

12-1-1966

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SOME OBSERVATIONS ON POLICE-ADMINISTERED TESTS FOR INTOXICATION

L. POINDEXTER WATTS*

TABLE OF CONTENTS

<i>Introductory</i>	35
I. Clinical Symptoms of Intoxication	41
A. Verbal Description of Defendant's Condition	41
B. Observation of Defendant by Others Than Arresting Officer	42
C. Examination of Defendant by Physician	42
D. Use of Alcoholic Influence Report Form and Its Standardized Tests..	44
E. Use of Visual and Sound Recordings	46
II. Chemical Tests for Intoxication	49
A. Direct Chemical Analysis of Blood	51
B. Chemical Analysis of Urine	53
C. Chemical Analyses of the Breath	55
1. Underlying Principles	56
2. Various Types of Breath-Testing Instruments	57
(a) The Drunkometer	58
(b) The Alcometer	61
(c) The Portable Intoximeter	62
(d) The Breathalyzer	64
(e) The Photo-Electric Intoximeter	69
(f) The DPC Intoximeter	73
(g) The Breath-Tester	74
(h) The Kitagawa-Wright Apparatus	75
(i) Preliminary Screening Tests	76
D. Evidentiary Factors with Respect to Breath Tests	77
1. Extent of Judicial Notice	78
2. Laying a Foundation for Breath Tests	83
3. Validity of the .10 Per Cent Presumption	91
4. Problems with Respect to "Per Cent by Weight"	97
III. Constitutional Problems	99
A. Consent	101
B. Various Types of Compulsion	102
C. Implied-Consent Statutes	103
D. Introducing Evidence of Refusal	104
E. Reluctant Consent; Refusal But No Resistance	106
F. Use of Force or Threat of Violence to Compel Test	108
G. Testing an Unconscious Person	108
H. Chemical Testing and Search and Seizure	109
I. Types of Permissible Compulsion	111
J. Right to Have Counsel Present During Test	112
K. Need for a Warning Before Questioning	113
L. The Future of Chemical Testing	116

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INTRODUCTORY NOTE: In 1963 following the passage of legislation as to chemical tests for intoxication, the Institute of Government was asked to furnish a legal consultant to work with several of the public agencies concerned with implementation of the program. As the Institute staff members who had previously researched this area¹ were no longer available, I was selected for this assignment—apparently because I had taught portions of the motor vehicle law to members of the North Carolina State Highway Patrol.

At the start I knew almost nothing about chemical testing, but in the past three years of working with the program in North Carolina I have gained a certain amount of information as to practical and technical problems relating to police-administered tests for intoxication that may be of interest to members of the bar both in North Carolina and elsewhere. I have attempted to avoid elaborate exposition of material easily available to lawyers elsewhere and to concentrate in this paper on material of the sort that does not usually appear in law review articles on the police or on chemical testing. Occasionally order in presentation has required repetition of the familiar, but my aim has been to bring out lesser known material.

Both facts and opinions that I have collected will be reproduced. I shall be conscientious in documenting my statements when possible, but much of my information (and possibly misinformation!) came not from journals and textbooks but from attendance at lectures and from conversations with persons knowledgeable in the field of chemical testing.²

¹ See, e.g., GUNN, SUGGESTED CHANGES IN THE MOTOR VEHICLE LAWS OF NORTH CAROLINA 34-39 (Institute of Government 1964); HENNESSEE, MONTGOMERY & MIDGETTE, CHANGES SUGGESTED IN THE MOTOR VEHICLE LAWS OF NORTH CAROLINA 1-11 (Institute of Government 1959); SMITH, CONFESSIONS AND SCIENTIFIC EVIDENCE 119-58 (1963); Gunn, *Chemical Test and Implied Consent*, 42 N.C.L. REV. 841 (1964).

² The first group of operators under the new law was trained in January

For this reason I give credence to a large number of probably true "facts" and entertain a number of probably quite respectable opinions that I could not possibly corroborate in the conventional style of legal periodicals within the limits of labor fixed by the constitutional prohibition against cruel and unusual punishments. I feel, nevertheless, that it will be useful to record these not-fully-documented ideas for what they are worth.

The social problem of drunkenness is as old as civilization itself,³ and a clinical description of the symptoms has survived from as far back as Mesopotamian times.⁴ Despite a succession of voices throughout history urging moderation or abstinence,⁵ the use of alcohol in beverage form has been to some degree a fixed part of almost all cultures.⁶ While some societies have been successful in creating customs and exercising social controls that lead to moderate and acceptable use of beverage alcohol, many others have suffered the harm that can be caused when intemperate use of alcohol be-

1964 in a school conducted in this state by The Traffic Institute of Northwestern University. Instructors included Dr. Robert F. Borkenstein, Chairman of the Department of Police Administration at Indiana University and inventor of the Breathalyzer, and Robert L. Donigan, General Counsel of The Traffic Institute of Northwestern University and author of DONIGAN, *CHEMICAL TESTS AND THE LAW* (2d ed. 1966) [hereinafter cited as DONIGAN]. I attended all sessions of this pilot course and later taught extensively in subsequent courses conducted for North Carolina chemical test operators by the Department of Community Colleges of the State Board of Education. I also attended as a student a course on Supervision of Chemical Tests for Intoxication at Indiana University in March 1964 and as a delegate the Fourth International Conference on Alcohol and Traffic Safety held in December 1965, also at Indiana University.

³ See Horton, *The Functions of Alcohol in Primitive Societies*, in *ALCOHOL, SCIENCE AND SOCIETY* 153 (rev. ed. 1954).

⁴ ROUECHÉ, *ALCOHOL: ITS HISTORY, FOLKLORE AND ITS EFFECT ON THE HUMAN BODY* 15-16 (paperback ed. 1962) (originally published as *THE NEUTRAL SPIRIT* (1960)) [hereinafter cited as ROUECHÉ]:

Mesopotamian civilization also produced the earliest clinical description of intoxication on the record, and the first attempt at an antidote. "If a man has taken strong wine," the account as cited by Henry E. Sigerist in his *A History of Medicine* reads, "his head is affected and he forgets his words and his speech becomes confused, his mind wanders and his eyes have a set expression; to cure him, take licorice, beans, oleander [and eight other unidentified substances] to be compounded with oil and wine before the approach of the goddess Gula [or sunset], and in the morning before sunrise and before anyone has kissed him let him take it, and he will recover."

⁵ See *DRINKING AND INTOXICATION* 39-175 (McCarthy ed. 1959).

⁶ ROUECHÉ 1-20.

comes fashionable or permissible among large segments of a society's population.⁷

The United States has had its share of these problems and is notorious for its attempt to outlaw alcohol as a beverage through legislation. Though it is not popular to say so in too loud a voice since the failure of Prohibition, alcoholic intoxication continues to be implicated as a causal or aggravating factor in an enormous amount of crime in this country.⁸ The evidence is accumulating, however, that a relatively new side effect of alcohol on our society is as harmful as the well-known effect of alcohol in releasing the inhibitions and cautions that otherwise would suppress the traditional crimes against the person, property, morality, and the public peace. The new problem is the impact of alcohol upon traffic safety.⁹

⁷ See, e.g., McKinlay, *Ancient Experience with Intoxicating Drinks: Non-Classical Peoples*, 9 Q.J. STUDIES ON ALCOHOL 388 *passim* (1948).

⁸ See Shupe, *Alcohol and Crime: A Study of the Urine Alcohol Concentration Found in 382 Persons Arrested During or Immediately After the Commission of a Felony*, 44 J. CRIM. L., C. & P.S. 661 (1954). The debate continues over the possibility that the "criminal classes" just drink a lot and that there would be just as much—or perhaps more—crime if liquor were by some miracle effectively banned. Alcohol in its action as a depressant may prevent some sex crimes, but it undoubtedly does trigger some crimes of violence—and it may be used by some criminals to "fortify the nerves." With our increasing democratization and the possible decline of "criminal classes" of the "Gin Lane" variety, the part played by alcohol in leading to crime may increase, especially among the young.

⁹ The gory toll of the dead and injured from traffic accidents, the staggering costs in terms of increased insurance premiums, lost production, etc., is too familiar to be set out here. For a recitation of statistics, see Fort, *Drinking and Driving in California and the United States*, in PROCEEDINGS OF THIRD INTERNATIONAL CONFERENCE ON ALCOHOL AND ROAD TRAFFIC 339 (1963) [hereinafter cited as THIRD CONFERENCE].

One factor that has been emerging with increasing force over the past ten years, however, should be emphasized. Involvement of alcohol in accidents is undoubtedly much greater than could have been credited in the past on the basis of official police reports. See Schmal, *Statistics—Alcohol and Accidents*, in A.M.A. COMMITTEE ON MEDICOLEGAL PROBLEMS, CHEMICAL TESTS FOR INTOXICATION—MANUAL 16 (1959) [hereinafter cited as A.M.A. MANUAL]. One of the major recent studies is BORKENSTEIN, CROWTHER, SHUMATE, ZIEL & ZYLMAN, *THE ROLE OF THE DRINKING DRIVER IN TRAFFIC ACCIDENTS* (1964). The studies that have been performed on the bodies of drivers killed in accidents have—for this country at least—almost uniformly shown that over half the dead drivers had significant blood-alcohol levels. See, e.g., Gerber, *Vehicular Fatalities in Cuyahoga County, Ohio, U.S.A.*, in THIRD CONFERENCE 38; N.J. DEP'T OF LAW & PUBLIC SAFETY, DIV. OF MOTOR VEHICLES, TRAFFIC SAFETY SERVICE, *ALCOHOL DETERMINATION PROGRAM IN FATAL TRAFFIC ACCIDENT CASES* (1963); *Alcohol or CO Found in Half of Driver Dead*, Traffic Dig. & Rev., Mar. 1966, p. 11; Neilson, *Alcohol Involvement in Fatal Motor Vehicle Accidents in Twenty-Seven California Counties in 1964* (mimeo. from Cal. Traffic Safety Foundation, San Francisco, Cal., Sept. 1965).

One of the most significant factors in the problem is that the negative effects of alcohol begin to be manifested at levels of intoxication heretofore tolerated by many as within the range of moderate social drinking.

The danger presented by the intoxicated driver has been recognized since the early days of the motor car,¹⁰ and most jurisdictions have added sanctions affecting the driver license¹¹ to the usual provisions for criminal punishment for drunk driving.¹² The great importance of the automobile in the United States for both personal and business use causes any driving restriction to be viewed by the public as an extremely severe punishment, and this view has made conviction difficult in drunk-driving cases.¹³ A superior court judge in North Carolina, for example, has stated that frequently up to half the time in a criminal term of court may be devoted to the trial of drunk-driving cases.¹⁴ These difficulties add up to a national

¹⁰ See *e.g.*, *State v. Rodgers*, 91 N.J.L. 212, 102 Atl. 433 (1917).

¹¹ Fox, *The Problem of Countermeasures in Drinking and Driving*, 19 TRAFFIC Q. 299, 306 (1965).

¹² The driving offense is almost everywhere committed at a lower level of intoxication than when one is "drunk" or "intoxicated." See Monroe, *The Drinking Driver: Problems of Enforcement*, 8 Q.J. STUDIES ON ALCOHOL 385, 386-88 (1947). Although the statutes in the various states may phrase the offense differently, there is little practical difference in result. Almost all states seem to treat the offense the same way as in the vast majority which make it unlawful to drive a vehicle (or motor vehicle) on the highway (or elsewhere) while "under the influence of intoxicating liquor." The "under the influence" phrase is usually further defined in terms of impairment of physical or mental faculties used in driving. ERWIN, DEFENSE OF DRUNK DRIVING CASES § 1.04, at 13-16 (2d ed. 1966) [hereinafter cited as ERWIN].

Lawyers quite often tend to denominate the offense as "drunk driving" in casual conversation even though they are aware that the phrase is inexact. It is easier to say than "under the influence of intoxicating liquor." The defense lawyer may even like to use the phrase in court, but the prosecution would not. Police officers, however, usually dislike the shorthand expression "drunk driving" both in and out of court and prefer such abbreviations as "DWI" (driving while intoxicated) or "OWI" (operating while intoxicated). As a simple matter of convenience, the under-the-influence offense will usually be called "drunk driving" in this paper.

¹³ As proof that the driver had been drinking is not enough to convict, the drunk-driving offense is by its nature more difficult to prove than the ordinary traffic offense in which, for example, one either did or did not fail to stop for a traffic signal. Nevertheless, the offense is no more difficult to prove than many other crimes that are routinely handled by the courts. One example of these that comes to mind is receiving stolen goods, with its requirement of proof that the goods were received with knowledge that they were stolen.

¹⁴ This was stated informally in a meeting. The superior court in North Carolina is a court of general trial jurisdiction which must handle all felonies but which in the majority of counties will handle misdemeanors only when they are appealed from a lower court or magistrate for a trial

composite picture in which law enforcement officers too frequently ignore the impaired driver or charge some other, lesser offense.¹⁵ And when there has been an arrest, drunk-driving cases are in many instances either nol-prossed by the prosecutor or allowed to languish on the docket until the case grows stale.¹⁶ Yet despite the strains that these difficulties put on the administration of criminal justice, there is no strong sentiment for turning the problem of imposing sanctions against the drunk driver over to some other agency or for relaxing either the sanction or the enforcement effort.¹⁷ The drunk driver as an abstraction is too dangerous for

de novo in superior court. Although in some counties it is possible to bypass trial at the lower-court level by demanding a jury trial, in the majority of superior court trials for drunk driving the case is undoubtedly being tried for the second time.

¹⁵ This is not so much a matter of corruption or outright nonfeasance as an understandable reluctance of the officer to face the known hurdles of preparing for a heavily contested trial and encountering searching cross-examination in any case that could conceivably be tagged as "borderline." The introduction of chemical testing programs in a community almost inevitably demonstrates to the local officers that they have been dismissing as "borderline" large numbers of defendants who were without question "under the influence" of liquor. The long-term effect of chemical testing will be to increase the number of arrests for the offense, although there will still be many drivers at the dangerous level who will go undetected under enforcement procedures of the type that we are currently using.

¹⁶ There are serious calls by many people for making traffic offenses noncriminal and affecting driver behavior solely through administrative sanctions against the license—perhaps tied to a point system. See Johnston, *A Plan for the Hearing and Deciding of Traffic Cases*, 33 N.C.L. REV. 1 (1954). There is no doubt that lumping a multitude of offenses without *mens rea* into the same pigeonhole as serious crimes causes dislocations. See Conway, *Is Criminal or Civil Procedure Proper for Enforcement of Traffic Laws?* (pts. 1 & 2), 1959 WIS. L. REV. 420, 1960 WIS. L. REV. 1. The problem becomes more acute as the Supreme Court of the United States begins to exercise greater supervision over state criminal procedure than in the past and to demand in some instances fewer shortcuts.

Putting aside the idea of retaining traffic violations in court but on the civil side, it should be pointed out that with cases such as drunk driving, in which there are conflicting community sentiments, the political pressure for and against invocation of sanctions will remain extremely strong no matter what agency is given the problem. The pressures are not good for the courts, but the courts may well be able to handle them better than any other agency. It must be remembered also that this pressure is not totally undesirable. In fact, we insist in a number of states on retaining the right to bring pressure on court and law enforcement officials by continuing with the system of electing judges, prosecutors, and other officials.

¹⁷ As to both points, it is instructive to read the words of one who dissents from what is at least the majority view among the professionals in the field of traffic safety. See Weinstein, *Some Thoughts on Legislation, Alcohol and Driving in the United States*, in PROCEEDINGS OF SECOND INTERNATIONAL CONFERENCE ON ALCOHOL AND ROAD TRAFFIC 82, 84-85 (1955) [hereinafter cited as SECOND CONFERENCE]:

that—yet there is often sympathy for and leniency given to the individual defendant who has not caused personal injury but is faced with loss of his driving privilege.

Although there are situations other than those involving drunk drivers in which the police need to determine a person's degree of intoxication, these cases are usually characterized by elements more easily proved than that of impairment of ability to drive.¹⁸ In any event, the largest category—public drunkenness—has not traditionally been one that presents the challenge of a strong defense.¹⁹ This paper, therefore, will concentrate upon tests for alcoholic intoxication administered by the police to help prove the element of driving while “under the influence of intoxicating liquor,” the element most commonly found in the drunk-driving laws of the various states.²⁰

Undoubtedly this harshness, particularly the mandatory revocation, is self-defeating because it leads to nullification. Judges and juries are reluctant to convict when the daily work of the defendant, say a truck driver, involves driving and conviction may mean loss of livelihood. Particularly is this so when, as in New York, enforcement is often in the hands of local police courts which are particularly subject to local pressures. When the choice is an unduly severe penalty or none at all, many courts have been choosing no penalty.

Penalties should be reduced to enforceable levels. Despite the fact that deterrence does not increase in proportion to the penalties—indeed the converse is often true—the legislature is under constant pressure from vocal individuals to prove that it is against sin by making penalties more harsh and inflexible. Such legislation requires no appropriation and the pressure is hard to resist. Discretion should remain with the judges. If their penalties are too lenient they should be properly educated as to the needs in this field. Licenses should be revoked only in separate proceedings before the state motor vehicle commissioner, who should have full discretion. In the case of a truck driver, the proper answer may well be a restricted license permitting him to earn his living but denying permission to drive a pleasure vehicle, rather than revocation of license and loss of livelihood.

¹⁸ In fact, in most other situations in which intoxication is an element in the criminal law, the intoxication has to be overt and flagrant. An example is the extreme level of intoxication necessary to negative specific intent in cases in which the defense of intoxication is asserted. A curious recent example is the wording of § 9(b) of the State Boat Act recommended for adoption by the states by the Council of State Governments: “No person shall operate any motorboat or vessel, or manipulate any water skis, surfboard, or similar device while intoxicated or under the influence of any narcotic drug, barbiturate or marijuana.” The shift from “intoxicated” to “under the influence” demonstrates a reluctance to restrict the boatman's drinking pleasures any earlier than absolutely necessary.

¹⁹ *But cf.* *Budd v. California*, 385 U.S. 909 (1966) (dissenting opinion of Mr. Justice Fortas to denial of cert.); *Easter v. District of Columbia*, 361 F.2d 50 (D.C. Cir. 1966) (en banc); *Driver v. Hinnant*, 356 F.2d 761 (4th Cir. 1966).

²⁰ The quoted words are used in § 11-902(a) of the UNIFORM VEHICLE

I. CLINICAL SYMPTOMS OF INTOXICATION

The most important test for determining intoxication or degree of intoxication has always been the subjective conclusion of the person making the determination based upon the clinical symptoms.²¹ Because these symptoms might be manifested subtly and be difficult to describe, the common law has provided an exception to the rule against opinion testimony with regard to the opinion of a witness that a person had been intoxicated.²² Significantly, the law presumes that almost anyone in our society has sufficient prior experience with drunks to form an opinion that has some worth, and no foundation on this score is required to be laid prior to introduction of the opinion.²³ Although in theory, at least, a man can be convicted of a drunk-driving charge when far less inebriated than when "drunk" or "intoxicated," the courts apparently make no distinction²⁴ and allow a witness to opine freely that a particular person was "under the influence" of beverage alcohol.²⁵

The pressure on the prosecution in drunk-driving cases to bolster the conclusions of the prosecuting witnesses has led to a search for ways to present the clinical symptoms more objectively to the jury.

A. Verbal Description of Defendant's Condition

Police officers, who are usually the star prosecution witnesses, probably rehearse ways of describing in words the condition and actions of intoxicated defendants. This is commendable if it results in painting an accurate and effective word picture of what was actually seen by the officer, but defense lawyers often complain that

CODE and according to ERWIN this formula has been "substantially adopted in forty-five states." ERWIN § 1.04, at 12. DONIGAN 4 sets the figure at forty-six states.

²¹ "Clinical symptoms" is a phrase widely used in chemical-testing circles to indicate symptoms of intoxication that could be detected simply by careful observation. It is not restricted in its use to examinations made by physicians or other specialists.

²² 7 WIGMORE, EVIDENCE § 1974 (3d ed. Supp. 1964).

²³ In many cases, however, it may be necessary for the witness to preface his opinion with a statement of his opportunity to observe and also to give a description of as many objective occurrences as possible.

²⁴ For a discussion of the issue by one who believes the courts should make a distinction, see ERWIN § 7.01B.

²⁵ No sane prosecutor in a jury trial would rest his case after merely eliciting the opinion of the witness as to this point to be proved, but as a matter of law it would probably be sufficient evidence to support a verdict of guilty.

such testimony is given by rote and has no relationship to the actual condition of the defendant.²⁶ One officer, however, complained in rebuttal that most highly intoxicated defendants are quite similar in their clinical symptoms and asked: "How *do* you describe the same thing differently in each case?"²⁷

*B. Observation of Defendant by Others Than
Arresting Officer*

Sometimes the prosecution or the enforcement agency may structure its processing at the time of arrest to make sure that other persons than the arresting officers observe the defendant closely and are prepared to testify if need be.

C. Examination of Defendant by Physician

Considering which days of the week and which hours of the day most defendants are arrested for drunk driving,²⁸ it is doubtful that many departments in this country could call upon physicians to examine such defendants. Some large departments do have either police physicians in their employ or standing arrangements with private physicians,²⁹ but most do not have the resources necessary to keep a physician available around the clock to examine all drunk-driving defendants apprehended by the department. While it would probably be unwise for a department's physician to examine some defendants and not others, on a haphazard basis, it is certainly desirable that a doctor be available on call in cases in which there is suspected illness or injury.

An examination of a defendant by a physician would be useful

²⁶ There is a definite need for the witness to describe as many concrete happenings as possible that tie in specifically with the investigation of the defendant's case. See the discussion of the Alcoholic Influence Report Form in the text below.

²⁷ Compare ERWIN § 9.01:

Because the prosecution is limited in the manner of proving the condition of a defendant charged with driving while under the influence of alcohol to the usual routine description of the acts and conduct of the defendant, and because almost every case is identical in the description, some police departments have been casting about for new and better methods of demonstrating the conduct of the defendant at the time of arrest.

²⁸ In terms of day of the week, arrests are most likely to occur on Friday and Saturday. In terms of time of day, the most productive hours are from 6:00 p.m. to 3:00 a.m. Coldwell & Grant, *Some Characteristics of Drinking Drivers*, in THIRD CONFERENCE 54, 58.

