases in a streamlined and systematic fashion.

It must be remembered, however, that the efficiency of our criminal justice system should not be increased at the expense of due process. Our system of justice does not seek to determine whether people generally are under the influence of alcohol at a level of 0.10 percent; it rather seeks to determine whether a particular defendant with that level is under the influence. It is not guided solely by percentages of error in measurement, but rather uses those to determine the existence or non-existence of a reasonable doubt,\(^\text{133}\) a guarantee of the due process clause. In the

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\(^{133}\) No attempt has been made in this article to discuss the margins of error demonstrated in any of the tests or presumptions discussed herein, for the reason that there is no realistic method of determining whether a range of error of, say, ±0.005 percent is sufficient to create a reasonable doubt. For discussions of whether or not the reasonable doubt standard can be reduced to quantifiable levels, see Ball, *Probability Theory: The Moment of Truth*, 14 *VAND. L. REV.* 807 (1961); Finkelstein & Fairley, *A Bayesian Approach to Identification Evidence*, 83 *HARV. L. REV.* 489 (1970); Simon & Mahan, *Quantifying Burdens of Proof*, in 5 *LAW & SOC. REV.* 319 (1971); Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 *HARV. L. REV.* 1329 (1971).

For an interesting article which discusses the quantification of the term "beyond a reasonable doubt" with specific reference to the breath/blood alcohol ratio used
last analysis, it is this guarantee which must prevail. No matter how urgent, immediate, and identifiable a problem may be, it cannot be solved by suspending due process.