²⁹ See ERWIN 187.

in ruling out many of the large number of illnesses and injuries that produce in a person one or more of the clinical symptoms normally associated with alcoholic intoxication.³⁰ On the pure issue of intoxication or impairment, however, there is strong evidence that physicians fare little better than anyone else in making a judgment.³¹

A physician or some other professionally trained expert would be useful—perhaps essential—in giving and interpreting some of the more experimental or complex tests that have been devised to reveal subclinical symptoms of alcoholic impairment, but most of these tests have not yet gained wide enough acceptance for their results to be used in court.³² A physician examining to determine degree of intoxication could, and probably would, use one or more of the standardized tests described below, but the important thing about these tests is that it does *not* take an expert to administer or interpret them.³³

³⁰ DONIGAN 300-07.

³¹ At the concluding session of the Fourth International Conference on Alcohol and Traffic Safety held at Indiana University, December 6-10, 1965, the proceedings of which are still in the process of publication, Working Party No. 10 on "Role of Clinical Examination in the Investigation of the Drinking Driver" made its report to the conference. After reciting the value of clinical examination by a physician to detect illness, injury, and presence of drugs, the report reached a different conclusion with respect to diagnosis of intoxication. The clinical examination will reveal levels of intoxication over .15%, but it is not sensitive for diagnosis of blood-alcohol levels under .10%. (See note 53 *infra* for a discussion of problems in expressing blood-alcohol percentage.) The Working Party thus concluded that clinical examination was of no practical value in detecting impairment of the ability to drive.

An early Swedish study that is widely cited by lecturers in the field emphasized that different doctors use widely varying criteria in making diagnoses of intoxication or impairment.

³² A great deal of research utilizing subtle optical tests is now being performed. It includes study of low levels of blood alcohol on the ability of the eye to distinguish flickering images, alcohol effect on latency of caloric nystagmus, horizontal optokinetic nystagmus under the influence of either alcohol or d-amphetamine or both, and effect of low blood-alcohol level on stereoscopic acuity and fixation disparity. Papers discussing the research on the above subjects were presented at the Fourth International Conference on Alcohol and Traffic Safety held in December 1965. Other research reported included study of low levels of alcohol on fine motor performance, mental tasks requiring concentration, driving skill on test courses with emphasis on driver reaction to surprise events, and handwriting.

³³ Note that the National Safety Council has amended its Alcoholic Influence Report form to eliminate an examination of the pupils of the eyes from the section on performance tests.

*D. Use of Alcoholic Influence Report Form and Its
Standardized Tests*

The National Safety Council has compiled a model form for use by officers investigating drunk-driving cases. It is based on experience in a great number of cases and in one section contains a range of adjectives to describe details of the defendant's appearance and behavior. All the officer does is check the proper block, although he may add specific information of his own. In addition a number of questions are to be asked of the defendant. Answers to these may in some instances indicate the defendant's lack of orientation,³⁴ other questions seek to establish whether the defendant is complaining of any illness, injury, or physical defect that would affect the diagnosis that he was under the influence of intoxicating liquor. The defendant is asked about any drugs taken recently and about his pattern of eating and drinking prior to the arrest.³⁵ The usefulness of these questions in anticipating defenses is obvious.

In recording the defendant's answers, officers are instructed to put down exactly what the defendant says. If he replies to a seemingly harmless question with profanity, his exact words are taken down—and will probably be repeated for the benefit of the jury by the testifying officer.

A section of the form provides space to record the results of five standardized performance tests.³⁶ There is a great deal of contro-

³⁴ The defendant is asked what time it is, what day of the week, on what road was he driving, etc.

³⁵ This includes a question as to whether any drinking occurred after the accident—if there was one.

³⁶ The North Carolina Traffic Safety Council, Inc., provides a Sample Instructional Bulletin on the Use of the Alcoholic Influence Report Form. This bulletin gives instructions on how to administer the performance tests. They are as follows:

Balance: Balance tests involve steadiness in an upright position. First, have the subject stand on one foot with arms outstretched, then have him transfer his weight to the other foot. Next, have him stand erect with his heels together, toes pointed straight ahead, head back and eyes closed. Actions such as swaying, a jerky motion used in attempting to recover balance, and shifting of feet should be noted.

Walking: Walking tests involve ability to walk a straight line. The subject should be asked to walk a straight line (sidewalk line or an imaginary line between two points) for a distance of approximately 20 feet, with the heel of one foot being placed against the toe of the other foot. Upon reaching the end of the specified distance, he should be directed to turn quickly about and walk heel to toe back to the starting point.

Turning: Particular attention should be paid to the manner in which

versy over the ability of these tests to reveal alcoholic impairment. For some of the tests, at least, seasoned drinkers may well have learned to compensate for their impairment sufficiently to pass muster. Yet a poorly coordinated but sober person may have difficulty. Use of the Alcoholic Influence Report Form is optional with local departments, and it is not unusual for a department to print its own modified version of the form with some changes in the performance tests.³⁷ The two tests that are perhaps most highly regarded are the balance test and the turning test. As for balance, the amount of sway is not so important as the type; jerky corrections of sway indicate impairment. To be an effective indicator the turning command, which is given during the walking test, should come unexpectedly and rather sharply while the defendant is concentrating on walking the line—somewhat before he has reached the end of the line. Richard E. Erwin, in his *Defense of Drunk Driving Cases* indicates that a number of defendants can successfully pick up the coins;³⁸ he also states that the testifying officer will often be unable to complete the finger-to-nose test with his eyes closed if the defense counsel has managed to make the officer nervous.³⁹

Despite the ambiguity of the results of the tests in a number of

he turns around and to any difficulty he experiences in this action while performing the walking test.

Finger to Nose: These test coordination of motor impulses of the arms. The subject should be asked to stand erect, feet together, eyes closed and arms extended horizontally with each index finger extended. Keeping his eyes closed, he should be asked to prescribe an arc with one arm at a time and touch the tip of his nose with his index finger. This procedure should be repeated with the other arm. In each instance, it should be noted if and where the index finger touches the face and the degree of sureness with which the operation was performed.

Coins: Coin pick-up is a good measure of muscular coordination in the fingers as well as balance. Arrange nine coins on the floor, such as three pennies, three nickels, and three dimes, in order, with the heads or tails all up. Each time, tell the suspect what type of coin he is to pick up, have him pick up each coin as you direct him, identify heads or tails (whichever was up on the floor) and hand to you. Note his balance while attempting to pick up coins.

³⁷ For a sample of this, see the Los Angeles form reprinted in ERWIN § 7.03, at 116.

³⁸ ERWIN § 8.16, at 146.

³⁹ ERWIN § 8.13, at 142-43. It should be noted that the version of the National Safety Council's form on pages 114-15 of Erwin's book is different from the one currently recommended. The main difference between the new and the old form is the elimination of some of the performance tests criticized by Erwin and others.

instances, in the usual case there is no substantial question in the officer's mind of the defendant's impairment,⁴⁰ and these tests serve essentially to provide an extension of the number of different situations in which the defendant's behavior may be noted. They allow the officer to take notes, give the jury objective descriptions of clinical symptoms, and add convincing detail to the stock description of slurred speech, staggering gait, fumbling with wallet, bloodshot eyes, odor of alcohol, and disarray of clothing.

It should be noted that the instructions as to the performance tests most generally followed in North Carolina state that "the driver should be given only those tests which he is willing to take."⁴¹ The questions pertaining to voluntariness, self-incrimination, and right to have counsel present in regard to the entire A.I.R. Form will be discussed in a later section of this paper.

E. Use of Visual and Sound Recordings

As one of the major problems of the prosecution is the difficulty that the testifying witnesses have in giving accurate verbal pictures of the defendant's condition, the question naturally arises—why not

⁴⁰ Arrests are seldom made when the evidence of impairment is considered borderline. See Stephens, *0.15 Per Cent Accessories*, Traffic Dig. & Rev., June 1964, p. 10:

The Charlotte [City] and Mecklenburg [County, North Carolina,] Police Departments' combined records disclose that in 1963 eight hundred sixty-five persons were charged with driving motor vehicles while under the influence of intoxicating liquor. Blood-alcohol determinations were done with the Breathalyzer in 573 of these cases with the results divided into three categories: (1) below 0.15 per cent (2) 0.15-0.199 per cent (3) 0.20 per cent and over. The percentages for 1963 were

- (1) Seven per cent tested below 0.15 per cent;
- (2) 25 per cent tested more than 0.15 per cent, but less than 0.20 per cent; and
- (3) 68 per cent were 0.20 per cent and over.

Thus far the figures for 1964, using the three broad categories, are

- (1) 11 per cent tested below 0.15 per cent;
- (2) 27 per cent were more than 0.15 per cent, but less than 0.20 per cent;
- (3) 62 per cent were 0.20 per cent and over.

It is interesting to note that a long-range study made in Finland shows that well over twice as large a percentage of arrests was made there at levels under the .15% blood-alcohol level. (The Finnish report breaks at .12%, so the difference could be even greater than indicated.) Alha, *The Forensic Medical Demonstration of the Presence of Alcohol and Clinical Intoxication in Finland*, in THIRD CONFERENCE 293, 294.

⁴¹ N. C. Traffic Safety Council, Inc., Sample Instructional Bulletin on the Use of the Alcoholic Influence Report Form, p. 3 (undated mimeo. bulletin).

take movies of the defendant? To do so and do it well is expensive, but conceding the importance of the drunk-driving offense in the traffic safety program, many communities believe that the expense is justified.

The ideal would be an unobstrusive camera capable of recording everything it sees that is trained upon the defendant during the entire time he is being questioned and tested. However, the need for bright lights, at least with color film, and the expense of taking extremely long segments⁴² leads in most instances to a different procedure.

A North Carolina municipality, after studying the problem, installed a camera in a special room to which the defendant is taken and requested to participate in the performance tests listed on the Alcoholic Influence Report Form. In a preamble in the presence of the defendant, the officer recites the name of the defendant, the date, the time, the charge, a statement of the defendant's rights, and the fact that a sound motion picture is being made. The defendant is then asked to perform the tests. If he refuses, the officer allows the conversation concerning the refusal to continue so that the camera can record the speech and actions of the defendant in this situation. If the defendant agrees to take the tests, the entire sequence is photographed. Until the end of the sequence, the camera is trained to take a full-length photograph of the defendant, but at the very end the zoom lens comes in for full-screen close-up of the defendant's face, in color.⁴³

A city in California, after investigating the use of motion pictures, decided that the expense was too great for the results produced and installed a sound tape recorder in the room to which the defen-

⁴² Too long a "movie" might also bore the jury. More importantly, the longer the film segment the more chance there is that material inadmissible in evidence will creep in.

⁴³ It would have been cheaper to have bought two separate lenses, but this would have required stopping the camera at the time of the change. It was decided that for court purposes the film should be an unbroken and unedited segment. On the same basis the camera uses sound equipment which photographically records an indelible sound track on the edge of the film. A synchronized tape recorder would have been much less expensive, but it too was not tamper-proof.

The suggestion has been made that a department considering so elaborate a program as that described above ought to investigate the possibility of a television camera coupled with a videotape recorder. There would be no film-processing costs, and after a case was final the tape could be reused. Whether it would be possible to get good quality color television within the price range in question, however, I do not know.

dant is taken and requested to submit to a chemical test of his breath. Apparently a recording of the slurred speech and disjointed thought patterns of many defendants is very effective—and the local courts have admitted the recordings even when the defendant has refused to take the breath test. He is asked to give his reasons for refusing and is allowed to talk.⁴⁴

For the immediate future, use of sound and visual recordings to show the actual condition of the defendant promises to be of great assistance in both convicting the guilty and protecting the innocent. Some may feel the camera to be yet another "Big-Brother" intrusion upon privacy, but under the circumstances here described, the defendant is not in private but in public custody upon probable cause that he committed a crime, and he is explicitly warned that he is being photographed. If it is constitutional for a witness to describe a defendant's condition,⁴⁵ why should a mechanical witness not be permitted to render an absolutely faithful description?⁴⁶ It is noteworthy that in the wake of *Escobedo v. Illinois*⁴⁷ there were several proposals for placing cameras or tape recorders in interrogation rooms as a means of *protecting* the defendant's rights.⁴⁸

One question for the future needs to be raised, however. Continuing research places more and more stress upon the culpability of those who drive with more than .06 to .08 per cent alcohol in their blood. At the lowest of these levels, many defendants who may be "under the influence" will surely not exhibit any gross symptoms of intoxication for the camera. If use of the camera were to become customary by the time the law is modified to cover the lower levels of

⁴⁴ Kneller, *Examining the Drinking Driver*, Traffic Dig. & Rev., June 1964, p. 28. Compare ERWIN § 9.04.

⁴⁵ If the courts were to rule out some of the investigatory procedures now employed, such as cajoling or pressuring a defendant into undertaking the performance tests or giving them out of the presence of defendant's lawyer, then both oral testimonial and mechanical evidence of the defendant's activity would be excluded.

⁴⁶ This presumes that a proper foundation has been laid for the film and that it in fact objectively portrays the events that took place.

⁴⁷ 378 U.S. 478 (1964).

⁴⁸ See, e.g., ALI MODEL CODE OF PRE-ARRAIGNMENT PROCEDURE § 4.09 (Tent. Draft No. 1, 1966) (sound recordings); Kamisar, *Equal Justice in the Gatehouses and Mansions of American Criminal Procedure: From Powell to Gideon, from Escobedo to . . .*, in CRIMINAL JUSTICE IN OUR TIME 1, 86-87 (1965). The purpose for advocating these film and sound recordings, though, was to guard against possible police abuse in private interrogations. The advocates apparently thought they would at most be shown to judges ruling on admissibility of confessions—not to juries as evidence to be used against the defendant.

intoxication, would it not perhaps cause acquittals of the actually guilty defendants with lower blood-alcohol levels? The answer probably is yes, for a while, but by the time the police have become reliably skilled in apprehending the lower-level defendants, juries will have become more sophisticated.⁴⁹

II. CHEMICAL TESTS FOR INTOXICATION

Because of the numerous difficulties in making an accurate determination of the degree of intoxication through observation of clinical symptoms, the use of chemical analyses of body fluids has been urged for several decades as a more reliable and objective method of determination. Because the pioneering research by Widmark⁵⁰ and others was stated in terms of amount of alcohol in the blood, these terms are still the method of expression almost exclusively used. Even when other body fluids than blood are tested, the results are usually converted to the equivalent blood-alcohol percentage.

Since the alcohol level in the brain of a live subject cannot be tested without injuring him, blood probably is the best indicator. The problem, however, is what blood?

While the obvious and ideal answer is arterial blood on its way to the brain, this is very difficult blood to get. Early experiments indicated that there was very little difference between the alcohol levels in samples of blood taken from different parts of the body.⁵¹ This seemed logical. Alcohol is highly volatile and disperses itself swiftly in water, and the water-based blood courses rapidly back and forth through the body. However, with the development of

⁴⁹ Compare ERWIN § 9.02[1]:

[T]he use of motion pictures has been abandoned by some police departments after a period of trial and experimentation.

The experience of one sheriff's office in a large county in California was that young and inexperienced drinkers would show . . . obvious signs of intoxication. . . . However, it was found that the experienced, or one might say the hard drinker, once he knew that the pictures were being taken, has the ability to pull himself together and to conduct himself in a manner that does not disclose his true condition even though he may be extremely intoxicated. . . .

⁵⁰ E.M.P. Widmark of Sweden published in 1922 a description of a micromethod for blood-alcohol determination that is still widely used. His interests in alcohol in the human body were fundamental, and he established the basic formulas used today for calculating rates of absorption, distribution, and metabolism of alcohol in the body.

⁵¹ Harger, *Blood Source and Alcohol Level; Errors from Using Venous Blood During Active Absorption*, in THIRD CONFERENCE 212.

more recent techniques such as arterial taps and the ability to make accurate analyses of microsamples of blood (thus allowing utilization of capillary blood from fingertip and ear lobe), studies have begun to indicate that during the absorption stage⁵² there are somewhat larger differentials in blood-alcohol level with samples taken from different parts of the body than had been expected. The differentials are not extremely great, but there are reports that venous blood at the extremities may often give readings shortly after drinking as much as .03 percentage points below that of arterial blood.⁵³ This figure acquires significance from the fact that blood for routine

⁵² After equilibrium is reached, the blood reaches practically the same alcohol level throughout the body.

⁵³ That is, arterial blood would contain, for example, .08% alcohol while venous blood would contain only .05%.

For those expecting to delve into the technical literature concerning chemical testing, a note is in order concerning methods of expressing the amount of alcohol that is in the blood. The text of this article and most American statutes speak of "percentage" of alcohol in the blood, although this may mislead persons not familiar with laboratory terminology.

A laboratory practice widely followed in this country and elsewhere for expressing solution strengths when small quantities of a liquid or a solid are dissolved in a relatively large amount of a liquid is to express the solution strength on a weight/volume basis. The reason for this is that measurement by weighing is the only accurate way to quantify extremely small amounts of a substance. Expensive analytical balances in laboratories, kept free of dust in glass cases, are capable of precisely determining weight even down to the fraction of a milligram. For the liquid, however, the most convenient method of measurement is volumetric.

The most straightforward method of expressing solution strength is to put it simply in terms of the number of milligrams of the substance per milliliter of solution—or, if more convenient, per 100 milliliters of solution. (The metric system is almost universally used in the laboratory.) Expressing solution strengths repeatedly in such fashion as "mg./ml." or "mg./100 ml." becomes a little cumbersome and several shorthand expressions have been developed.

One of these is directly based upon the fact that 100 milliliters of solution was the quantity often tested in laboratories before they developed more refined techniques for testing smaller quantities of liquids. The expression "milligram per cent" (mg.%) became common to express the number of milligrams per 100 milliliters. ("Per cent" literally means "per 100.") Thus 80 mg./100 ml. is exactly the same as 80 mg.%.

Another shorthand expression that developed is the use of a conventional weight/volume percentage figure in which the specific gravity both of the weighed substance and the solvent would be disregarded. In establishing this one-to-one hundred relationship, the metric system's point of conversion from weight to volume has been utilized. In the metric system one cubic centimeter (one milliliter, for all practical purposes) of water has a mass of one gram. Thus one gram of substance per 100 milliliters of solution would represent one weight part in enough solvent to make a volume of 100, which would be a 1% solution. On this basis a solution of the strength 80 mg./100 ml. would be an .08% solution.

The reason the above is in terms of "solution" instead of weight of

tests in the United States is most frequently taken from the cubital vein (at the elbow).⁵⁴

A. Direct Chemical Analysis of Blood

The direct chemical analysis of blood is still the method most favored on the part of conservative researchers for determining blood-alcohol concentration. There is some accumulation of evidence, to be discussed below, of occasional unexplained variations between blood and breath tests too large for comfort below the .10

alcohol in volume of blood is to point up that these conventional expressions developed in laboratory practice generally and are used with respect to various types of tests. And as the early blood-alcohol tests were reported by laboratories using these methods of expression, the early literature in this country concerning blood tests for alcohol also used the terminology. The Europeans add one more expression: the pro mille. The simply means parts per thousand (‰) and is used in the same fashion as the per cent or parts per hundred (%). In pure mathematical situations, the pro-mille concept is used to refer to parts per thousand parts, with all parts being identical. The same is true, of course, of the percentage concept. But in laboratories where solution strengths are being expressed, the pro mille, just as the per cent, is used to express weight/volume relationships—again with a disregard of specific gravity.

Perhaps the best method of comparing the different expressions of quantification is to assume that blood has been tested and there is found in it 180 milligrams of alcohol (weight) per 100 milliliters of blood (volume). This amount of alcohol in the blood might be expressed in any of the following ways:

180 mg./100 ml.	1.80‰
180 mg.%	.18%
1.8 mg./ml.	

As the pioneering blood-alcohol laboratory reports and studies used the weight/volume quantification, it inevitably happened that the blood-alcohol "percentage" figures seized upon by the nonexpert lawyers, legislators, and traffic safety enthusiasts were in fact the weight/volume percentage figures. All the widely-used testing instruments that report in terms of "percentage" or "percentage by weight" of alcohol in the blood actually utilize the weight/volume percentage quantification. It can be safely assumed in the entire field of chemical testing that, unless the contrary is indicated, all blood-alcohol percentage figures express weight/volume relationships.

⁵⁴One North Carolina city running blood-correlation tests to compare with the readings of its new Breathalyzer ran into trouble on this score and got higher breath readings than venous-blood readings. A repeat of the experiment was necessary—with a two-hour waiting period after drinking to insure that equilibrium had been reached. This time the expected results were obtained; the Breathalyzer readings tended to be low by a small amount.

Several persons in the field of chemical testing have claimed that Swedish ignorance of the venous-blood lag changed the course of chemical testing in Europe. The Swedes, who were the pioneers in chemical testing, became convinced in 1932 that breath tests were unreliable and thus implemented programs, copied throughout Europe, that utilized only blood and urine as samples.

per cent blood-alcohol level. Although the accuracy of some of the prior research in which venous blood was used during the absorption period has been impeached, the vast majority of the careful research in the field is nevertheless tied to direct tests of blood.

Since capillary blood at the fingertip rather closely approximates arterial blood even during absorption, the development of micro-methods of testing blood makes use of this blood feasible.⁵⁵ Also, withdrawal of a drop of blood from the fingertip or the ear is far less traumatic than intravenous withdrawal of a large sample of blood.

The main objection to blood testing in the United States in the past has been the very poor accuracy record achieved in routine laboratory tests.⁵⁶ Almost certainly the blood testing reported out of state toxicology laboratories and out of police laboratories attached to state police agencies and large city departments has been a great deal more reliable than the testing reported from the average commercial or hospital laboratory. A current shift to the use of auto-analyzers,⁵⁷ gas chromatography in analyzing blood,⁵⁸ and

⁵⁵ In Sweden, capillary blood from the ear lobe is split into six samples. One sample is reserved in case doubts arise during the testing. The other five samples are distributed to five different technicians; three of these analyze their samples by one method while the other two use another. The standard deviation of the five readings is calculated, and three times the standard deviation is subtracted from the average figure. In practice this means subtracting about .015% blood-alcohol level. This "net" figure is given the court along with the original figures. See INDIANA UNIVERSITY, SYMPOSIUM ON ALCOHOL AND ROAD TRAFFIC, PROCEEDINGS 120-21 (1959).

⁵⁶ Because regulation of laboratories has traditionally been a state rather than a federal matter, the quality of the state regulation, if any, has varied considerably throughout the country. In any event, it is unlikely that laboratories in this country would go to the extremes in insuring fairness to the defendant that apparently has been built into the procedural routines of government-operated laboratories in Sweden.

The quality of laboratory services generally available in this country has been shocking. Dr. R. N. Harger, the inventor of the Drunkometer, may be considered a biased witness, but he forcefully asserts:

Now, I have repeatedly stated in court that in my opinion, with a properly trained police technician, these methods of breath analysis are so simple that a mistake is almost inexcusable, and I have further said that in my opinion I would sooner rely on the results of a police technician whom we have carefully trained in our school, than I would on a whole lot of girl laboratory technicians in hospitals.

Comment quoted in *THIRD CONFERENCE* 219.

⁵⁷ These expensive analyzers can justify their costs in busy laboratories through their capacity to turn out far more tests in an hour than a person can.

⁵⁸ Gas chromatography analysis has the virtue of testing specifically for the suspected substance; its reading will not be affected by the presence of something else with similar properties. It is quite a versatile instrument with many capabilities other than in the field of alcohol testing. With the

colorimeters in comparing samples of a reagent offers prospects for improved accuracy.

State toxicology departments and even the larger police agencies with many other uses for their laboratories will undoubtedly continue making direct analyses of blood to determine alcoholic concentration. The question is whether an agency with no elaborate laboratory and with no significant expected need for a laboratory other than to test for intoxication should invest in a blood-testing program. The answer being reached by most police departments now is "no." Talking with those in the field indicates that the increase of breath testing is far outstripping blood testing.⁵⁹ Two factors may affect the future: (1) possible superior suitability of blood to determine the presence of drugs that impair driver behavior,⁶⁰ and (2) possible substantiation of the claim that breath tests are not consistently reliable at blood-alcohol levels under .10 per cent, and a change in the laws of enforcement practices so that there are a significant number of prosecutions at levels lower than this figure.⁶¹

B. Chemical Analysis of Urine

When samples are taken under laboratory conditions, chemical analyses of urine can provide quite a reliable indication of the corre-

growing use of drugs that affect driving, development of this instrument in a form suitable to cover this field may be essential.

There are gas chromatographs that can test samples of breath as well as blood and urine. The cost of gas chromatography, however, may restrict its use for the present to laboratories that can utilize its particular virtues of specificity and wide versatility.

⁵⁹ Cf. Smith, *Medical Difficulties in Blood Withdrawal Under Implied Consent Legislation*, *The Police Chief*, Nov. 1965, p. 10, 12:

Despite the fact that everyone has many times had a needle inserted in his arm for medical purposes, the simple act of blood withdrawal is considered by most legislatures as akin to a prefrontal lobotomy. . . .

It does appear that it would be wiser for all [implied consent] states to eliminate the blood test and go to the equally effective but easier administered breath test. . . .

A check of the appellate cases collected in DONIGAN, however, will show that the blood-test cases are still outnumbering the breath-test cases. This probably indicates that a number of jurisdictions which established procedures for testing blood are still using them. The statement in the text concerns those agencies or jurisdictions just embarking on a testing program.

⁶⁰ Urine, and perhaps saliva, may also be suitable samples for determining presence of drugs, but it seems doubtful that the moisture in breath would give a sufficient sample to allow testing for a nonvolatile drug in a person's system.

⁶¹ See comment as to Finnish prosecutions in note 40 *supra*.

sponding blood-alcohol level.⁶² As with direct analysis of blood, a laboratory must be maintained to make analyses of urine samples.

I have the impression that, just as with blood tests, jurisdictions that have established programs to test urine for alcohol content are continuing them, but most of the new programs utilize breath testing devices. Nevertheless, there are some drawbacks to the use of urine in enforcement work that do not apply to blood.

Squeamishness that exists with regard to collecting the urine sample is counterbalanced by the equal feeling that many have about drawing blood with a needle, but the fact that blood obtained from a much less terrifying finger prick may now be used for analysis increases the advantage of blood testing as a determinant technique.

A basic objection to urine tests comes from the possible inaccuracy that results when the defendant giving the sample has not voided his urine for several hours. The urine collected in his bladder will represent an average of the levels of alcohol within his body since the last voiding.⁶³ This may fortuitously give a reading closer to the alcohol level at the time of the driving offense than a precise analysis showing the level at the time of the test, but it is also possible for the reading to be misleadingly high. To determine with urine the equivalent blood-alcohol level at the time immediately preceding the test, the person being tested must first void his bladder and then after a shortest possible lapsed time produce the urine sample to be tested.

⁶² In the literature I have noted, there seems to be some variation in stating the relationship between percentages of alcohol in blood and in urine. ERWIN § 22.01[2], at 571 cites a British Medical Association recommended factor of 1.33:1. Urine contains about 1.30 times as much alcohol as venous blood, however, according to Friedemann & Dubowski, *Chemical Testing Procedures for the Determination of Ethyl Alcohol*, in A.M.A. MANUAL 20, 24. But see Dubowski, *Alcohol Determination—Some Physiological and Metabolic Considerations*, ALCOHOL AND TRAFFIC SAFETY 91, 98 (Fox & Fox ed. 1963): "[T]he urine/blood alcohol ratio of about 1.25 holds strictly only for ureteral urine at the time of its excretion, or for short-term collection with an initially empty bladder."

⁶³ If an extremely long time elapses without voiding and during that time the blood-alcohol level substantially decreases or reaches zero, the urine-alcohol level will remain high for a good while. Although there is some dispute over the issue, there apparently will be an eventual reabsorption of the alcohol in the urine through the wall of the bladder to bring the urine-alcohol level to zero or to equilibrium with the rest of the body. Herman Heise states that reabsorption follows a logarithmic curve and that this process occurs at a fast rate when there is a high disparity in concentration levels. If true, this phenomenon would somewhat minimize the danger that a urinalysis would give a grossly higher reading than a test of blood or breath. See INDIANA UNIVERSITY, SYMPOSIUM ON ALCOHOL AND ROAD TRAFFIC, PROCEEDINGS 22-23 (1959).

A procedure might work smoothly in which the defendant voids upon first reaching the police station; after the time spent in interviewing him in connection with the Alcoholic Influence Report Form and other required procedures, the defendant might be able to produce a specimen. Taking a urine sample in this manner will require cooperation from the defendant, but probably much the same level of cooperation is also needed in administering the average breath test.

Urine and blood appear to be far more satisfactory materials than breath for analysis to determine possible drug impairment. The evidence is clear that more and more persons will be driving while under the influence of drugs. Although there are a number of research projects devoted to detecting impairment (and detecting the presence of the drug itself),⁶⁴ the technical problems are immense.⁶⁵ It is not yet clear whether chemical analysis to detect drugs will become feasible or whether tests will be primarily used as a negative check on the presence of alcohol and other perhaps easily identifiable compounds.

C. Chemical Analyses of the Breath

Although my views are undoubtedly shaped by my experience in a state whose legislature enacted a chemical test law geared to breath tests only,⁶⁶ I confess that in *police-administered* tests I favor testing the breath over blood and urine⁶⁷ in order to determine alcoholic influence, principally because I believe that in the United States today breath tests are both more precise and more accurate⁶⁸ in indi-

⁶⁴ See *Traffic Safety Research Projects*, 9 TRAFFIC SAFETY RESEARCH REV. 108, 116-18 (1965).

⁶⁵ There are so many types of drugs and their interactions with each other and with alcohol are so unpredictable that it may take the computer as well as the auto-analyzer and the gas chromatograph to make any headway in meeting the problems of drug impairment. As it has taken fifty years for us to reach our present level of knowledge with respect to alcohol, the prospect of obtaining a useful background of information on drugs in the reasonable future is discouraging. Substance of statements made during a presentation by Dr. H. Ward Smith on "Pharmacology of Alcohol and Alcohol-Drug Combinations" at the Fourth International Conference on Alcohol and Traffic Safety, Indiana University, Dec. 1965.

⁶⁶ N.C. GEN. STAT. §§ 20-16.2, -139.1 (1965).

⁶⁷ Tests of saliva, spinal fluid, or other body fluids to determine the amount of alcohol in the body have little practical enforcement importance.

⁶⁸ The distinction between "precision" and "accuracy" is more than a semantic quibble, and I am indebted to Dr. Borkenstein for calling my attention to the difference. An instrument that always registers exactly the same percentage of error is precise but not necessarily accurate. The differ-

cating blood-alcohol level than most blood and urine tests performed on criminal defendants.

1. *Underlying Principles*—Breath tests are based on an application of Henry's Law, which states that when a volatile substance is dissolved in a liquid a predictable amount of the volatile substance will escape into still air which is in intimate contact with the liquid. Provided that temperature and pressure remain constant, and within a certain range of solution strengths, the greater the strength of the solution, the greater the concentration of the volatile substance in the enclosed atmosphere as a matter of direct proportion. A series of experiments tended to prove that Henry's Law held true with regard to volatile alcohol in blood reaching the lungs and the undisturbed air in the lower, or alveolar,⁶⁹ portion of the lungs.⁷⁰ Thus, through the use of the formula, once the partition ratio of alcohol in blood at the pressure and fixed temperature that more or less constantly exist in the lung area has been established, the amount of alcohol in the blood can be predicted by measuring its concentration in alveolar air, and vice versa. Early studies indicated that the blood-breath partition ratio using alveolar breath is in the neighborhood of 2,000:1, and this has been confirmed by later careful research that indicates a ratio of approximately 2,100:1.⁷¹ This means

ence between the two terms is especially relevant to breath-testing devices. One may measure the alcohol in a breath sample with great precision to the thousandths of a per cent, and yet its final result—given in terms of blood-alcohol level—could lack accuracy if there were any problem as to the breath sample (e.g., alveolar air or not, error in computing equivalent volume of breath when there has been a temperature change, or condensation of breath moisture) or any inaccuracy in the blood-breath ratio used (either in general, or in the special case).

⁶⁹ The alveoli are the air cells in the lungs. These cells are so thin that alcohol in the blood reaching them can easily penetrate the cells and escape into the air of the lungs.

⁷⁰ There are published studies concerning excretion of alcohol through the lungs as early as 1854 and 1887, but the true pioneering research was done in the late 1920's and early 1930's. The data usually accepted today are published in Harger, Forney & Barnes, *Estimation of Level of Blood Alcohol from Analysis of Breath*, 36 J. LABORATORY AND CLINICAL MEDICINE 306 (1950); Harger, Raney, Bridwell & Kitchel, *The Partition Ratio of Alcohol Between Air and Water, Urine and Blood; Estimation and Identification of Alcohol in These Liquids from Analysis of Air Equilibrated with Them*, 183 J. BIOLOGICAL CHEMISTRY 197 (1950). See also a critique calling for additional research. Dubowski, *Unsettled Issues and Practices in Chemical Testing for Alcohol*, in THIRD CONFERENCE 203, 204-07.

⁷¹ Although early research published in 1927 and 1930 indicated a 2,000:1 ratio, H. W. Haggard and Leon D. Greenberg reported a ratio of 1,150:1 in 1934 and a ratio of 1,300:1 in 1941. Glenn C. Forrester adopted the 2,100:1 ratio for the Intoximeter in 1941, however, and R. N. Harger's elaborate

that one volume of arterial blood will contain 2,100 times as much alcohol as an equal volume of alveolar breath (at mouth exit temperature). Or, one milliliter of blood will contain the same amount of alcohol as 2,100 milliliters of breath.

When an entire exhalation of breath is measured rather than just the portion containing alveolar breath, the partition ratio increases to about 3,200:1.⁷² This ratio for a full ordinary exhalation (mixed-expired air) is less precise than the one pertaining to alveolar air, however, for body structures of individuals vary. Thus some persons will have slightly different proportions of corridor and tidal⁷³ air in their exhalations from the average.

2. *Various Types of Breath-Testing Instruments*—In the following pages I will discuss various types of breath-testing instruments that are in enforcement use in the United States.

research published in 1950 established the 2,100:1 ratio. Because of the conflict over the ratio, the National Safety Council established a subcommittee in 1949 to study the question; in 1952 it reported the ratio was "approximately" 2,100:1. The subcommittee's report was approved and signed by the inventors of the three breath-testing instruments then in current use in the United States—Greenberg, Forrester, and Harger.

ERWIN § 16.02, at 361-64 suggests that the National Safety Council may have pressured Greenberg to back down from a correct position and that the blood-breath ratio is subject to wide and unpredictable variations. Greenberg, however, has informally admitted the likelihood of laboratory error in the disparate 1934 and 1941 experiments. The ratio is easily influenced by very slight changes in pressure and temperature; also, there is a possibility of error depending on the source of the blood. It seems fairly plain that the ratio for most people is about 2,100:1; numerous blood-breath correlation tests with sensitive instruments based on the ratio have proved the point. Nevertheless, there are occasional readings on breath instruments that vary unaccountably from the blood reading, under circumstances that suggest either a poor breath sample or a variation in the blood-breath ratio. One theory offered, however, is that *all* chemical-reaction tests are subject to occasional aberrant results that simply cannot be explained, and that breath tests are no more inherently inaccurate than blood tests. Fortunately, the breath readings that vary significantly from the blood usually tend to be low.

I have been developing a hunch as to the reason for occasional poor correlations, based on the slight fluctuations of the alcohol level within an individual. One experiment with blood and breath samples taken every five minutes showed that capillary blood and breath were subject to similar ups and downs—but out of time phase with each other. I believe that many of the apparent noncorrelations are caused by either an overlapping or wide divergence of fluctuating blood- and breath-alcohol curves.

⁷² Friedemann & Dubowski, *Chemical Testing Procedures for the Determination of Ethyl Alcohol*, in A.M.A. MANUAL 20, 31.

⁷³ Corridor air is that in the passages to the lungs. Tidal air is that air in the upper part of the lungs that is inhaled and exhaled in the course of normal breathing—leaving the deep-lung air in continuing contact with the blood at the alveoli relatively undisturbed. ERWIN § 16.02[2][a], at 360

(a) *The Drunkometer*—The Drunkometer⁷⁴ is the oldest of the breath instruments in use in this country. Essentially it is a portable laboratory for making a breath analysis.⁷⁵

states, without citing authority, that "experiments have shown that some persons blowing into a balloon will fill it with air containing about 60 per cent alveolar air, while others may fill it with air containing almost 100 per cent alveolar air."

⁷⁴ Developed by Dr. R. N. Harger and associates and placed in commercial distribution in 1938. It is distributed by the Stephenson Corporation, Red Bank, N.J.

⁷⁵ The person to be tested blows up a balloon of a volume large enough to make sure that mixed-expired air is obtained. The subject is asked to blow up the balloon with one breath if possible. The balloon is then attached to the instrument. Upon partial release of a pinch clamp on a piece of rubber tubing within the instrument, the balloon deflates slowly and forces the alcohol-laden breath through the instrument. The breath first is bubbled through a reagent containing sulfuric acid and potassium permanganate. The acid has the effect of removing all the alcohol vapor from the breath bubbling through the reagent. The potassium permanganate in the reagent reacts with the alcohol and is of such concentration that it will reach the end point of its reaction exactly when .169 milligrams of alcohol has been bubbled through. Shortly before the end point is reached, the reagent begins to lose its purple color. The operator must close the pinch clamp, wait ten seconds, and then let a small spurt of air bubble through the reagent. He repeats the waiting-spurting process until the color change is complete. The entire process should take about two minutes. There is no further color change after the end point, and allowing more breath to pass through the reagent after this would result in a falsely low reading. So that the operator can judge when the color change is complete, the ampoule containing the reagent is flanked by two comparison ampoules. One is slightly pinkish yellow and approximates the color of the acid reagent with just a bare amount of the purple potassium permanganate left. The other ampoule is of a slightly deeper yellow hue than the reagent will be at the end point. When the color of the reagent is between the color of the two comparison ampoules, the operator knows the end point has been reached.

The top of the reagent ampoule is stoppered, and a rubber tube in the stopper carries off the breath that has been bubbled through the reagent. This breath is first passed through a drying agent to remove any remaining moisture in it and next passed through a tube (which is detachable from the instrument and must have been carefully weighed in advance of the test) containing crystals of Ascarite, a sodium hydroxide asbestos absorbent that will absorb all the carbon dioxide in the breath passing through it. Weighing this tube after the test on a expensive and sensitive analytical balance will allow the operator to know with precision the weight of carbon dioxide in the breath sample used to reach the end point. On the basis of the conventionally accepted figure that alveolar breath contains 5.5 per cent carbon dioxide by volume, it can be calculated from the known weight of carbon dioxide that 2,100 milliliters of alveolar air will contain 190 milligrams of carbon dioxide. Thus, for mathematical simplicity, assume that the carbon dioxide collected in the Ascarite tube weighed 19 milligrams; this means that 210 milliliters of *alveolar* air bubbled through the reagent, as 210 is one tenth of 2,100 (just as 19 is one tenth of 190). The 210 milliliters of breath will contain the same amount of alcohol as .1 milliliter of arterial blood entering the lungs. Since the end point was reached when .169 milligrams of alcohol had been bubbled through the reagent, we know that the

When the standard Drunkometer test is administered by a careful operator to a normally healthy person under usual conditions, it will give a blood-alcohol reading as precise and accurate as that of any other breath instrument in general use today. It has the further virtue of yielding two simultaneous readings than can be compared as a check upon possible error. Nevertheless, it has two important

210 milliliters of alveolar breath contained .169 milligrams of alcohol. As this is the amount of alcohol in .1 milliliter of blood, we know that one milliliter of the subject's blood contains 1.69 milligrams of alcohol. Expressing this in terms of the weight-volume percentage most commonly used in this country to express blood-alcohol level, the subject is reported as having .169% alcohol in his blood.

Using these same ratios, the number of milligrams of alcohol per milliliter of blood (x) can be determined for any other weight of carbon dioxide by use of the formula:

$$\frac{.169 \text{ mg. of alcohol}}{\text{wt. of carbon dioxide}} = \frac{x}{190 \text{ mg. carbon dioxide}}$$

The operator, however, need not work this formula himself, for he is furnished a table giving the corresponding percentages of blood alcohol for each tenth of a milligram of carbon dioxide weight all the way from 6.0 milligrams (.535% blood alcohol) to 60.0 milligrams (.054% blood alcohol). (Note that the greater the amount of air used in the test, the lower the alcohol concentration.)

As a double check on the results obtained through weighing the carbon dioxide, the breath that went through the ascarite tube is passed through a gasometer also before finally being dispersed into the outer air. On the basis of the total volume of the breath that was passed through the reagent to achieve the end point, the ratio of 3,200:1 for mixed-expired air is applied and a reading is calculated. If there is a wide divergence between the two readings, it is an indication that the operator should check for possible error.

The gasometer is an ingenious two-part device based on a reversal of the hourglass principle. The gasometer has in it a measured amount of water that can all be held in one of the two halves. The water is drawn into the bottom half by a suction bulb and the gasometer inverted so that all the water is contained in the half that becomes the top half. The breath-carrying tubing from the instrument is fitted over the nipple top on the gasometer. As the breath is fed into the top half it displaces the water down into the lower half. The volume of the breath metered in is identical with the volume of the water displaced. This volume can be read directly from calibration markings etched into the glass walls of the gasometer. Each half of the gasometer will hold a volume of 360 milliliters of water—and this many milliliters of breath used indicates a level of .15% blood alcohol. If the blood-alcohol level is lower than this figure, it will take more than 360 milliliters of mixed-expired breath to reach the end point. Thus, when the last drop of water is displaced from the top into the bottom half of the gasometer, the operator must shut off the flow of breath with the pinch clamp, invert the gasometer, and resume the flow of breath. He must, however, note each inversion required and add 360 to the number of milliliters showing on the gasometer when the end point is reached for each inversion necessary. Otherwise, a most erroneously high reading would result. The gasometer scale has a double calibration on it, and the blood-alcohol percentage level can be read directly if it is *above* .15% (so

drawbacks: (1) dependence upon the percentage of carbon dioxide in alveolar breath in order to determine the quantity of such breath utilized in a test; and (2) a type of design that requires a higher level of operator care and competence to produce reliable results than most of the other breath instruments.

As there is no direct measurement of the alveolar air used in the test (mixed-expired air being caught and passed through the reagent), the quantity of alveolar breath involved is computed indirectly. The computation is based on a long accepted statement of the percentage by volume of carbon dioxide in alveolar breath, but the figure quoted as standard—5.5 per cent—is being recognized now as more an average than a constant factor. There will be small variations from person to person, the male average different from the female average, and there can be quite significant variations when the subject is suffering certain illnesses or has undergone recent physical exertion. The Drunkometer thus came under blistering attack from Richard E. Erwin.⁷⁶ Oddly enough, the Erwin attack led at least one jurisdiction in which Drunkometers were being used to place sole reliance upon the gasometer,⁷⁷ an auxiliary part of the Drunkometer that measures the volume of mixed-expired air used in the test, even though the 3,200:1 ratio for mixed-expired air is conceded to be less accurate than the 2,100.1 blood-alveolar air ratio.⁷⁸

When the doubts arose about the constant validity of the carbon dioxide figure, the resourceful inventor of the Drunkometer came out with a modification of the instrument which is today available but not widely popular.⁷⁹

that the gasometer does not have to be inverted). If there were one or more inversions, indicating more breath needed to reach the end point and thus a lower reading than .15%, a table is provided setting out the corresponding blood-alcohol levels at ten-milliliter intervals from 100 milliliters (.541% blood alcohol) to 1,000 milliliters (.054% blood alcohol) and at 25-milliliter intervals from 1,000 milliliters to 2,000 milliliters (.027% blood alcohol).

⁷⁶ ERWIN §§ 16.03, 18.03[3].

⁷⁷ The Drunkometer has always had a valve to allow a bypassing of the Ascarite tube and a direct (and quick) measurement of the volume of air needed to reach to end point of reaction.

⁷⁸ See *State v. Johnson*, 42 N.J. 146, 199 A.2d 809 (1964). Because New Jersey's presumptive level is set at the .15% blood-alcohol level, however, it is unlikely that use of the gasometer reading as the only test will unfairly convict any defendants actually innocent of the charge of driving under the influence of intoxicating liquor.

⁷⁹ In place of the disposable balloon, there is a flexible bag (with dis-

While this modified Drunkometer is not surpassed in accuracy by any other instrument in enforcement use, it still has the other major drawback of the standard Drunkometer. It takes a fairly high level of operator sophistication to maintain the instrument, produce consistently accurate results, and explain the basis of the instrument in court.⁸⁰ In numerous jurisdictions law enforcement officers have been performing quite well with the Drunkometer, but in others where there has been a relaxation of supervision the procedures have not always been ideal. Moreover, the number and complexity of the operating and maintenance procedure in which operator error could effect the test results invites stiff challenge in the courts.⁸¹

(b) *The Alcometer.* The Alcometer⁸² is the first automated breath-testing instrument to be used in the United States. A brilliantly conceived successor to the Drunkometer in instrumentation, based on direct collection of alveolar breath, the early models have now largely disappeared from use. In contrast to the Drunkometer, many of its steps are performed automatically, and it is powered by an electric pump. It influenced the design of later instruments, but in

posable mouthpiece) within a flannel pillowcase-type covering containing electric heating coils. The subject is asked to breathe into and out of the bag four times. This rebreathing process has the effect getting the corridor and tidal air also in contact with the alveoli and all the air in the bag becomes the equivalent of alveolar air after the fourth exhalation. The heating coils keep the breath warm enough so that none of the moisture in the breath will condense in the bag and cause low readings or prejudice the bag's being reused. (The standard Drunkometer model uses the disposable balloon and eliminates this consideration. The instructions, however, do caution that breath should not stay in the balloon longer than five minutes. There is danger of condensation and low readings after this time.)

The heated rebreathed air is passed through the reagent and the amount of air necessary to reach the end point of the reaction is measured in the gasometer. Using a 2,100:1 conversion ratio for this perfect equivalent of alveolar air, the blood-alcohol level can be very accurately determined.

⁸⁰ One illustration: The acid base for the reagent comes in a sealed ampoule, but the potassium permanganate must be added just prior to the beginning of the test. The operator must use a pipette and measure into the ampoule exactly one milliliter of potassium permanganate. And this chemical must be stored out of the light and be checked periodically to make certain that it is of proper strength.

⁸¹ Stiff court challenges that must be routinely met actually have a desirable effect on the level of operator care and skill. Nevertheless, the North Carolina State Board of Health did not approve either the standard or the improved model of the Drunkometer for use in the state.

⁸² Developed by Professor Leon A. Greenberg and Dr. F. A. Keator under the original name Alcoholometer and first sold in 1941. It is distributed by Keyes Scientific Corporation, Cambridge, Mass.

field enforcement use it proved overly sensitive. It has been accused of giving falsely high readings on a number of occasions because of the sensitivity of the reagent used in the test to other chemicals than ethyl alcohol.⁸³

The manufacturer of the Alcometer has announced a new model, the MK V. The new model features a host of improvements over the old models,⁸⁴ but in essential principle the new model is the same as the old ones.⁸⁵ The manufacturer has indicated that the instrument's reputation was hurt because the indicator solution formerly used occasionally would not change color even when the instrument was testing strong concentrations of alcohol.⁸⁶ A silicone coating process for the glass vials containing the indicator solution has been developed, and this is claimed to have eliminated completely the failure problem.⁸⁷

(c) *The Portable Intoximeter*. The Intoximeter⁸⁸ (now called the Portable Intoximeter) appeared about the same time as the

⁸³ ERWIN §§ 19.03[1], .06.

⁸⁴ In addition to a number of mechanical modifications, the instrument also has an optionally available attachment, the KR Recorder, that will automatically "print out" the blood-alcohol reading obtained.

⁸⁵ A description of the Alcometer analysis written with respect to the older models still remains accurate for the new. See A.M.A. MANUAL 45:

The analysis consists of four principal phases: (1) purging of the sample chamber and chemical train with purified room air; (2) collection of a measured volume of alveolar air; (3) pumping of the breath sample through the hot iodine pentoxide reagent bed and flushing of any liberated proportionate quantity of iodine vapor into the 0.1 per cent starch indicator solution; and (4) measurement of the resulting blue color of the indicator solution with an integral photo-electric colorimeter, on which a reading, proportionate to the alcohol concentration of the breath sample, is obtained on a microammeter scale, calibrated directly in blood alcohol concentration.

⁸⁶ Letter from Earl J. Spears, Vice-President, Keyes Scientific Corporation, to William L. Spitler, June 9, 1966.

⁸⁷ *Ibid.* It may be that the occasional failures of the indicator solution to react had the most damaging effect on sales of the Alcometer; police agencies cannot be expected to purchase an instrument that sometimes will not give a reading. Nevertheless, some of the criticism I have heard concerned the possibility that the older models of the Alcometer would give falsely high readings. It may be that some of the design changes made will eliminate whatever trouble that existed on this score, but a number of persons I have talked with attributed the oversensitivity of the instrument to its use of iodine pentoxide as a reagent. As the new model still uses this reagent, it will likely be met with some suspicion and will have to carry the burden of proving its accuracy.

⁸⁸ Developed by Dr. W. W. Jetter, Dr. M. Moore, and Dr. Glenn C. Forrester, the instrument is now primarily associated with Dr. Forrester. It is distributed by the Intoximeter Association, Niagara Falls, N.Y., and by Intoximeters Midwestern, St. Louis, Mo. The original Intoximeter is

Alcometer. It departed from the miniature chemistry laboratory approach, however, and merely preserves the alcohol in a breath sample for later analysis in a professional chemistry laboratory. The Intoximeter is portable and inexpensive, and has the virtue of being usable in the field. Thus it minimizes the problem often posed when there is a substantial lapse of time between the act of driving and the taking of the chemical analysis.

The Intoximeter is noteworthy in that it provides a field screening test device that will give the officer a rough indication of the blood-alcohol level. Because the Intoximeter's precise reading depends solely upon use of the carbon dioxide percentage, it is now much less used than in the past.⁸⁹

The developers of the Intoximeter have consistently supported the view that chemical analyses are highly technical operations requiring skilled technicians, and that when chemical evidence is to be presented in criminal court to deprive a man of his liberty, the chemical analysis should be backed by a trained chemist. Evidences

now designated as the Portable Intoximeter to distinguish it from other types of breath-testing instruments since developed.

⁸⁹ The Intoximeter consists largely of reusable tubing and fittings to be prepared by the laboratory. The laboratory must fill two connected tubes with chemicals. In one is put magnesium perchlorate (designed to absorb moisture and alcohol) and in the second, Ascarite (to absorb the carbon dioxide). The weight of the Ascarite tube is recorded on the paper protective carton placed over these sample-collecting tubes. In the field the subject blows up a balloon with mixed-expired air, which is then forced into the instrument. Part of the breath sample is diverted into a tube containing the field screening test to be interpreted by the officer then and there. Simultaneously, the rest of the breath sample is passed first through the magnesium perchlorate tube and then through the Ascarite tube. These are stoppered and preserved for the laboratory and the balloon discarded.

In the laboratory, the collected alcohol in the magnesium perchlorate tube is distilled and weighed and the carbon dioxide absorbed in the Ascarite tube is measured by weighing the tube. The blood-alcohol level is then calculated from these weight measurements—on the basis of the carbon dioxide fraction in alveolar breath. The method of calculation is the same as used with the Drunkometer. For a technical description, see A.M.A. MANUAL 52-53. The field screening test, which uses potassium permanganate, is interpreted on a time basis. If it requires less than thirty seconds for the purple color to fade, the probable blood-alcohol level is over .15%; if it takes from forty to fifty-three seconds, the likely reading will be between .15% and .10%, etc. An indication by the screening test that the blood-alcohol level will be low usually results in a dropping or reduction of the charge, and the laboratory need not analyze the primary sample collected. The tubes are merely cleaned out and filled with fresh chemicals for use again.

of this attitude are reflected in the design of other models of the Intoximeter Association, which will be discussed below.⁹⁰

(d) *The Breathalyzer*. The Breathalyzer⁹¹ is a semi-automatic console analyzer designed to give reliable results when operated by law enforcement officers and others with little formal scientific background. It wastes all but the last portion of a long exhalation and then traps a measured volume of that exhalation. Upon release of a gravity-activated piston, the trapped (alveolar) breath is forced through a measured volume of reagent (potassium dichromate in sulfuric acid) contained in a glass ampoule. The alcohol-sensitive reagent loses color in direct proportion to the amount of alcohol present in the breath sample. By comparing the test ampoule of reagent with an unopened ampoule, the instrument photoelectrically measures the amount of color change and automatically calculates and gives a reading of the subject's blood-alcohol percentage.⁹²

⁹⁰ As a statement of principle, this position has much to commend it. Nevertheless previous discussion has indicated the doubts that may still exist as to the quality of work performed in many hospital and private laboratories in the United States.

⁹¹ Developed by Dr. Robert F. Borkenstein and first made available to the public in 1954. It is distributed by the Stephenson Corporation, Red Bank, N.J.

⁹² The amount of color change indicates how much alcohol was in the breath sample. From this, percentage of alcohol in the blood can be computed on the basis of the 2,100:1 ratio.

The interior of the Breathalyzer sample chamber is kept at approximately 50 degrees Centigrade (122 degrees Fahrenheit) to prevent condensation of the breath. In theory, the instrument should capture 52.5 milliliters of alveolar breath as it leaves the mouth, but because of expansion of breath upon heating and the fact that some breath will remain in the tubing between the sample chamber and the ampoule containing the reagent, it is necessary to capture approximately 56.5 milliliters of breath at 50 degrees C. As the breath is blown into the bottom of the cylindrical sample chamber, the force of the breath raises a piston. This piston has a magnetized washer on a stud at the top designed to allow a very small amount of vertical play. At the top of the cylinder magnets that can be rotated engage the washer. While the person being tested blows his breath, the excess air will expel through vent holes at the top portion of the cylinder. The moment he stops exhaling, however, the play between washer and piston will allow the piston to drop just sufficiently to cover the vent holes and capture the desired quantity of breath. If the person tested has followed instructions, he will have exhaled as much as possible and the portion of breath captured will be alveolar breath. (If not, the reading will be low.)

When the control knob on the Breathalyzer is rotated from "Take" to "Analyze," this simultaneously disaligns the magnets (allowing the piston to start falling) and switches valves in the instrument's tubing so the breath leaving the sample chamber goes into the ampoule containing reagent rather than back out the mouthpiece.

Prior to the test, the operator will have measured the test ampoule to

The Breathalyzer is an instrument of great sophistication. Since its introduction in 1954 it has been continually refined and has gone

determine that the proper quantity of reagent is present and will have optically balanced the instrument to compare the test ampoule with the standard ampoule. (The quantity of reagent is critical. Too little reagent will give high results; too much will give low results. For technical data on this aspect of the Breathalyzer, see Coldwell & Grant, *A Study of Some Factors Affecting the Accuracy of the Breathalyzer*, 8 J. FOR. SCIENCE 149, 153-55 (1963).)

The piston is machined closely to fit the cylinder snugly, and the tubing is of relatively small diameter. Thus, the breath slowly bubbles through the reagent in the test ampoule (in about thirty seconds). The operator is instructed to wait about a minute and a half more to allow the reagent (potassium dichromate in sulfuric acid plus a catalyst) to react with any alcohol that may be in the breath. After this waiting period, the test ampoule is photoelectrically compared with the standard ampoule to see whether the test ampoule has lost color through reaction with alcohol.

The optical system of the Breathalyzer is its most distinctive feature. A light is set on a moving carriage that follows a track that is in line with the two ampoule wells. Thus the light can be moved away from or toward either ampoule. A photoelectric cell is placed behind each ampoule well. If the solutions in the two ampoules were identical and the light were in the center between the two, the amounts of light striking each photocell would be identical. The two cells would therefore generate equal amounts of electrical current. They are connected to a galvanometer, in opposition to each other, so that a null reading is obtained when the cells are producing identical amounts of current. Where, as is often the case, the solutions are not identical, the light can be moved until the light balance is established and a test may nevertheless be made. When the optical density of the reagent changes—as when alcohol is oxidized—the galvanometer will show an imbalance, because the photocell behind the lighter-colored ampoule will be generating more electricity and will thus upset the electrical balance.

To obtain a new balance, the light is moved away from the test ampoule (and thus toward the standard ampoule) until the galvanometer again gives a null reading. By measuring the distance the light had to travel to establish the optical balance again, the amount of loss of optical density in the reagent can be determined. Because the color loss is proportional to the amount of alcohol oxidized, the amount of alcohol in the breath sample can be computed and, using the 2,100:1 formula, the percentage of alcohol in the blood can be further determined. As all of these computations are in direct and constant relationship with each other, it is possible for a mechanical linkage device on the instrument to move a scale pointer as the light moves and give a direct and instantaneous reading in terms of blood-alcohol percentage.

The apparent simplicity is deceptive, however. The inverse-square law governs the amount of light that will fall on an object as the light source is moved through varying distances, and the Beer-Lambert Law governs the amount of light transmitted through solutions of varying optical densities. These are not direct proportional relationships by any means, but at the levels of color change that would be caused by breath of a person with a blood-alcohol percentage anywhere from zero to .55% (over the usual lethal range), the gain in light transmittance is geometrically proportional to loss of optical density. Within these ranges, then, the inverse-square law of light and the Beer-Lambert Law will be in inverse geometrical relationship, and a linear (or directly proportional) ratio results. See Borkenstein

through nine models.⁹³ But the absolute retention of its basic design and the satisfactory service still being given by early models indicate its conceptual excellence. One of its most interesting aspects is utilization whenever possible of the "fail-safe" principle, so that errors caused by either mechanical defect or operator fault will usually produce low rather than high readings.

Since the Breathalyzer appeared, there have been a great many studies of its faults and virtues and of its accuracy in reporting blood-alcohol level by means of breath testing.⁹⁴ From their results a clear picture has emerged. The Breathalyzer gives readings that are usually slightly lower than those of the blood-alcohol test. Every so often, however, there will be a result varying from this fairly consistent pattern that will be unexpectedly higher or lower than

& Smith, *The Breathalyzer and Its Applications*, 2 MEDICINE, SCIENCE AND THE LAW 13, 17-19 (1961).

⁹³ One of the most significant changes was the introduction of a catalyst into the reagent to make heating the test ampoule to speed the reaction unnecessary. This should be kept in mind when considering other literature that discusses the ampoule-heating phase of the Breathalyzer's operation. See, e.g., *State v. Baker*, 56 Wash. 2d 846, 853, 355 P.2d 806, 810 (1960).

A new model now in preparation will be quite different in many respects from the old. It will capture a larger sample of breath than the older models and be almost fully automatic in operation, including breath collection. After a given volume of air has been wasted, the instrument will trap the next portion and allow no more to be collected. Though this procedure will not always collect the very last purely alveolar portion of air in the lungs, Dr. Borkenstein asserts that his researches indicate that this is not necessary. So long as the breath sample collected comes from the last one-third of an exhalation, the results of breath tests will be consistent with blood-correlation tests. Past variations in use of the instrument have been widely associated with low readings caused by poor breath-collection techniques; the new instrument will standardize the technique and thus stabilize the variations.

At the Fourth International Conference on Alcohol and Traffic Safety, Dr. B. M. Wright of England stated that he had independently been working upon a similar breath-collecting modification for the Kitagawa-Wright apparatus.

⁹⁴ See, e.g., Begg, Hill & Nickolls, *A Statistically-Planned Comparison of Blood and Breath Alcohol Levels*, in THIRD CONFERENCE 277. Coldwell & Grant, *A Study of Some Factors Affecting the Accuracy of the Breathalyzer*, 8 J. FOR. SCIENCE 149 (1963); Dubowski, *Alcohol Determination—Some Physiological and Metabolic Considerations*, in ALCOHOL AND TRAFFIC SAFETY 91, 101-05 (Fox & Fox ed. 1963) (summarizing research up to 1961); Fox, Lower & Fox, *Measurement and Reduction of Some Sources of Variation in a Breath Instrument*, in THIRD CONFERENCE 261; Scroggie, *Some Aspects of Recent Australian Research in Breath Tests for Alcohol*, in THIRD CONFERENCE 272.

The results of several research projects with the Breathalyzer were additionally reported at the Fourth International Conference on Alcohol and Traffic Safety.

the blood reading. Most of these variations will be low, but a very few may be up to .02 or .03 percentage points higher than the corresponding direct measurement of the blood-alcohol level. Because of the difficulty of analyzing blood, these occasional high readings were long thought to be caused by faulty processing of the blood samples. Even in comparisons using blood readings made with the latest, most sophisticated techniques, however, Breathalyzer results continue to show this pattern, though it is emerging that the difference is more absolute than proportional⁹⁵ and that the Breathalyzer produces results of an acceptable accuracy when reporting blood-alcohol levels within the .10 per cent range and over.⁹⁶

Since very little blood breath correlation research has been performed with arterial blood and auto-analyzers,⁹⁷ it is still an open possibility that these apparently false high readings really reflect the fluctuations that have recently come to light in the arterial blood-alcohol level within an individual. At least one researcher, however, maintains that these high readings have been noticed in successive tests of the same cooperative subject, and he suggests that the 2,100:1 ratio may not hold true for all persons.⁹⁸ In any event, for the moment the validity of breath tests is somewhat in doubt when accurate and precise results are essential at levels under .10 per cent.⁹⁹

⁹⁵ At the Fourth International Conference on Alcohol and Traffic Safety, Dr. R. N. Harger suggested a correction factor for several breath instruments. That for the Breathalyzer was: (instrument reading + .0035%) $\times 1.15$.

⁹⁶ The relative decline in correlation between blood and breath readings at the lower levels apparently holds true for all other breath-testing instruments also.

⁹⁷ For an exception, see Forney, Hughes, Harger, & Richards, *Alcohol Distribution in the Vascular System* 25 Q.J. STUDIES ON ALCOHOL 205 (1964) (Drunkometer readings based on rebreathed air were compared with arterial blood).

⁹⁸ Scroggie, *Some Aspects of Recent Australian Research in Breath Tests for Alcohol*, in THIRD CONFERENCE 272, 273.

⁹⁹ E.g., in European countries which make it an offense to drive with a blood-alcohol level exceeding .05%.

As has been indicated above, I believe that even if this criticism of breath-testing instruments is sustained, it still does not indicate against their use in the United States at this time. Our critical levels of intoxication are usually deemed to be at least .10% blood-alcohol level or above, and breath tests well administered are still probably more accurate than the usual blood test obtained here. Assume the maximum legal prejudice in a state with a presumptive level set at .10% by taking a defendant with a breath reading of .11% or .12% blood alcohol. Even if the defendant were that one person in twenty whose breath reading is slightly higher than

One of the greatest virtues of the Breathalyzer is its ability to discriminate against other substances than alcohol that might react with its reagent, potassium dichromate, which is perhaps more selective than reagents used by some of the other instruments. It currently appears that *under the conditions of its use* the Breathalyzer will give readings only when the following substances are encountered in the breath: ethyl alcohol, ether, paraldehyde, methanol, and the higher alcohols.¹⁰⁰ However, these substances are necessarily eliminated from consideration in a drunk-driving test:

[T]hese substances [other than alcohol] act as intoxicants and their presence in the blood in concentrations sufficient to give an apparent blood alcohol reading of 0.05% would be associated with severe poisoning or death. There is no need to be concerned with these substances when testing suspected drinking drivers.¹⁰¹

his blood reading would be, the overwhelming odds are that the defendant, even at an actual blood-alcohol percentage of .08 or .09, would be definitely under the influence of alcohol. Those rare individuals who *can* hold their liquor at this range do not get arrested for drunk driving when their readings are at this level.

¹⁰⁰ A multitude of carbon-bearing compounds will react with potassium dichromate, but they are not found in the breath of living human beings under the conditions prescribed for making a Breathalyzer analysis.

Cigarette smoke blown directly into the instrument—especially from menthol cigarettes—will give a reading, but because all persons to be tested are required to wait at least fifteen to twenty minutes without smoking, eating, or drinking prior to a test, this possibility of error is minimized. Pieces of onion or garlic dropped directly into the potassium dichromate reagent will cause a color change, but repeated tests of persons (and mechanical equilibration devices) reeking of onions and garlic fail to cause any reaction when nothing but *breath* is introduced into the instrument.

One persistent criticism is that acetone on the breath of diabetics will react with potassium dichromate. It is true that acetone can react and give somewhat low readings, but it takes at least five minutes for a sufficient reaction to take place for the acetone even to begin to give a significant reading. The Breathalyzer instructions require the reading to be made at the end of about two minutes (thirty seconds for the bubbling to be completed plus the minute-and-a-half waiting period). This time is not critical, however, as the instructions indicate that accuracy can be obtained if the reading is made up to fifteen seconds before or a minute or two after the indicated time. BORKENSTEIN, BREATHALYZER MODEL 900 INSTRUCTION MANUAL 26 (1963). One caution is necessary, however, for those seeking to prove the point made here by equilibrating air through an acetone and water solution: acetone that can be purchased commercially will have had alcohol added during the processing stage. Residual traces of this will of course react with potassium dichromate. Also, do not let onions sit several days in the equilibration device. They can ferment.

¹⁰¹ Coldwell & Grant, *A Study of Some Factors Affecting the Accuracy of the Breathalyzer*, 8 J. FOR. SCIENCE 149, 157 (1963). In addition, ether and paraldehyde have odors which can be detected.

(e) *The Photo-Electric Intoximeter.* The Photo-Electric Intoximeter¹⁰² is a semi-automatic console breath analyzer that, like the Breathalyzer, captures a measured quantity of alveolar air and determines the amount of alcohol in the breath sample by a photo-electric comparison technique utilizing ampoules of potassium dichromate in sulfuric acid. The one major advantage of this instrument over the Breathalyzer is that it also simultaneously captures a back-up sample for analysis by a chemist against any question of instrument or operator error.¹⁰³

The Photo-Electric Intoximeter also puts rough controls on the amount of breath that is wasted before the samples to be analyzed are captured, and thus reduces the variability of results.¹⁰⁴ The total

¹⁰² Developed by Dr. Glenn C. Forrester and first made available to the public in 1958. It is distributed by the Intoximeter Association, Niagara Falls, N.Y., and by Intoximeters Midwestern, St. Louis, Mo.

¹⁰³ The back-up sample consists of a tube of magnesium perchlorate similar to that employed in the Portable Intoximeter, but here a measured sample of alveolar breath is passed through the tube and the chemist can come up with meaningful figures through direct determination of the amount of alcohol in the tube. As with the tubes used with the Portable Intoximeter, it is necessary to cap both ends of the tube immediately to preserve the alcohol captured.

¹⁰⁴ There are two cylinders to collect breath samples. The smaller one, designed to capture 105 milliliters of alveolar breath, feeds the ampoule; the larger one must hold 210 milliliters of breath to be fed into the perchlorate tube. The pistons in the two sample chambers have vertical rods attached which rise above the surface of the console when the pistons have been raised by a breath sample. Breath entering the instrument feeds into the smaller cylinder first; when this is full, it overflows and fills the larger cylinder from the bottom (raising piston and rod of this chamber also); overflow breath from the second chamber then flows out a tail gas exit over which a whistle is to be put during the time a breath sample is being taken. When the operator hears the whistle, he knows that there is breath in both chambers.

The person to be tested blows into a flexible tube mounted on the exterior of the instrument. Close to the intake point, there is a tee joint in the tube to which a deflated one-quart plastic bag is attached. As the person to be tested begins to blow into the tube, the operator must press his finger on top of the rod just sticking up from the smaller chamber; this prevents any breath from raising the piston and thus insures that no breath enters either chamber. This forces the breath to pass a check valve at the tee joint and flow into the plastic bag. When the bag is inflated and the operator knows that one quart of breath has been wasted, he releases his finger from the rod and allows breath to flow into the sample chamber.

The person to be tested is expected to fill the waste bag and the two sample chambers all in one exhalation. The whistle signals when both cylinders are full of breath, and the operator is instructed to judge when the end of the exhalation is near and turn the knob attached to a valve assembly while the whistle is still blowing. This is necessary to insure full samples. If the person stops exhaling before the valve is turned, the breath will begin to flow back out the intake tube. The reason the operator is told

amount of breath required for both P.E.I.¹⁰⁵ samples is six times that utilized in the current model of the Breathalyzer.¹⁰⁶

Instead of using the moving-light principle to achieve optical balance between two ampoules as the Breathalyzer does, the Model 300 P.E.I. scans only one ampoule at a time. The standard is not another ampoule, but a constant amount of light striking the second photovoltaic cell. This cell will always produce more electrical current than the one with an ampoule before it, so a variable resistor is introduced to bring the current from the standard photocell into balance with that from the other cell. A dial is attached to the resistor knob that has been precalibrated for correctness of a zero and a maximum reading through the use of standards in the ampoule well.¹⁰⁷ The dial scale between these two points is calibrated in the

to wait until close to the end of the exhalation rather than to turn the valve when the whistle first blows is to make sure that all the breath captured is true alveolar air.

As some persons do not have enough breath to fill the quart bag plus the two cylinders, a pint-sized bag is also furnished. If a person stops exhaling before the valve knob is turned, the operator is to allow the breath to waste back out of the instrument, deflate the plastic bag, and try for a breath sample again—with the smaller-sized bag if necessary.

¹⁰⁵ This abbreviation for "Photo-Electric Intoximeter" is used commonly in the literature of the Intoximeter Association.

¹⁰⁶ But the volume of breath actually bubbled through the acid dichromate reagent is only twice as large as that utilized in the Breathalyzer. The automated Breathalyzer now being planned for production will capture the equivalent of 105 milliliters of deep-lung breath.

There is no question that testing a sample twice as large gives greater precision of results. Questions may remain whether, with regard to the limits imposed by suggested variations in blood-breath ratios, striving for greater precision may not already be reaching the point of diminishing returns so far as accuracy in terms of blood-alcohol level is concerned. Since the quantity of alcohol analyzed in these breath instruments is so very minute, however, it appears that a doubling of the breath sample is quite in order. Strong contamination on the part of some carbon-bearing compounds on the bubbler, for example, could affect results by an amount significant enough to be measured. The standard procedures tend to guard against error from this source, however. In the Breathalyzer the instrument is flushed and the same waiting period as in an actual analysis is required before the zero balance is established. During this period any gross bubbler contamination will have been eliminated. Nevertheless, I have seen indications in laboratory practice (where bubblers are reused) that there are certain types of slow-reacting contaminants that will introduce small errors in readings taken. Fortunately, the slow-reacting contaminants will not produce large errors. (Bubblers used in law enforcement work come fresh from the factory and are not reused.)

¹⁰⁷ The zero point on the dial is established by balancing when there is an absolutely full-strength ampoule in the well. The point of maximum reading on the dial is established by turning the knob to the resistor until balance is established on the galvanometer with an ampoule bleached of all

logarithmic curve given by application of the Beer-Lambert Law, and a direct value in terms of blood-alcohol percentage can be read off the dial.¹⁰⁸

The P.E.I. has several refinements that the Breathalyzer lacks,¹⁰⁹ but in some respects it places greater reliance on operator technique.¹¹⁰ Several of the complications related to collecting the sample have already been detailed in the footnotes.¹¹¹ Also, the bubbler must be removed from the acid reagent after the alcohol has bubbled through it.¹¹² Perhaps more importantly, if the test ampoule does not perfectly match the standard ampoule, the operator must note the amount of the discrepancy, whether it is a plus or a minus figure, and record the amount to be added to or subtracted from the instrument reading to get an accurate final result.¹¹³ It should be

its potassium dichromate. Since it is known that to use all of this quantity of dichromate would take the amount of alcohol in the breath of a person with a blood-alcohol percentage of .394, this figure is the maximum reading on the dial.

¹⁰⁸ Since all production ampoules cannot be of the same absolute optical density as the standard by which the zero reading was set, it is necessary for the operator to check the ampoule to be used in the test and note the dial reading that results when the galvanometer needle is brought to mid-point. (This reading may be in the negative or positive.) If the fresh ampoule gives a reading greater than $\pm .02\%$ blood alcohol, the instructions call for it to be discarded. If the error is less than this figure, the amount of the error must be recorded. Then the dial is again set at zero and the test is conducted. The amount of error recorded is finally either added to or subtracted from the dial reading obtained following the test. This procedure is necessary because the dial scale is logarithmic rather than linear, and one must always start from zero in order to interpret the size of any intermediate reading on the dial scale.

¹⁰⁹ *E.g.*, it has a pump for automatic flushing, a fan to spread the heat evenly throughout the console (which must be kept between 105-110 degrees F.), and an arrangement whereby turning the valve knob brings printed instructions for the next steps in the sequence into view in a window.

¹¹⁰ It seems probable, however, that use of a resistor rather than a moving light carriage to establish electrical balance would eliminate the "backlash" problems that novice Breathalyzer operators experience.

¹¹¹ See notes 103 & 104 *supra*.

¹¹² The earlier models of the P.E.I. placed the ampoule outside the well during bubbling and in the well only after this step occurred. The reason for the removal of the bubbler is that the instrument has been set for zero and maximum standards without bubblers in them; to get comparable results, there must be no bubbler in the test ampoule at the time of the reading. The Breathalyzer can balance the test ampoule, with a bubbler in it, against the standard ampoule without bubbler because it has a linear scale and can establish a new zero point without introducing error. ERWIN, *DEFENSE OF DRUNK DRIVING CASES* § 19.03[1], at 296 (1st ed. 1963) was critical of error that might be induced by jiggling the Breathalyzer ampoule with the bubbler in it, but this portion of the text was deleted from the second edition.

¹¹³ Another related consideration affecting level of operator competence

noted, though, that the operator is not intended by the manufacturer to be the sole witness in a strongly contested case. The back-up tube is available for independent analysis by a chemist.¹¹⁴

needed will be discussed below in relation to proof of the identity and purity of the chemicals used.

¹¹⁴ See ERWIN § 17.07[5][c] for a favorable comment on this aspect of the P.E.I. design. (Note that Erwin's detailed listing of operating steps given earlier apply to the previous Model 200 P.E.I. rather than the current Model 300. A catalyst is now used in the reagent, and the step of heating the ampoule is eliminated.)

In law enforcement circles, at least, the question of single versus multiple tests is controversial. There is some justification for the opinion that the enforcement officials would prefer to go to court with results from a single test—right or wrong. Dr. G. C. Forrester made the point rather gently:

In the view of some, this [double test from the P.E.I.] is not an unalloyed blessing. While in most categories of evidence, conscientious investigators seek as much relevant data as possible, the results of more than one chemical test for alcohol, if not in agreement to a hundredth of one per cent, might serve the purpose of the defense attorney. This is particularly true when the chemical testing program does not use a technician with a toxicologist's standing. With the P.E.I. the toxicologist can show that a human error by the operator, possible with all tests, may result in either high or low readings. However, the second sample captured for the toxicologist, even if imperfect, can only be low. Thus the P.E.I. provides a double check to the benefit of the subject.

Forrester, *Intoximeters: Their Development and Use*, Traffic Dig. & Rev., May 1964, p. 11, 12.

While the popularity of the Breathalyzer with some enforcement officials may in part be based upon its giving only a single test, it should be noted that this instrument is well adapted to a sequential-test procedure that is perhaps just as effective—if not more so—than split sampling. See Smith & Lucas, *The Development of a Large Scale Breath Testing Programme in Ontario*, in THIRD CONFERENCE 189, 191-92:

As a result of such a study, we have decided upon the Breathalyzer as being the instrument of choice. The subsequent world-wide acceptance of this instrument has tended to confirm this choice. The linear relationship between scale reading and concentration of alcohol on the Breathalyzer allows for several samples to be analyzed with the same ampoule of reagent. Thus, a blank, a standard solution of alcohol, and at least two samples of the subject's breath, may be analyzed in one ampoule.

Of course, use of the single ampoule for the second test on the defendant would not be feasible for blood alcohol levels much over .23%. (Though the Breathalyzer ampoule will continue to react with alcohol up to a cumulative total of readings of .70%, the results begin to be low after about the .55% point; postulating a standard-solution test in the neighborhood of a .10% reading, the basis for the assertion can be seen.)

Very few, if any, testing programs in the United States take as much precaution in establishing breath-test results as Ontario, just as few if any laboratories here go to the lengths that are standard for blood tests in Sweden. It is to be expected that as courts, juries, and defense lawyers in this country become more sophisticated as to the possibility of biological variables, multiple testing will be more and more demanded—with a consequent acceptance of normal variations between tests.

(f) *The DPC Intoximeter.* The DPC Intoximeter¹¹⁵ is a double-piston sample-collecting device that is electrically heated to prevent condensation during use. It is apparently the replacement for the old Portable Intoximeter. It uses the plastic waste-bag technique¹¹⁶ to allow capture of two measured samples of alveolar breath. Because it is electrically adapted to use either house current or twelve-volt current from an automobile battery, it remains portable.

Just as was true of the portable Intoximeter, in the DPC Intoximeter one sample of breath passes through a reagent to give the officer a field corroboration of his opinion that a person's impairment is caused by alcohol.¹¹⁷ The other sample, in normal use, passes through the magnesium perchlorate tube used in all Intoximeter products. This sample is reserved for the laboratory.

One interesting feature of the DPC Intoximeter is that it can be kept heated,¹¹⁸ laid on its side, and transported to a breath-testing console at a headquarters location. There, the preserved breath sam-

¹¹⁵ Developed by Dr. Glenn C. Forrester and first made available to the public in 1964. It is distributed by the Intoximeter Association, Niagara Falls, N.Y., and by Intoximeters Midwestern, St. Louis, Mo.

¹¹⁶ See note 104 *supra* describing the waste bag on the P.E.I.

¹¹⁷ This field screening test utilizes silica gel impregnated with a solution of sulfuric acid and potassium dichromate in a glass tube. The color of the gel changes from yellow to green as alcohol is oxidized. The amount of alcohol oxidized can roughly be determined by the length of the green color in the tube. Though some other screening tests are advertised as giving results much more quickly, the instructions accompanying the DPC Intoximeter indicate that it takes about four minutes for the green reaction to begin to appear if there is alcohol in the breath, and about twenty minutes for the length of the green section to be well defined.

With very laudable conservatism, the Intoximeter Association has refused to etch any markings on the glass tube. This screening test is for qualitative, not quantitative, results. See FORRESTER, *MANUAL FOR THE DPC INTOXIMETER 16* (1964):

If no green color develops in twenty minutes it is evident that the amount of alcohol is negligible and the subject should have medical attention if his behavior has been abnormal. *This* is the primary purpose of this test—protection of all concerned against a mistaken diagnosis that might prove tragic. A printed blank scale is provided in the container for the chemical tubes whereon the operator can record the length of the green section for his future reference. By obtaining the chemist's report on the perchlorate sample and comparing his color test thereto he can soon build up a scale of values which may prove useful to him, and which will show that it is hazardous to try to pinpoint the percentage by the length of the column of green.

¹¹⁸ By keeping the cord hooked into the cigarette-lighter receptacle of the automobile while driving.

ple can be fed into the console instead of into the perchlorate tube.¹¹⁹

In a number of experiments breath samples have been collected in plastic bags, heated later to a point that would vaporize any condensation within the bags, and then fed into breath-testing consoles.¹²⁰ The DPC Intoximeter would apparently be a more fool-proof sample collector than a plastic bag, but if reliable plastic-bag techniques can be worked out for use in enforcement work it is debatable whether the investment in the DPC Intoximeter merely for this purpose is sound.¹²¹

(g) *The Breath-Tester*. The Breath-Tester¹²² is a semi-auto-

¹¹⁹ The instruction manual indicates that a Photo-Electric Intoximeter, a Breathalyzer, or a gas chromatograph could be used. Since the DPC Intoximeter collects a 210-milliliter breath sample, if the P.E.I. were used, only the ampoule-testing stage of the P.E.I. could be utilized.

It might be noted that the Breathalyzer is adapted to work on twelve-volt direct current, but this is a sufficiently sensitive instrument that I have some doubts whether field use of it is advisable. See third paragraph of note 121 *infra*.

¹²⁰ See, e.g., BORKENSTEIN, CROWTHER, SHUMATE, ZIEL & ZYLMAN, *THE ROLE OF THE DRINKING DRIVER IN TRAFFIC ACCIDENTS* 57-61 (1964); Kalow, Lucas & McColl, *Containers for Breath Samples for Alcohol Analysis*, in *SECOND CONFERENCE* 137.

¹²¹ It is always desirable that a chemical analysis be made as soon after the time of the driving as possible, for there are dangers involved in extrapolating probable blood-alcohol level at a previous time—even when two or three subsequent tests are made at spaced intervals to determine a person's individual alcohol-clearance rate. There is a multitude of literature on this subject. See, e.g., ERWIN § 14.06[7]; *Report of the Working Party (IX) on Problems of Presenting Evidence of Chemical Tests in Courts of Law*, in *THIRD CONFERENCE* 289.

Back calculation is almost always necessary, however, and this places a premium on obtaining from defendants statements as to time of last drinking, etc., through use of the Alcoholic Influence Report Form.

Despite the need for a quick test, however, there are problems connected with field administration of chemical tests. Obvious problems of sample collection exist in the field with respect to blood and urine. As for breath, there is the cardinal requirement that the defendant have nothing in his mouth at the time of the test; that he not have eaten, drunk, or smoked recently; and that there must have been no alcohol in his mouth within the past twenty minutes or so (whether from drinking, vomiting stomach contents, belching, etc.). It is clear that control of these basic validating observational procedures will be more secure in a headquarters location than in the field. Thus, to transport the person quickly to headquarters, if possible, is probably better than a field test.

One other consideration militating against field tests deserves mention. The North Carolina chemical test statute contains a provision that will clearly find favor in an increasing number of jurisdictions: the arresting officer or officers cannot administer the chemical test. N.C. GEN. STAT. § 20-139.1(b) (1965). Such a provision will likely be stretched to cover enforcement officers at the scene of the arrest who are there merely to give the chemical test. Cf. *State v. Stauffer*, 266 N.C. 358, 145 S.E.2d 917 (1966).

¹²² Distributed by the Muni Quip Corporation, Decatur, Ill.

matic console breath analyzer. It has certain superficial design differences from the Breathalyzer, but in all essential respects the two instruments appear similar.¹²³

(h) *The Kitagawa-Wright Apparatus*. The Kitagawa-Wright¹²⁴ apparatus is a breath-analysis console developed in England that uses the Kitagawa sealed glass tubes of silica gel impregnated with a sulfuric acid and potassium dichromate reagent. The amount of alcohol present in the alveolar breath sample collected in the console can be determined with apparently satisfactory¹²⁵ precision and accuracy by measuring the amount of the reagent that changed color. Because the tube has a uniform diameter, the alcohol component can be determined by a simple measurement of the length of the tube portion showing a color change.

Tubes of silica gel impregnated with acid reagent are used in this country in several devices for preliminary screening tests. The Kitagawa-Wright instrument differs, however, in being intended to give a reading sufficiently accurate for use in court. The reason for this increased accuracy is that the diameter of the Kitagawa tube is smaller and more uniform than the usual tube used in screening test devices. Thus the length of gel that reacted will give a more uniform measure of the alcohol present. Also, the screening devices do not use alveolar breath, which yields the more reliable 2,100:1 ratio. Nor do they measure the mixed-expired air that they do use with great precision. The inventor clearly views his instrument as one that should be competitive with the Breathalyzer.¹²⁶

¹²³ The literature for the Breath-Tester mentions the following features which current models of the Breathalyzer do not have: (1) a pump to flush the instrument; (2) a nonreversible sequence switch to be turned through 12 operational steps; and (3) an adjustable bubbler time control.

¹²⁴ Developed by Dr. B. M. Wright, National Institute for Medical Research, London, England. I am not informed whether arrangements have been made for commercial distribution in this country.

¹²⁵ See Wright, *Breath Alcohol Analysis*, in THIRD CONFERENCE 251. As Dr. Wright's paper makes clear, the extreme sensitivity of the Kitagawa tubes to moisture causes problems when the instrument is tested with the aqueous alcohol test solutions that are usually equilibrated into other breath instruments to check them for accuracy. As the gel is sealed in the glass tube until the ends are snapped off just prior to a test, however, this moisture sensitivity apparently would not affect the instrument in an actual test of a person.

One person familiar with instrumentation of breath devices has questioned the consistent accuracy of Wright's sample-collecting device, however. It utilizes a flexible diaphragm between two cones instead of the usual metal cylinder and piston.

¹²⁶ See Wright, *Breath Alcohol Analysis*, in THIRD CONFERENCE 251, 253:

(i) *Preliminary Screening Tests.* There are a number of devices on the market designed to give a rough field indication of the amount of alcohol in a person's blood. Some are inexpensive disposable units; others, like the Portable Intoximeter and the DPC Intoximeter, are often integrated into devices designed to give quantitative breath-alcohol determinations.

The Drunkometer procedure for testing mixed-expired air in accordance with the 3,200:1 ratio was originally viewed as suitable only for a quick field check when it was the only test given; when given simultaneously with the quantitative test utilizing the carbon-dioxide percentage, it was considered merely as a check against mathematical error in the main test. It has already been noted that this test has proved itself more reliable than it was at first credited with being, and that at least one state accepts in evidence quantitative results based on it.¹²⁷

The field screening tests employed by the Portable Intoximeter¹²⁸ and the DPC Intoximeter¹²⁹ have already been discussed in the footnotes.

One of the earliest disposable screening tests introduced in this country was the Alcotest,¹³⁰ which was originally developed in Germany. It uses a deflated plastic bag that will hold about one liter of breath; the person being tested is to blow mixed-expired breath in one exhalation through a silica gel tube till the plastic bag at the other end of the tube is filled. The flow resistance of the tube is such that ideally twenty seconds are required to fill the bag. A color change along the length of the reagent-impregnated¹³¹ gel from yellow to green indicates reaction to alcohol. A first mark on the tube

[T]he accuracy of the whole thing depends upon the manufacture of your analytical package. On the face of it, however, there is a rather better chance of reliability with a dry reagent in a sealed tube, because if a liquid reagent is contaminated the whole liquid is affected, whereas if an indicator tube is contaminated it can usually be seen before it is used and it will only have local effect.

Still, it may be that court proof of the identity and purity of the chemicals used in the analysis would be simpler with a liquid reagent than with a solid one.

For technical data, see Kitagawa, *Detector Tubes for Analysis of Alcohol in Breath*, in THIRD CONFERENCE 246.

¹²⁷ See *State v. Johnson*, 42 N.J. 146, 199 A.2d 809 (1964).

¹²⁸ See note 89 *supra*.

¹²⁹ See note 117 *supra*.

¹³⁰ Distributor in the United States: Schueler and Company, New York, N.Y.

¹³¹ Sulfuric acid and potassium dichromate.

indicates approximately the length of green to be expected if the person had a blood-alcohol level of .05 per cent. A second mark indicates the approximate point to which the color reaction would extend if the person had a blood-alcohol level of .15 per cent.¹³²

Another screening test widely used in the United States is the Mobat Sober-Meter.¹³³ This device may bring forth more objections than some of the others because the tube of chromic gel has more markings on it than the others and will inevitably lead to attempts to quantify the results of this screening test.¹³⁴

The Drunkotester works on a somewhat different principle from the others:

The Drunkotester is another breath-testing device designed for nonquantitative analysis. This machine is manufactured by the Komyo Chemical Industrial Co., Tokyo, Japan. Like the Alcotest, the chemical used is potassium dichromate in sulfuric acid solution. The results are based upon a comparison of the color change with a standard chart.¹³⁵

D. Evidentiary Factors with Respect to Breath Tests

The host of legal problems that arise with respect to chemical

¹³² For a report on the reliability of the Alcotest in Europe by one of its developers, see Grosskopf, *Experiences in Using The "Alcotest" for Testing Breath as a Guide to Alcohol Concentration in the Blood*, in THIRD CONFERENCE 281.

¹³³ Distributed by Luckey Laboratories, San Bernadino, Calif.

¹³⁴ See, e.g., *Meet the Sober-Meter—A Mobile Breath Alcohol Test*, Traffic Digest & Rev., May 1964, p. 25. This article also indicates that a Mobat Sober-Meter II, which splits the sample and gives, like the old Portable Intoximeter, a field test plus a preserved sample in a tube to be taken to a laboratory for analysis, is in production. From the printed description, however, it appears that—unlike the Intoximeter—the Mobat determines the volume of breath used through a "calibrated" balloon. This means the 3,200:1 mixed-expired-air ratio is used. Thus the Model II Mobat would be subject to attack in many courts.

A scanning of state cases collected in DONIGAN 188-264 indicates that appellate courts have at times allowed testimony as to the results of screening tests, though ERWIN § 21.04 states flatly that this is not permissible. If the officer giving the test waited for the necessary twenty minutes or so beforehand and the results showed a very long green column, it may not be unfair to allow testimony that the test gave an indication of a substantial amount of alcohol in the breath. Also, presuming a valid foundation for the test, it may not even be unfair in any situation in which this was the case to allow the officer to testify that the test gave a positive result. It is not good practice, however, to attempt to use the results of a screening test in a quantitative fashion.

¹³⁵ ERWIN § 21.03.

testing have been well covered by Donigan and Erwin.¹³⁶ I add only special thoughts on certain matters.

1. *Extent of Judicial Notice*—Basically, when a court is faced with a situation involving specialized knowledge, it requires an expert witness to enlighten the court's fact-finding body. When the specialized knowledge in question becomes generally accepted in scientific circles (rather than just among the specialists or subspecialists studying the area), then the court will take judicial notice of the relevant information.¹³⁷ If the information is generally accepted, it makes no difference that it is not of common knowledge; the court will refer to encyclopedias and standard reference works.

The field of chemical testing for intoxication has been one of the major areas in which scientific expert witnesses¹³⁸ have been required in criminal cases. It can be expected that in the normal passage of time the undisputed¹³⁹ facts and principles as to chemical tests will be judicially noted, but the process is slow. Moreover, courts become accustomed to using experts to prove certain matters¹⁴⁰ and come to expect them in every case. The result has been that most legislatures have not waited for the era of judicial notice to arrive and have enacted legislation to obviate some of the ex-

¹³⁶ See primarily DONIGAN 20-112. Erwin's book weaves consideration of evidentiary matters and trial strategy throughout.

¹³⁷ SMITH, *CONFESSIONS AND SCIENTIFIC EVIDENCE* 114-16 (1963). An apparent exception to the above statement is knowledge in the purely medical area, but probably as the general public becomes more informed as to matters of health, more things will be judicially noted. On the other hand, though the practice of medicine may be based upon considerations of chemistry and biology, diagnosis and treatment remain perhaps as much art as science.

¹³⁸ It should be stressed that an "expert" witness can be any individual with training and experience that most others do not have. It is possible to have expert witnesses on the mysteries of bricklaying—or anything else. The scientific expert is simply one special breed of expert witness.

¹³⁹ Cf. *McKay v. State*, 155 Tex. Crim. 416, 419, 235 S.W.2d 173, 174 (1950): "This court may recognize generally accepted scientific conclusions, even though there should be some who disagree with them. In all probability a scientist may be found who will disagree with practically every generally accepted scientific theory."

¹⁴⁰ The practice in a number of jurisdictions which are inaugurating chemical-test programs is to select a first test case and bring in nationally known experts to insure that this case will be both well publicized and won by the state. This may be justified if the case is clearly slated to become one of first impression at the appellate level, but so far as subsequent trials are concerned it may be setting a bad precedent to go too much beyond the necessary minimum to prove the chemical-test evidence in the first trial.

pense in producing experts to testify in routine criminal trials for drunk driving that involve chemical tests.¹⁴¹

It must be emphasized that a statute merely setting a presumption that the defendant is under the influence of intoxicating liquor when his blood-alcohol level is above a certain point really gets rid of only *one* expert—the medical or biochemical expert who testifies as to the effect of alcohol on the human body. When a jurisdiction with a presumptive-level law has a police run testing program, can a police technician be trained sufficiently to testify as to all the remaining scientific issues? There apparently is not a clear-cut answer to this question; it depends on the amount of training, experience, and ability the particular technician is able to demonstrate to the court.¹⁴² Qualification here does not depend on academic degrees.¹⁴³ It seems fairly certain that many of the legislatures enacting presumptive-level legislation, especially those authorizing breath tests to show the blood-alcohol level, intended to eliminate to the greatest extent possible the need for scientific or technical experts in the misdemeanor courts trying drunk-driving cases. The remainder of this section, then, will concentrate on the question of need for expert testimony in breath-test cases under a presumptive-level statute.¹⁴⁴

¹⁴¹ Thirty-nine states currently set presumptions that drivers with blood-alcohol levels over certain maximums are guilty of drunk driving. See National Safety Council Committee on Alcohol and Drugs, Report: Uses of Chemical Tests for Intoxication 1964.

¹⁴² DONIGAN 102.

¹⁴³ See *State v. Baker*, 56 Wash. 2d 846, 855, 355 P.2d 806, 811 (1960):

Appellant argues further that Lt. Whitman was not qualified to conduct spot checks to determine the chemical contents of the ampoules as he was not a chemist.

It is not contended that the methods of testing employed by Lt. Whitman are improper. Appellant did not produce a chemist or other qualified expert witness at the trial to challenge the methods of testing used. . . .

Although Lt. Whitman is not a chemist, he has had sufficient experience in the field of chemical testing *of the type involved in this case* to warrant the trial court's allowing him to testify concerning his spot checking of ampoules. [Emphasis added.]

See also *State v. Powell*, 264 N.C. 73, 140 S.E.2d 705 (1965).

¹⁴⁴ This is not a simple issue. On the one hand it is wasteful of the time and talents of highly competent professionals to parade them through the courts in the many routine criminal cases in which there is no real challenge offered to the validity of either the theory or the method of chemical testing employed. On the other hand, it is a criminal proceeding and important rights of the defendant are in the balance. The sincere opinion of Forrester as to the need of the professional in both conducting chemical analyses and giving evidence in these cases has already been noted.

With the experienced police technician who has built up a store of knowledge based on personal observation, much of the difficulty vanishes. He has tested large numbers of persons and noted the correlation between the test reading and degree of intoxication;¹⁴⁵ he has participated in blood-breath correlation studies and observed the accurate performance of his instrument; he has tested persons with only garlic and onions on their breath and obtained only negative results; he has learned enough chemistry to check out the reagent chemicals and found them satisfactory. This man has command of his subject. But what of the intelligent novice fresh from training school?

Assume that a relatively inexperienced Breathalyzer operator has learned his lessons well and is testifying with no acknowledged expert to back him up. Can he testify to the 2,100:1 ratio? To the Charles Law formula on the expansion of gases to explain why the cylinder has a volume of 56.5¹⁴⁶ milliliters to catch a theoretical

A legal consideration of some magnitude may also be involved. When the state is allowed to prove its case with police technicians who know their theory from rote and their routines only from experience, their limitations of knowledge may foreclose legitimate cross-examination by the defense concerning both theoretical and practical objections to the testing method employed. The police technician can be expected to omit the qualifications with respect to limitations of the theory and method used that his teacher in chemical testing would have added. In a sense, it could be said the defendant is not allowed to confront the witnesses against him when the police technician is allowed to parrot what he has been taught.

Of course, the weight of the technician's testimony is always for the jury, and the defense can not only expose the technician's essential lack of supportable knowledge but also introduce his own rebutting testimony. Perhaps a more important actual consideration in the constitutional picture, then, is the extent to which the matters as to which the technician "testifies" are things that could be judicially noted by a liberal court.

¹⁴⁵ Some officers who deal with chemical testing develop a remarkable ability to predict from observation prior to the test the approximate blood-alcohol level of the person tested. Experience is vital, but more than simple correlation is involved; intuitive judgment as to age, health, probable drinking experience, social factors that may have caused the person to learn to mask his impairment symptoms, etc., must also be taken into account.

¹⁴⁶ Has he ever measured the output of the sample chamber to see that it gives the correct volume within the allowable tolerance? The requirements for maintenance of the instrument hold that this must be done periodically, but it is possible that these maintenance procedures were always performed by some other operator.

Even if the operator has measured the volume of the chamber with the calibrated gauge supplied by the manufacturer, there is the further question whether the gauge is correct. Difficulties of this sort could multiply infinitely; in the absence of specific impeachment by the defense, the reading of this gauge should be accepted. At some point one must relax the hearsay rule and accept the standard measures fabricated by others.

breath sample of 52.5 milliliters?¹⁴⁷ To the fact that all alcohol in the breath sample is oxidized upon entering the ampoule of reagent? To the proportionality of the color change to the amount of alcohol in the breath sample? To the principles underlying the photoelectric system of the instrument with the complications as to the Beer-Lambert Law and the inverse-square law? To the fact that a galvanometer measures the direction of flow of electric current?

If he has really learned his lessons well (and this level of achievement is rare even with good students in the ordinary one-week training course),¹⁴⁸ he may be able to testify to everything but the 2,100:1 ratio. The other items are mostly matters of chemistry and physics that are objectively supportable and probably the subject of judicial notice. If he is qualified as a sufficiently trained breath technician,¹⁴⁹ he should be able to testify like other experts on the basis of study and reading as to the generally accepted facts within the specialty.¹⁵⁰

But it seems improbable that a police technician would, in a strict court, be allowed to testify to the 2,100:1 ratio.¹⁵¹ This ratio

¹⁴⁷ Application of the Charles Law indicates that 52.5 milliliters of a gas at 34 degrees C. expanded to 50 degrees C. would occupy a volume of about 55.2 milliliters. The difference between this theoretical figure and the volume of the sample chamber is accounted for by the air in the tubing between the sample chamber and the ampoule.

¹⁴⁸ North Carolina, it should be noted, requires Breathalyzer operators to attend a sixty-hour course in order to be certified. The regulations of the State Board of Health governing operator qualifications do not yet require that each department have a technician with advanced training in charge of the operational and maintenance features of the testing program, but training is optionally provided at state expense to operators qualified to advance to this higher level.

¹⁴⁹ The prosecution has a problem of strategy if it calls the breath technician an "expert." It may be necessary as a point of law for the judge to qualify him as at least a limited-purpose expert in order to allow him to testify on matters in his field as to which he has been trained and as to which he has read without violating the hearsay rule. Yet use of the term "expert" in the hearing of the jury can have undesirable consequences and lead to effective demonstration of the technician's vast areas of ignorance on cross-examination.

¹⁵⁰ Cf. DONIGAN 104-05.

¹⁵¹ The police technician, as opposed to the ordinary operator, may know more about the blood-breath ratio than the average medical doctor. The technician has been intensively instructed in this one small aspect of biochemistry while the doctor may have had only an hour or two of instruction on the subject long ago in medical school. Nevertheless, the technician's knowledge is probably not acceptable in court because of his lack of general depth in relevant areas of knowledge.

In less strictly run courts, chemical-test operators and technicians have

is so important to the chain of logic supporting the validity of breath-testing instruments that the state's breath-test evidence should be excluded without recognition of it.

There are three possible ways, it would seem, for a court to take cognizance of the ratio without requiring the state to produce a scientific expert on the point:

(1) Legislative recognition. The *Uniform Vehicle Code* states that "the amount of alcohol in the person's blood . . . [as based upon a test of] blood, urine, breath, or other bodily substances shall give rise to the following presumptions" ¹⁵² The numerous legislatures that have adopted this or similar language are saying that there is clearly presumed a reliable ratio between blood and breath. ¹⁵³ Perhaps this statutory implication, plus testimony that all the instruments in the field generally recognized as giving accurate quantitative results purportedly ¹⁵⁴ utilize the 2,100:1 ratio, would be sufficient. ¹⁵⁵ Also, a little dash of judicial notice might help.

(2) Judicial notice. New Jersey has for a number of years been progressive in its chemical-test decisions. In a 1964 case, the Supreme Court of New Jersey took judicial notice of the validity of breath tests and held:

In what has become the usual practice of this state, the condition and operation of this municipally owned drunkometer was under the supervision of a trained member of the State Police who understood the theory of the device and the test. The machine was under his periodic inspection. He had placed a fresh

been known to testify to all sorts of scientific and medical matters the basic rationales of which are probably beyond their ken.

¹⁵² UNIFORM VEHICLE CODE § 11-902(b).

¹⁵³ A more direct approach, apparently not followed so far, would be for the legislature to declare that the 2,100:1 ratio is presumptively accurate.

¹⁵⁴ It could be said that the *claims* of the manufacturers are objective facts and can be testified to on a nonhearsay basis. But, as the inevitable thrust of the offer would be to prove by circumstantial evidence that the ratio is about 2,100:1, it is difficult so to rationalize the hearsay problem. The answer may simply be that the courts do not always push the hearsay exclusion rule to the limit of its logic. (There is, incidentally, a belief by some that the designers of the breath instruments tend to develop them on an empirical basis and supply their theory later.)

¹⁵⁵ Under the North Carolina statute, N.C. GEN. STAT. § 20-139.1(b) (1965), chemical analyses of the breath, to be valid for invoking the statutory presumptive level, must be performed according to methods approved by the State Board of Health. The regulations of the Board, which may be introduced into evidence, say that breath-testing instruments are not approved *unless* they are based upon the 2,100:1 ratio. The Board to date has specifically approved the Breathalyzer and the Photo-Electric Intoximeter for use in North Carolina.

bottle of potassium permanganate, which he had tested and found to be of proper strength, in the instrument some 19 days before use upon the defendant and had retested the chemical, with proper result, about 13 days afterward. The local police officer, who actually gave the test, had successfully completed a forty-hour course for a drunkometer operator given by the State Police. He knew how to operate the machine mechanically, had administered many tests previously, and could apply the pertinent formula to the finding to calculate the percentage of alcohol in the blood. His detailed testimony was that he prepared the apparatus, conducted the test and computed the reading as he had been instructed. This is enough, as to this particular device in the present state of general scientific knowledge thereof, to ground admissibility of the result, and there was nothing of substance offered by the defendant to affect its weight adversely. Neither the supervisor nor the operator need be a scientist and the operator does not have to understand the technical theory.¹⁵⁶

(3) Proving validity by empirical methods. It may be possible to bypass the ratio and simply prove that the breath tests using instruments such as the one in question simply *work*, and affirm that the police-technician witness has either observed or participated in blood-breath correlation studies that were totally in line with the studies extensively reported in the chemical-test literature.¹⁵⁷

2. *Laying a Foundation for Breath Tests*—Perhaps the most concise statement of the foundation that must be laid for breath tests is that accepted in *State v. Baker*:

[F]our basic requirements must be shown by the state before the results of such tests may be admitted in evidence, to wit:

(1) That the machine was properly checked and in proper work-

¹⁵⁶ *State v. Johnson*, 42 N.J. 146, 172, 199 A.2d 809, 823 (1964). *But cf.* *City of Sioux Falls v. Christensen*, 79 S.D. 633, 116 N.W.2d 389 (1962) (error to instruct jury on presumptive levels when there was no expert testimony in a proceeding to which state presumptive-level statute did not apply).

¹⁵⁷ Here there is a double hearsay problem. If the testimony describes other correlation tests, it is the general problem discussed above whether the limited-purpose technician expert can testify to what he has read and has been taught in his field. But even when the technician observes correlation tests (say, on the very instrument he used in his department), there is a question as to the extent of his personal observation. Did he watch the chemist analyzing the blood samples with any understanding, or did he merely accept the chemist's announcement of the direct blood-alcohol percentage? If the technician were trained well enough, he might give the breath tests and then himself chemically analyze the blood samples that were taken simultaneously. But this seems to be a rather unnecessary hurdle to place in the technician's way.

ing order at the time of conducting the test; (2) that the chemicals employed were of the correct kind and compounded in the proper proportions; (3) that the subject had nothing in his mouth at the time of the test and that he had taken no food or drink within fifteen minutes prior to taking the test; (4) that the test be given by a qualified operator and in the proper manner.¹⁵⁸

Some comments are in order on these four points.

(1) Maintenance of instrument; proof of proper working order. Instruments such as the Breathalyzer and the Photo-Electric Intoximeter can be operated quite reliably by someone with a minimum of training. This is, in fact, one of the sales points for such instruments. Yet it is imperative for any police agency conducting a chemical-testing program to have a supervisor of the program who understands the need for continuing maintenance, and someone within the program, whether the supervisor himself or a technician to whom authority is delegated, must be fairly knowledgeable as to instrumentation and the necessary maintenance requirements to keep the instrument in proper working order.¹⁵⁹

If the operator knew little of the maintenance procedures undertaken by the technician in his routine work, would the technician be necessary in court each time? Taking the *State v. Baker* rule at face value, the answer may be "yes." Proof of proper maintenance is an element of the foundation that the state must lay in order to introduce the chemical test evidence. But is there any way to prove this maintenance in the routine case in which it is not a seriously contested issue without dragging the technician into every case?

There are at least three possible alternatives. (a) The state court could presume regular maintenance in the absence of specific evidence of the defendant raising doubts on this score.¹⁶⁰ (b) The

¹⁵⁸ *State v. Baker*, 56 Wash. 2d 846, 852, 355 P.2d 806, 809-10 (1960).

¹⁵⁹ The Drunkometer operator must have more skill than one working a semi-automatic console. Nevertheless, a supervising technician who mixed and tested the chemicals to be used backed up mere operator-level police officers in the program described in the quotation from *Johnson*. See text accompanying note 156 *supra*.

¹⁶⁰ In *State v. Cummings*, 267 N.C. 300, 148 S.E.2d 97 (1966), the defendant argued in his brief for reversal on the ground, among others, of failure of the state to prove by affirmative evidence the proper maintenance and working order of the instrument. The court summarily dismissed the defendant's objections to the chemical-test evidence. As the court did not discuss the issue in its opinion, however, it is not clear how strong the case is on this point.

department could devise a procedure requiring all operators to be present when the technician performed his maintenance chores. This would require an operator with more skill and experience than necessary simply to run a valid test; he would need a sufficient understanding of the purposes and procedures that he could knowledgeably testify as to what he had personally observed. There might be problems of gathering all operators from all shifts in a large department together at one time, but ordinary maintenance (other than that performed by the operator at the beginning and end of each test) need not occur very frequently.¹⁶¹ (c) The department could require that official logs be kept of all instrument checks, test results, and maintenance procedures. Assuming that the hearsay problem would not be insurmountable,¹⁶² the operator could introduce the logs into evidence as proof of continuing maintenance and proper working condition.

The operator must also be trained to the point he can satisfy the court on the question of proper working order of the instrument at the time of the test. The operating checklists for most of the instruments insure that the operator will notice any defects in an instrument's functioning.

(2) Identity, purity, and strength of the chemicals used. Proof that the chemicals used were of the proper strength and purity is vital when one is dealing with the Drunkometer, and the steps involved in storing and mixing them were discussed in connection with that instrument. The Breathalyzer and the Photo-Electric Intoximeter, however, use sealed ampoules of acid reagent furnished by their manufacturers. The ampoules are merely opened and used; there is no mixing.

The traditional procedure for establishing identity, purity, and strength has required the purchase by the police department of a large batch of these ampoules at once—all from the same manufacturer's lot number. Out of the entire batch of ampoules pur-

¹⁶¹ *E.g.*, BORKENSTEIN, MODEL 900 INSTRUCTION MANUAL 20 (1963), which requires the maintenance check to be made "once a month or other fixed regular period" There will be a greater problem in connection with the alcohol solution in the Alcoholic Breath Simulator to be discussed below.

¹⁶² The exceptions to the hearsay rule relating to official public records and to business entries made in the regular course of business may arguably apply to official logs. If the purpose of keeping the log is as much to provide courtroom evidence as to allow internal supervision of the program, it may be doubted whether the business-entry exception could be invoked.

chased, a chemist¹⁶³ selects at random¹⁶⁴ and analyzes a representative sampling of the ampoules purchased.¹⁶⁵ When the chemist finds that each ampoule selected has, within allowable limits for error, the proper quantity of reagent and that the reagent, when subjected to various analytical tests, proves to be of proper type and strength, he executes a certificate to this effect. This certificate will usually be sufficient to produce a stipulation as to the random sample of chemicals tested from the defense lawyer—at least so long as the state has the chemist available to testify if need be. While the defense may speak of the errors possible in chemical factories, maintaining that there is still no proof as to the strength and identity of the reagent used in the test on the defendant, such argument has been of little avail as a matter of law¹⁶⁶ and is now used primarily as a jury argument.

The above procedure is probably still advisable with ampoules for the Photo-Electric Intoximeter and a modification of it with the Kitagawa tubes, but I believe that the Breathalyzer's linear scale makes possible a much less cumbersome and much more direct proof of the integrity of the chemicals in question.

The Breathalyzer's unique design feature¹⁶⁷ utilizing the moving light between the two ampoules and the resulting linear scale have been discussed in the notes.¹⁶⁸ Because of the linear scale of measurement, it is possible to rebalance the light between the standard and the test ampoule even though the test ampoule has lost some of its color in a completed test. Taking advantage of this, Dr. H. Ward Smith of Ontario, Canada, recommends that the following tests should all be made on the same ampoule, and in the order

¹⁶³ Either an independent professional chemist or a police chemist.

¹⁶⁴ Perhaps using a table of random numbers. See, e.g., RAND CORPORATION, *A MILLION RANDOM DIGITS* (1955).

¹⁶⁵ Apparently if a true random selection is made, a very small number of ampoules all testing out correctly will be statistically significant. I do not understand the mathematics of probability, but I can report that in North Carolina it has been very fashionable for the chemist to select six ampoules for analysis.

¹⁶⁶ Cf. *State v. Baker*, 56 Wash. 2d 846, 854, 355 P.2d 806, 811 (1960):

The fact that the *sealed* ampoules are delivered by the manufacturer of the breathalyzer machine for exclusive use in such machine plus the additional fact of regular spot checking of the ampoules is, in our opinion, sufficient *prima facie* proof that the chemicals in any one ampoule are of the proper kind and mixed to the proper proportion.

¹⁶⁷ Later copied in the Breath-Tester.

¹⁶⁸ See note 92 *supra*.

given: (a) a blank test with room air, which should give zero results; (b) an aqueous-alcohol equilibration test, which should give the expected reading within allowable tolerances; (c) two successive tests of the defendant's breath.¹⁶⁹ If the room-air and equilibration tests give expected results, this would seem to be almost incontrovertible proof not only that the chemicals are proper but that the instrument is in working order. This, plus testimony that the ampoules were received from the manufacturer for use in the instrument and that the label on the carton containing them stated them to contain the requisite chemicals,¹⁷⁰ should make all prior chemical testing of the ampoules superfluous.¹⁷¹

¹⁶⁹ See note 114 *supra*.

One North Carolina community has adopted a modification of this procedure. First the instrument is checked with a known alcohol solution to make certain it is working properly. Next, a blank test with room air is run to make sure that there is no alcohol left from the previous test. Last, the defendant is tested. All this is done on the same ampoule.

¹⁷⁰ Here, it seems, the labeling on the cartons would be an objective fact—constituting circumstantial evidence—to which one could testify from personal knowledge.

¹⁷¹ This approach to testing both the ampoules and the instrument has been a realistic alternative only for the past two or three years.

There were instruments developed very early that flushed room air through an alcohol-water solution so as to pick up a predetermined amount of alcohol vapor in order to test breath instruments. But these room-air instruments were very temperamental. The slightest imbalance of temperature between the alcohol-water solution and the room air would cause false results—and the solution temperature could rise from merely holding the container in one's hands too long. Also, the temperature of the solution equilibrated through the breath instrument would have to be carefully noted and a correction factor applied to compensate for the expansion of heated gases, as the room temperature would be less than the breath temperature for which the instruments were calibrated.

About three years ago the problem of producing an artificial breath equivalent—at least for instruments using a liquid reagent—was solved when the Alcoholic Breath Simulator, developed by Dr. Borkenstein, was marketed. The alcohol-water solution in it is agitated and kept very close to a constant 34 degrees C. (approximately the exit temperature of breath—which may rise from about 31 degrees C. at the beginning of an exhalation to about 35 degrees C. toward the end). Instead of flushing room air, nonalcoholic breath from a control individual is blown into the Simulator, and the breath bubbles up through the agitated solution and picks up an amount of alcohol that can be precisely determined in advance in accordance with the solution strength used. The temperature remains constant throughout until the breath enters the breath-testing instrument, where it is handled in exactly the same way as breath actually being tested. No correction factors need be applied, and the results that can be obtained through repeated tests are startlingly reproducible under varying conditions. If the breath instrument, or at least the Breathalyzer, gives a reading deviating from the expected by more than .005% blood-alcohol concentration, something is wrong. This is a far

Although checking out the reagent with the alcohol solution *before* the test is conducted is the more scientifically desirable approach, some police departments steadfastly refuse to do this. Because of fear that defense attorneys would have a field day over an admission that alcohol was placed into the ampoule used on the defendant, these departments run the test solution through the defendant's ampoule at the end of the test.¹⁷² This position, though

closer margin for error than could be allowed the room-temperature vaporizers.

As the Simulator was not in existence when *Baker* was decided, it seems to me that the statements in that and other similar cases as to the mode of proving the reliability of the ampoules and the instrument are subject to modification.

Although he may have been speaking only of the room-air vaporizers, Dr. Wright has indicated that the water-bath testing devices contain too much or too variable an amount of moisture to work satisfactorily with the solid reagent of the Kitagawa-Wright apparatus. Wright, *Breath Alcohol Analysis*, in *THIRD CONFERENCE* 251.

Using the Simulator to check the chemicals eliminates an important number of evidentiary problems, but it creates several new ones.

The alcohol-water partition ratio at 34 degrees C. was published by Dr. Harger and the formula for mixing the alcohol-water solution in the Simulator is based upon it. Ordinary operators will have some difficulty explaining *why* they put a given amount of alcohol in the Simulator solution to get a specified result on the breath console, but at least they can testify that they get the results they expect. Judicial notice may be a necessary factor here.

Also, in usual chemical-test procedure, a Simulator solution can be used up to a week or two, depending upon how many tests are run. (Each time breath is blown through the Simulator solution a minute quantity of the alcohol in the solution is carried off, and the breath-instrument readings begin dropping by the very slightest amount.) Where there are several operators, the one who runs the test on a defendant may have to accept on faith the marking as to expected reading on the Simulator he uses to check his instrument. Hearsay problems of the sort previously discussed come into play, and it may be necessary to have all operators present when a solution is mixed or else to resort to official logs for recording time of mixing and Simulator-solution strength.

Despite these attendant problems in using the Simulator, it seems to me that they are less difficult to handle than those met when there is a frontal assault upon the chemicals themselves.

¹⁷² If the test solution reveals quickly correctable instrumental error *after* the test on defendant has been run, it may be best to write off the chemical test attempt. The operator's consternation and the necessity for a second test will quite often be noticed even by decidedly drunk defendants. Also, trouble with the instrument will usually mean low results; a defense lawyer would be delighted to assert that the operator kept retesting the defendant while manipulating the instrument in order to make it give higher and higher results.

In some states the implied-consent laws are interpreted to mean that the defendant has consented to but one chemical analysis. When an after-the-fact check shows error, it may be legally impossible to secure another admissible analysis.

One North Carolina program utilizes not the optimum two tests of a

understandable, is somewhat difficult to accept since juries in Canada and at least two counties in North Carolina¹⁷³ have not been misled.

The point truly most critical as to the chemicals in the Breathalyzer and the Photo-Electric Intoximeter is that each ampoule contain the minimum quantity of reagent.¹⁷⁴ The Breathalyzer has furnished with it a special cup-type gauge into which the ampoule is seated; if the level of the reagent is (barely) visible above the rim of the gauge, this indicates that the proper amount of reagent is in the ampoule.¹⁷⁵

This measurement step is considered important by the Breathalyzer manufacturer, and gauging the ampoule is one of the items on the operational checklist to be completed by the operator. Perhaps strangely, the training manual for the Photo-Electric Intoximeter does not list an ampoule gauge as available equipment; nor does the list of operating steps mention measurement of the ampoule contents.¹⁷⁶ Neither does the checklist furnished with the Breath-Tester by the Muni-Quip Corporation itemize any step for measuring the contents of the ampoule.

(3) Waiting period prior to breath test. Training schools held in connection with the Breathalyzer usually recommend a fifteen-minute waiting period during which the defendant is observed.¹⁷⁷

defendant on the same ampoule recommended by Dr. Ward Smith but two tests with the Simulator. The ampoule is tested before the defendant's analysis is made and, if sufficient reagent strength remains, then another Simulator test is run to make certain the instrument was continuing to operate properly.

¹⁷³ Guilford County (Greensboro's testing program); Mecklenburg County (testing program of the County Police).

¹⁷⁴ See BORKENSTEIN, BREATHALYZER MODEL 900 INSTRUCTION MANUAL 19 (1963); ERWIN § 20:03[1][b].

¹⁷⁵ For technical data on the Breathalyzer ampoule, its measurements and contents, see Coldwell & Grant, *A Study of Some Factors Affecting the Accuracy of the Breathalyzer*, 8 J. FOR. SCIENCE 149-57 (1963). Note, however, that the discussion relating to heating the ampoule to speed the reaction is now irrelevant; the ampoule now has a catalyst added to the reagent which makes application of extra heat unnecessary.

¹⁷⁶ Since the Photo-Electric Intoximeter has the back-up sample that can be independently analyzed, absolute accuracy of results in the ampoule test may not be so critical as with the others in which the ampoule test is the sole one. Also, the Intoximeter Association may feel that it does a completely adequate job of screening all ampoules for proper volume and identity of solution before they are sold. It should be noted that at one time the ampoules used in the Breathalyzer were not made by its manufacturer.

¹⁷⁷ The instruction manual for the Breathalyzer does not mention a waiting period, but in training sessions the waiting period is always emphasized as vital.

The Intoximeter Association recommends a twenty-minute wait.¹⁷⁸ The longer period is clearly justified by the results of studies that have been made.¹⁷⁹

The waiting period is not entirely a matter of letting time pass. Any raw alcohol or any other carbon-bearing volatile substance in the mouth (except that present in saliva and breath) will give falsely high readings. These could be caused by alcohol in stomach contents vomited or belched into the mouth; some pain killer on cotton packed in the mouth to alleviate toothache; an alcoholic mouthwash gargled within the time period; menthol cough drops or menthol cigarette smoke; etc. After the mouth is examined and nothing improper discovered in it,¹⁸⁰ a waiting period of twenty minutes will insure against error.¹⁸¹

Police department procedures must make clear who has primary observational responsibility during the waiting period. It is somewhat difficult to prove a negative—that the defendant did not sneak a cough drop or that he did not belch or vomit alcoholic stomach contents into his mouth. To have the arresting officer think that the chemical-test operator was watching and the operator rely on the officer's observations could prove fatal to the breath-test evidence. Still, even when primary responsibility is fixed, it is desirable that both the arresting officer and the chemical-test operator be able to testify that they carefully watched the defendant during the critical period prior to the test and that neither saw nor heard anything untoward.¹⁸²

¹⁷⁸ TRAINING MANUAL-MODEL No. 300 PHOTO-ELECTRIC INTOXIMETER at X (undated pamphlet distributed as insert in FORRESTER, ALCOHOL, TRAFFIC ACCIDENTS AND CHEMICAL TEST EVIDENCE; TRAINING MANUAL; THE PHOTO-ELECTRIC INTOXIMETER (1960)).

¹⁷⁹ Coldwell & Grant, *A Study of Some Factors Affecting the Accuracy of the Breathalyzer*, 8 J. FOR. SCIENCE 149, 150-53 (1963). When a sober person engages in conversation after rinsing his mouth with a strong alcoholic solution, all but minor traces of alcohol are gone from his breath reading after fifteen minutes, but to be completely safe, twenty minutes should be allowed for alcohol traces to disappear. When the mouth is kept closed, slight effects can persist for up to twenty-five or thirty minutes.

¹⁸⁰ Dental plates do not seem to create any special problems, and the twenty minute waiting period is probably sufficient for denture wearers also.

¹⁸¹ As a practical matter, the fifteen-minute rule widely observed is undoubtedly enough time. The traces of alcohol remaining in tests after twenty minutes were detected only when persons rinsed their mouths in a forty per cent (eighty proof) alcohol solution. Mouth contact with alcohol of this strength is highly unlikely to occur in the five minutes immediately preceding the formally observed waiting period.

¹⁸² As the operator will have to be working with his instrument, it is

(4) Qualifications of operator and manner of giving test. An effective operator must be something more than a person who merely knows the proper buttons to push or turn in making a test. Each operator should be encouraged to develop as much expertise in the chemical-test field as his own ability, educational background, and opportunity for experience will permit. When there is a closely supervised program, however, the level of operator knowledge and sophistication need not be so high.¹⁸³

A successful program will require that operators maintain their mechanical competency and their grasp of the subject of chemical testing on the theoretical level. Various retaining sessions and periodic examinations¹⁸⁴ are essential.

One further caution needs to be stated. In almost all jurisdictions chemical test operators will be assigned other duties; with shift changes, days off, and other considerations, there may be a temptation to train too many men. The idea may be to have two or three operators available at any time around the clock so as not to inconvenience operators who are either off duty or who are on duty but doing something else of importance. Also, if there are several courts in the jurisdiction, the need to be in more than one court at once may be a factor. Nevertheless, when a department does train too many men, a good many of them will find themselves performing chemical analyses so infrequently that they lose their touch on the instrument and forget their schooling in both practical procedures and theory.

3. *Validity of the .10 Per Cent Presumption*—In 1939¹⁸⁵ the American Medical Association recommended a set of legal presumptions relating to blood-alcohol percentage that has been substantially adopted in thirty-six states of the United States.¹⁸⁶ This familiar

best to put the primary responsibility on the arresting officer who accompanies the defendant into the chemical-test room. But the operator should take pains to listen for anything unusual during the entire time and observe the defendant as closely as possible so that he can corroborate the testimony of the arresting officer.

¹⁸³ Provided, of course, that this less highly trained operator has the proper skill for manipulating the instrument.

¹⁸⁴ The examinations ideally should include written tests as well as performance tests on the instrument with test solutions of unknown strength.

¹⁸⁵ Hall, *Statutes—Model Legislation*, in A.M.A. MANUAL 65.

¹⁸⁶ See National Safety Council Committee on Alcohol and Drugs, *Uses of Chemical Tests for Intoxication* 1964; National Safety Council Committee on Alcohol and Drugs, *Annual Report of Subcommittee on Legal Matters*, Dec. 6, 1965, pp. 1-2. Three other states—North Carolina, North

set of presumptions need not be belabored here. At levels over .15 per cent, one was presumed to be definitely under the influence of intoxicating liquor; at levels under .05 per cent, one was presumed not under the influence; at level between .05 and .15 per cent, there was no presumption and the case was to be tried on the clinical symptoms.

With the adoption of these presumptive levels by more and more states, however, an unfortunate thing began to happen. Acquittals or nol prosses became invariable for a person tested below .15 per cent—no matter how drunk the evidence showed him to be.¹⁸⁷ Since it has always been clear that substantial numbers of persons begin to come under the influence at levels over .05 per cent and that by .10 per cent almost everyone is visibly affected by intake of liquor, it may be said that the presumptions had backfired to some extent.

Early in the 1950's studies began to establish that alcohol played a much more significant role in causing automobile accidents than had previously been believed, and that much lower levels of alcohol were often causative agents than had been thought. As a result, dissatisfaction with the three-level presumptive set became strong. In 1958 the panel on Interpretation and Medical Aspects of the Symposium on Alcohol and Road Traffic held at Indiana University made the following recommendations:¹⁸⁸

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 per cent will definitely impair the driving ability of some individuals and, as the blood alcohol concentration increases, a

Dakota, and Vermont—have established a lower presumptive level, at .10% blood alcohol. New York, though one of the thirty-six states, has supplemented its presumptions as to drunk driving with two lesser offenses. These lesser offenses depart from presumptions and merely make it a crime for anyone to drive with blood-alcohol readings as high as .10%, and for anyone under twenty-one years of age to drive with levels as high as .05%.

¹⁸⁷ See, e.g., Stephens, *0.15 Per Cent Accessories*, Traffic Dig. & Rev., June 1964, p. 10. In some states where this became the practice, the prosecutors and police would even give "a margin for error" on top of the .15% presumptive level and not bring cases to trial for drunk driving unless the reading was at least .18%. This may still be the case in some places, but it is to be hoped that the practice is dying out in the light of better information as to the effect of alcohol on driving behavior at the lower levels.

¹⁸⁸ INDIANA UNIVERSITY, SYMPOSIUM ON ALCOHOL AND ROAD TRAFFIC, PROCEEDINGS 275 (1959).

progressively higher proportion of such individuals are so affected, until at a blood alcohol concentration of 0.10 per cent, all individuals are definitely impaired.

In 1960, the American Medical Association recommended that blood-alcohol concentrations of .10 per cent and above be accepted as *prima facie* evidence of being under the influence of alcohol.¹⁸⁹ Two years later, the National Committee on Uniform Traffic Laws and Ordinances revised its *Uniform Vehicle Code* to presume a person under the influence at a blood-alcohol level of .10 per cent or more.¹⁹⁰ Since that time, three states have followed the revised *Uniform Vehicle Code*.¹⁹¹

These actions have kindled a controversy that will probably increase over the next several years. Are all drivers—or substantially all of them—“under the influence of intoxicating liquor” at the .10 per cent blood-alcohol level? Defense lawyers will strenuously contend that while perhaps most drivers are under the influence at that level, at least some are not. They will then argue, perhaps less plausibly, that the number not under the influence is substantial enough to impeach the constitutionality of presumptions based on .10 per cent. In any event, we can expect many arguments that the fact that some men may not be under the influence at .10 per cent should provide a reasonable doubt in the case at bar. As a clincher, these arguments will then quote some of the earlier oversimplified writings and testimony of pro-chemical-test experts to the effect that not all persons are under the influence until the .15 per cent blood-alcohol level is reached.¹⁹²

One thing should be made plain: although a number of the scientists and researchers in the area of chemical testing are traffic safety partisans and perhaps less objective than might be desired, the new recommendations do not represent any collective attempt to distort or suppress scientific facts. The unhappiness with the misuse by the courts of the old .05-.15 per cent presumptions may have been a factor leading to reconsideration, but the decisive influence was unquestionably the research done on the effect of alcohol on driving just after World War II.¹⁹³

¹⁸⁹ A.M.A. MANUAL 68a (1963 Addendum). Note the shift to *prima facie* evidence from the old language of presumption.

¹⁹⁰ UNIFORM VEHICLE CODE § 11-902(b).

¹⁹¹ See note 186 *supra*.

¹⁹² See ERWIN §§ 14.02[5], .10.

¹⁹³ INDIANA UNIVERSITY, SYMPOSIUM ON ALCOHOL AND ROAD TRAFFIC,

A second point to be made most emphatically, although rarely stressed by chemical-test enthusiasts, is that chemical tests are becoming much more accurate. The .15 per cent presumption gave a perhaps needed margin for error in earlier days.

A third factor can be mentioned for what it is worth. Driving is daily becoming a more complex and demanding task as traffic increases. Perhaps a lesser impairment has become more critical for safe driving.

The influence of alcohol on driver behavior is far more subtle and pervasive than mere impairment of coordination—which was the consideration on which the early studies concentrated.¹⁹⁴ Evi-

PROCEEDINGS 276-77 (1959). In this connection, it is instructive to note the dates of the First (1950) and Second (1953) International Conferences on Alcohol and Road Traffic.

¹⁹⁴ See Rentoul, *Observations on the Effects of Alcohol and Their Relations to Urine Alcohol Effects*, in THIRD CONFERENCE 147, 150:

While this prolongation of reaction time seems to me to be a reasonable explanation of an increase in the accident rate associated with drinking, it did not seem to be the complete answer to the problem. The defect did not, in fact, seem to be big enough. I went back through all the figures and studied again the records of each individual's behavior, and I then came upon what may be another important factor. When you are establishing the normal reaction time for an individual it takes some time for him to get accustomed to the machine, and you get occasional markedly prolonged reaction times due to a failure of manipulation. After some time these occur infrequently, and when they did occur they were left out of the calculations as due to a failure in experimental technique. When we made a closer examination, however, we found that these isolated markedly prolonged reaction times, which did not fit into the individual's general reaction picture, occurred far more frequently when the individual had taken alcohol, and they continued to occur no matter how familiar the person became with the machine. . . . Now if this finding is correct it is extremely important. I think myself that it is due to a failure in concentration. The person under the influence can maintain his concentration for varying periods, but suddenly there seems to be a momentary cessation of cerebration with possible disastrous results. . . .

Dr. Borkenstein, it should be mentioned, is critical of simple reaction-time studies. He maintains that the reaction in an automotive emergency is not simple but complex. Alcohol may, quite dangerously, speed up this reaction time. One needs in a crisis on the road to do such things as check escape routes, look quickly in the rear-view mirror to see whether there is traffic behind, etc. The proper action may not be a putting on of brakes suddenly and instinctively, but a speeding up or some other evasive driving action. Alcohol at low levels can impair the judgment necessary to make these critical decisions even though it may have no noticeable effect upon simple reaction time. In one test typists being scored on both speed and accuracy were given small amounts of alcohol. They actually typed faster than usual during the test, but their overall scores dropped because they made more mistakes. Compare, however, Fox, *Behavior of Alcohol in the Body/Effect of*

dence indicates clearly that alcohol even at low levels will (1) impair judgment; (2) release controls on neurotic or emotional impulses and reactions (including suicidal ones); and (3) cause momentary lapses in concentration. These effects add up to impaired driving.

"That's all very well," the defense lawyer will respond. "I'm convinced by the Grand Rapids Study¹⁹⁵ that the accident rate begins to skyrocket at levels above .08 per cent. The only thing wrong is that our laws do not make 'statistical tendency to produce accidents' a crime. The laws haven't changed; they still require proof beyond a reasonable doubt that the driver is 'under the influence.' And I believe there are a good many experienced drinkers walking around who aren't noticeably affected at the .10 per cent level. The scientists can't change the definition of 'under the influence' to fit their new findings. This is a legal concept and change must come in the courts and the legislatures."

The defense lawyer has a point. While not so numerous as he implies, there are a few individuals who cannot be adjudged "under the influence" at the .10 per cent level on the basis of ordinary clinical symptoms. They may well be truly impaired in their driving ability, but does their impairment amount to the "appreciable impairment" that has been required in North Carolina and a few other states?¹⁹⁶ This is a minority verbal formulation,¹⁹⁷ and the experience has been for the courts to reach the same general interpretative results in under-the-influence cases despite the semantic differences. Nevertheless, it does pose a problem for the courts that have explained "under the influence" in those terms in the past. One escape route possible would be for the court to say that when the legislature adopted a .10 per cent presumption it by implication directed the court to conform to the majority view of "under the influence."

Accepting the majority formulation of "slightest" or "any" impairment as defining "under the influence," there is nevertheless a further problem. Even under this strict definition, the courts in

Alcohol on Behavior, Traffic Dig. & Rev., June 1964, p. 21, 23-24 (indicating that generally complex reaction time is slowed even more than simple reaction time).

¹⁹⁵ BORKENSTEIN, CROWTHER, SHUMATE, ZIEL & ZYLMAN, *THE ROLE OF THE DRINKING DRIVER IN TRAFFIC ACCIDENTS* (1964).

¹⁹⁶ See ERWIN § 1.04, at 15.

¹⁹⁷ See note 12 *supra*; see also DONIGAN 4-10. The majority of courts seem to state that the phrase "under the influence" includes "any" or "the slightest" or "some" impairment.

pre-chemical-test days (when the legislatures adopted the under-the-influence statutes) would have uniformly turned loose these rare individuals who apparently hold their liquor at .10 per cent. Does that forever fix the interpretation of the statute? Or does the application of that interpretation change in the light of changing circumstances? It should be relatively easy for the courts to answer "no" to the first question and "yes" to the second.

The problem discussed above is essentially theoretical. Under existing procedures in the United States, a driver is not tested at random but only after the officer has formed the belief that he is under the influence. Thus, the person who can hold his liquor and who arguably may not be impaired does not become part of this consideration.¹⁹⁸ It should not often be necessary, for example, for courts to explore whether a conviction may stand when the *only* evidence of impairment results from the chemical test results.¹⁹⁹

The current thinking in light of the new evidence thus is that *all* drivers are impaired (at least as to capacity to meet possible emergencies) when their blood-alcohol level is above .10 per cent. But even assuming the existence of a few persons who with blood alcohol at this level will not fall under the state's legal definition of impairment, should their existence rule out use of a statutory presumptive level set at .10 per cent? There seems little doubt as to the validity of setting the level at this point. To be constitutional such a presumption would have to be reasonable and rebuttable.²⁰⁰

¹⁹⁸ About the only time the drinking nonimpaired driver would be charged with an offense would be when he was sick or injured and displaying visible symptoms resembling those of alcoholic impairment. And in most instances this type of driver would welcome a chemical test in order to clear himself.

¹⁹⁹ *But see* State v. Johnson, 42 N.J. 146, 173-74, 199 A.2d 809, 824 (1964). On this subject generally, see DONIGAN 30-35.

²⁰⁰ *Cf.* United States v. Gainey, 380 U.S. 63 (1965). Of course, the state could constitutionally drop the presumption approach altogether and simply make it unlawful for a person to drive when he has over a certain percentage of alcohol in his blood. The action of alcohol is consistent enough that it would be fair—at least on the misdemeanor level—to impose strict liability. The *mens rea* requirement might cause trouble, however, if the punishment became too stringent or the percentage of alcohol were set too low. *Cf.* Morissette v. United States, 342 U.S. 246 (1952).

One state, Nebraska, has pioneered with a law setting .15% as the level at which driving becomes flatly unlawful. DONIGAN 34.

Although it has retained its .15% under-the-influence presumptive level, New York several years ago enacted a lesser-included offense prohibiting an adult from driving with as much as .10% alcohol in his blood and prohibiting a person under twenty-one from driving with as much as .05%. See *Id.* at 23.

As the number of drinking drivers who arguably might not be covered by the presumption is relatively small, the reasonableness can be shown.²⁰¹

4. *Problems with Respect to "Per Cent by Weight"*—A previous note²⁰² has explained that the "percentage" of blood alcohol almost universally²⁰³ utilized in this country is not a true percentage at all but a convenient conventional method of expressing the weight-volume solution strength historically arrived at in our chemical laboratories. Understanding this convention is essential to correct interpretation of results. Accepting the specific gravity of normal blood as 1.055 at 20 degrees Centigrade, a given weight/weight (or true) percentage will be on the order of five per cent lower than the same weight/volume conventional "percentage" that excludes the factor of specific gravity.²⁰⁴

This problem has been compounded by the fact that our most important legislative model, the *Uniform Vehicle Code*, until 1962 stated its presumptive levels in terms of "per cent . . . by weight of alcohol" in the blood—without any further definition.²⁰⁵ Because of the confusion between the true percentage and the conventional, a number of persons with medical and scientific orientation advocated total abandonment of the percentage concept. In November 1962, for example:

The House of Delegates of the American Medical Association, on recommendation of its Reference Committee on Public Health and Occupational Health, adopted a recommendation that the method of reporting alcohol concentration in the blood be on the basis of milligrams of alcohol per 100 milliliters of blood. On this basis, 0.05 per cent would become 50 milligrams per 100 milliliters (50 mg./100 ml.) and 0.10 per cent would become 100 milligrams per 100 milliliters (100 mg./100 ml.).²⁰⁶

In an attempt to give effect to the recommendation that was brewing in the American Medical Association, the 1962 revision of

²⁰¹ Compare *United States v. Romano*, 382 U.S. 136 (1965) with *United States v. Gainey*, 380 U.S. 63 (1965).

²⁰² See note 53 *supra*.

²⁰³ But see UNIFORM CHEMICAL TEST FOR INTOXICATION ACT § 7(d).

²⁰⁴ Dr. Borkenstein relates that one European laboratory testing an early model of the Breathalyzer in blood-breath correlation tests complained that the Breathalyzer results consistently ran about five per cent high. Investigation revealed that the laboratory was reporting its blood percentages on a weight/weight basis.

²⁰⁵ See DONIGAN, *CHEMICAL TESTS AND THE LAW* 18 (1st ed. 1957).

²⁰⁶ A.M.A. MANUAL 68a (1963 Addendum).

the *Uniform Vehicle Code* retained the per-cent-by-weight-of-alcohol terminology but added a new definitional subsection: "4. Per cent by weight of alcohol in the blood shall be based upon milligrams of alcohol per one hundred cubic centimeters of blood."²⁰⁷

It is easy to understand why the drafters of the *Code* would reject abandonment of the percentage concept; a tremendous amount of public education and propaganda has been based on the older terminology and there has been a substantial acceptance and understanding of the general significance of the various blood-alcohol concentrations so expressed. Yet in following only part of the A.M.A. recommendation, the revised *Code* promulgates what is at the very least a mathematical *non sequitur*. Percentage being a one-to-one-hundred ratio, disregarding specific gravity and using that of water would require the weight-volume percentage to be based upon *grams* of alcohol per one hundred milliliters (or cubic centimeters) of blood.²⁰⁸ The *Uniform Vehicle Code* definition, taken literally, postulates a one-to-100,000 ratio. The significance of this is blunted, however, since for convenience the fractions of a gram would normally be expressed in milligrams anyway and thus indicate a fraction of a per cent.

Assuming that the court understands the problem,²⁰⁹ it seems

²⁰⁷ UNIFORM VEHICLE CODE § 11-902(b), subparagraph 4.

²⁰⁸ Cf. UNIFORM CHEMICAL TEST FOR INTOXICATION ACT § 7(d) which says "per cent by weight of alcohol in the blood shall be based upon milligrams of alcohol per one hundred milligrams of blood."

²⁰⁹ ERWIN § 14.03[3][d] quotes from a case, *State v. Rodell*, 17 Wis. 2d 451, 117 N.W.2d 278 (1962), in which the mathematics in question caused confusion. The person who administered the test stated that there was "seventeen hundredths of one per cent of alcohol in the blood by volume"; the court noted that the state's statute was in terms of percentage by weight and said in a dictum that it was erroneous to invoke the statutory presumption on the basis of this evidence. The operator, of course, simply made a misstatement. No one routinely quantifies the minute amounts of alcohol that are extracted from test samples by volume; it would be too inaccurate. Use of the analytical balance, on the other hand, assures that a weight quantification can be done with extreme accuracy and precision.

Erwin, building upon the Wisconsin case, compounds the confusion by stating in essence that there is a twenty-five per cent difference between "percentage by volume" and "percentage by weight." Inasmuch as the specific gravity of alcohol is .79 at 20 degrees C., a pure "by volume" percentage (*i.e.*, volume/volume) would differ from a weight/weight percentage by approximately the amount indicated, for 1.0 is about twenty-five per cent greater than .79. The operator, of course, meant to say that the breath test gave a blood-alcohol reading in terms of a weight/volume percentage. As noted above, this weight/volume result will run about five per cent higher than a weight/weight percentage. See text at note 204 *supra*.

unlikely that this somewhat ambiguous definition will cause any purely legal difficulties in any state that copies²¹⁰ the provisions of the Code. Since the definition of a percentage is mathematically impossible, it will be necessary to convert the milligrams to grams to make sense, and the intended meaning will prevail.²¹¹ At the trial level, however, this definition may prove useful to the defense for embarrassing the state's expert witnesses asked to explain it and for confusing the jury.²¹²

III. CONSTITUTIONAL PROBLEMS

One week after its five-to-four decision in *Miranda v. Arizona*²¹³ extending the full privilege against self-incrimination into the police station, the Supreme Court of the United States handed down another five-to-four decision in a chemical-test case restricting the application of the privilege. The split of the justices remained the same except for the change of one vote. Not startlingly, the swing man, Mr. Justice Brennan,²¹⁴ delivered the opinion of the Court. *Schmerber v. California*²¹⁵ restricted the reach of the privilege against self-incrimination and held:

²¹⁰ E.g., N.C. GEN. STAT. § 20-139.1(a) (1965).

²¹¹ Under N.C. GEN. STAT. § 20-139.1(b) (1965), North Carolina follows the recommendation in the *Uniform Vehicle Code* and confers upon its State Board of Health the responsibility of approving both chemical-test methods and licensing qualified operators. In regulations made pursuant to this authorization, the State Board of Health has clarified the problem here discussed by defining "blood alcohol level" as "per cent by weight of alcohol in a person's blood. At the 0.10 per cent level, the percentage shall be based upon one hundred milligrams of alcohol per one hundred cubic centimeters of blood."

²¹² It is also reasonable to expect in the near future an amendment of the *Uniform Vehicle Code*. In the appendix to Donigan's 1966 edition the Code is reprinted in part. Although the Code has not yet been formally amended, DONIGAN 313 carries UNIFORM VEHICLE CODE § 11-902(b), paragraph 4, as follows:

4. Per cent by weight of alcohol in the blood shall be based upon grams of alcohol per one hundred cubic centimeters of blood. [Emphasis added.]

Donigan apparently expects an amendment soon and does not want his new edition to be made obsolete in this particular.

²¹³ 384 U.S. 436 (1966).

²¹⁴ Formerly a member of the New Jersey judiciary, a state which pioneered in chemical testing in this country, Mr. Justice Brennan wrote the opinion in *State v. Hunter*, 4 N.J. Super. 531, 68 A.2d 274 (App. Div. 1949) (case reversed, but judicial notice taken of effect of blood-alcohol level over .15% on driving).

²¹⁵ 384 U.S. 757 (1966).

that the privilege protects an accused only from being compelled to testify against himself, or otherwise provide the State with evidence of a testimonial or communicative nature, and that the withdrawal of blood and use of the analysis in question in this case did not involve compulsion to these ends.²¹⁶

Although the case answered one important open question and hinted at the answers to several others, it was itself curiously limited in several respects and raises perhaps as many questions as it answers. In the discussion below, then, the implications as well as the holdings of this second²¹⁷ chemical-test case decided by the Supreme Court of the United States will be analyzed along with other governing principles.

So far as formal constitutional analysis is concerned, most commentators have evolved a conventional three-pronged approach to chemical testing. (1) They have asserted that extracting blood or taking other samples for testing, at least when done under reasonably sanitary and nonviolent circumstances, does not offend minimal due process requirements.²¹⁸ (2) They have asserted that the privilege against self-incrimination does not apply to compelled production of physical as distinguished from testimonial evidence.²¹⁹ (3) They have asserted that the right of search and seizure incident to a lawful arrest justifies chemical testing of a person in custody upon probable cause.²²⁰ The majority opinion in *Schmerber*, although it suggests some qualifications, in the main appears to accept this conventional constitutional analysis.

It is instructive that while there is no constitutional proscription that really covers chemical-test cases,²²¹ a number of the trial courts

²¹⁶ *Id.* at 761.

²¹⁷ The first was *Breithaupt v. Abram*, 352 U.S. 432 (1957). An earlier case was dismissed for failure to present a federal question. *Walton v. California*, 350 U.S. 868 (1955).

²¹⁸ The holding of *Breithaupt v. Abram*, 352 U.S. 432 (1957).

²¹⁹ This contention was upheld in *Schmerber v. California*, 384 U.S. 757 (1966).

²²⁰ This assertion was passed upon in *Schmerber* and at least partially upheld.

²²¹ See Note, 31 U. CHI. L. REV. 603, 605-06 (1964):

Drivers' arguments may have failed, however, because they have raised only self-incrimination, due process or search and seizure objections which the courts have properly rejected on the basis of established doctrine. It is urged here that the federal constitutional issue would be more sharply posed by arguing that an incriminating sample of body fluid or breath submitted under the terms of the [implied-consent] statute is analogous to a coerced confession.

that first faced the issue hesitated to accept chemical-test evidence unless the test was voluntarily taken. None stated any compelling reasons for the rejection, but clearly many courts were troubled by the thought that some inherent unfairness or coerciveness might be involved. In time, however, sentiment in the lower courts began to shift. Factors in the shift probably included (1) success of the traffic-safety propagandists in showing drunk driving to be an extreme danger to society; (2) legislative judgments in favor of chemical testing through the passage of implied-consent laws and statutory presumptions; (3) apparent approval of chemical testing by the Supreme Court of the United States in *Breithaupt v. Abram*,²²² and (4) the ascendancy of legal commentators utilizing the three-pronged analysis and stating that there was no constitutional ban against pressuring defendants under arrest for drunk driving into taking chemical tests.²²³

A. Consent

It has been generally conceded by all courts that when a man consents to take a chemical test while in custody, this consent, if voluntarily given, is not vitiated by his drunkenness. If he was conscious enough to consent at all, the courts seem to hold him to it, absent any special factors of police behavior in obtaining consent or

I agree with the author's line of logic, but not with his conclusion that borrowing the coerced confession rule would invalidate the implied-consent statutes. See text accompanying note 266 *infra*.

The coerced confession exclusionary rule is today nothing more than a special application of a due process test. It is important to remember that the rule excluding confessions developed originally on the line of testimonial trustworthiness. It was not until the decision in *Rogers v. Richmond*, 365 U.S. 534 (1961), that testimonial trustworthiness was explicitly rejected and the due process exclusionary rule substituted for it. As *Miranda* makes clear, the old coerced-confession rule did *not* prohibit all compulsion; it only rejected that which went beyond the pale and became "overbearing." To my mind, facing the defendant with a legal dilemma—as is the case with implied-consent statutes—is not the kind of overbearing treated in the confessions cases.

²²² 352 U.S. 432, 435-40 (1957).

²²³ See DONIGAN 188-264 for a digest of over 500 state cases on chemical testing. More of the early appellate cases upheld chemical tests against attack than struck them down, but the scarcity of appellate decisions clearly indicates reluctance at the lower court level to admit tests that were not voluntarily taken. See Note, 31 U. CHI. L. REV. 603, 604 (1964) (citing 1941 ruling of Attorney General of New York). It is noteworthy, however, that though a number of courts subjected the statutes to very strict construction, no state court ever held the essential provisions of implied-consent laws unconstitutional.

failure to observe statutory or court-made requirements of the jurisdiction as to procedures in chemical-test cases.²²⁴

So far as academic statement of the law is concerned, this situation is not likely to change a great deal. But two things will probably make voluntary consent by a defendant to take a chemical test less frequent in drunk-driving cases. (1) Although they do not strictly apply, the new high standards for voluntariness or for waiver of constitutional rights developed in other cases will inevitably exert their influence.²²⁵ The courts will become more and more strict in determining what is true voluntary submission to a chemical test. (2) As the public begins to know more about chemical testing and as testing begins to aid in the jurisdiction's convictions for drunk driving, the number of voluntary submissions to chemical test will decline.²²⁶

B. Various Types of Compulsion

The future of chemical testing depends on the allowable extent and types of compulsion to take the test and the consequences of refusal. Lumping all types of tests together for one moment, non-volunteers who are suspected of drunk driving and are requested to take a chemical test may be broken into the following categories:²²⁷

- (1) The person who successfully refuses to submit to a chemical test and
 - (a) his driver's license is placed in jeopardy because of the refusal [implied-consent laws] and/or
 - (b) the fact of the refusal is offered in the criminal drunk-driving trial for the purpose of illustrating the defendant's consciousness of probable guilt.
- (2) The person who reluctantly consents to a chemical test in order to avoid either or both of the adverse factors listed above attendant upon refusal, and the results of the test are offered as evidence against him.

²²⁴ See DONIGAN 162-65.

²²⁵ See criticism of this practice of borrowing precedents from another area in *Miranda v. Arizona*, 384 U.S. 436, 513 (1966) (dissenting opinion). Perhaps the most popular recent case setting high standards for waiver of rights that is being cited in other areas is *Fay v. Noia*, 372 U.S. 391 (1963).

²²⁶ DONIGAN 175-76.

²²⁷ When the nature of the test may affect the law applicable to it, there will be individual analysis of the rules applicable to blood, breath, and urine tests.

- (3) The person who refuses to take the chemical test but is compelled to submit anyhow, and the results of a test taken without violence or force are offered as evidence against him [the facts of *Schmerber v. California*].
- (4) The person who refuses to take the chemical test and is forcibly compelled to submit anyhow, and the results of the test are offered as evidence against him.
- (5) The person who is unconscious when a chemical test is administered, and the results of the test are offered as evidence against him [the facts of *Breithaupt v. Abram*].

Statutes, administrative provisions, and various holdings of state courts furnish differing answers in the situations outlined above.²²⁸ The question to be discussed here, however, is not what answer one state or another might reach, but what effect the Constitution of the United States has on the issues posed, since restrictive consequences of this nature cannot be avoided by any state.

C. Implied-Consent Statutes

To the extent that a defendant *has* a constitutional right to refuse a chemical test, the so-called implied-consent statutes²²⁹ are, I believe, ineffective to alter the right.²³⁰ What it really boils down to is whether the state has a right to compel the defendant to take the test under the circumstances of the case—say, a defendant lawfully arrested for drunk driving on probable cause.²³¹ If the state could

²²⁸ See DONIGAN for an exhaustive treatment of state cases.

²²⁹ The model is UNIFORM VEHICLE CODE § 6-205.1. Fifteen states have adopted legislation of this type: Connecticut, Idaho, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Dakota, Oregon, South Dakota, Utah, Vermont, and Virginia. Committee on Alcohol and Drugs, National Safety Council, Annual Report of Subcommittee on Legal Matters (Dec. 6, 1965). North Carolina has a law which is of the implied-consent form, but the traditional license suspension sanction did not survive into the legislative enactment. The defendant's refusal to take the test, however, is made admissible in evidence. N.C. GEN. STAT. § 20-16.2 (1965).

²³⁰ *Hess v. Pawloski*, 274 U.S. 352 (1927), has been completely superseded in its implied-consent concept by cases such as *International Shoe Co. v. Washington*, 326 U.S. 310 (1945). See particularly *Olberding v. Illinois Cent. R.R.*, 346 U.S. 338, 341 (1953). For other criticisms of the driving-is-a-privilege approach of the implied-consent laws, see INDIANA UNIVERSITY, SYMPOSIUM ON ALCOHOL AND ROAD TRAFFIC, PROCEEDINGS 247-56 (1959); Weinstein, *Some Thoughts on Legislation, Alcohol and Drivers in the United States*, in SECOND CONFERENCE 82, 86-88.

²³¹ UNIFORM VEHICLE CODE § 6-205.1(a) confines the operation of its compulsory provision to a person "arrested for any offense arising out of

use reasonable compulsion of some sort to force a defendant to take a test of some kind and use the results against him in court upon his trial on a criminal charge, then the state could clearly take such a lesser coercive action as granting a privilege of refusal but suspending a driver's license upon that refusal.²³²

D. Introducing Evidence of Refusal

From a purely pragmatic viewpoint, the reasoning used above—if correct—should apply here. Once you concede the right of the state to use a threat of license revocation as a form of coercion (and also to follow through on its threat), there seems little difference between that and threatening to tell the court or jury in the criminal trial of the refusal to take the test. Most defendants would surely look upon the revelation at trial as a lesser threat than the threat to take away the driver's license.

This analysis, of course, reckons without the effect of constitutional doctrine. *Schmerber v. California*, in upholding the chemical test, emphasized the difference between testimonial compulsion and noncommunicative compulsion.²³³ Traditionally, the rules of evidence have permitted telling the court or jury of the defendant's refusal to take the test only when it could be shown that the refusal was prompted by the defendant's consciousness of probable guilt.²³⁴ But forcing the defendant to communicate awareness of guilt is well within the scope of what the privilege against self-incrimina-

acts alleged to have been committed while the person was driving or in actual physical control of a motor vehicle while under the influence of intoxicating liquor." Some of the earlier state statutes, however, contain no such restriction. It is my belief that attempts to use such unrestricted statutes to compel chemical testing when there is not both probable cause and lawful arrest as a foundation would run into constitutional difficulty.

²³² The license-suspension procedure would, of course, have to afford due process of law. The *Uniform Vehicle Code* expressly grants a right of refusal; even when the statute does not do this, the courts will undoubtedly imply the right from the provision of a sanction for refusal.

²³³ *Schmerber v. California*, 384 U.S. 757, 764 (1966):

The distinction which has emerged, often expressed in different ways, is that the privilege is a bar against compelling "communications" or "testimony," but that compulsion which makes a suspect or accused the source of "real or physical evidence" does not violate it.

Although we agree that this distinction is a helpful framework for analysis, we are not to be understood to agree with past application in all instances. . . .

²³⁴ DONIGAN 166-71. See, e.g., *State v. Paschal*, 253 N.C. 795, 117 S.E.2d 749 (1961).

tion forbids.²³⁵ As noted, *Miranda v. Arizona* extended the full reach of the privilege to defendants in police custody, and *Schmerber* acknowledged the testimonial nature of most refusals in a long and somewhat confusing footnote.²³⁶

This conclusion [that the incriminating evidence stemmed from the test alone] would not necessarily govern had the State tried to show that the accused had incriminated himself when told that he would have to be tested. Such incriminating evidence may be an unavoidable by-product of the compulsion to take the test, especially for an individual who fears the extraction or opposes it on religious grounds. If it wishes to compel persons to submit to such attempts to discover evidence, the State may have to forego the advantage of any *testimonial* products of administering the test—products which would fall within the privilege. . . .

Petitioner has raised a similar issue in this case, in connection with a police request that he submit to a "breathalyzer" test of air expelled from his lungs for alcohol content. He refused the request, and evidence of his refusal was admitted in evidence without objection. He argues that the introduction of this evidence and a comment by the prosecutor in closing argument upon his refusal is ground for reversal under *Griffin v. California*, 380 U.S. 609. We think general Fifth Amendment principles, rather than the particular holding of *Griffin*, would be applicable in these circumstances, see *Miranda v. Arizona* Since trial here was conducted after our decision in *Malloy v. Hogan*, [378 U.S. 1 (1964)], making those principles applicable to the States, we think petitioner's contention is foreclosed by his failure to object on this ground to the prosecutor's question and statements.²³⁷

Assuming that this exclusion of refusal testimony is a constitutionally-compelled application of the privilege against self-incrimination,²³⁸ it can be argued that statutes such as North Caro-

²³⁵ Cf. *Griffin v. California*, 380 U.S. 609 (1965). *Griffin* holds that a defendant's constitutional right not to take the witness stand cannot be undermined by adverse comment to the jury. As there is no absolute right to refuse a chemical test, the Court in the footnote quoted in the text at note 236 *infra* correctly indicates that *Griffin* has no direct application.

²³⁶ *Schmerber v. California*, 384 U.S. 757, 765-66 n.9 (1966). The Court seemed especially concerned that refusals based on fear or religious scruples would be used to incriminate defendants, yet the traditional rules of evidence would treat reasons of this nature as exculpatory.

²³⁷ But cf. *Henry v. Mississippi*, 379 U.S. 443 (1965).

²³⁸ Cf. *Miranda v. Arizona*, 384 U.S. 436, 512 (1966) (dissenting opinion):

The Fifth Amendment, however, has never been thought to forbid all pressure to incriminate one's self in the situations covered by it. On

lina's²³⁹ that attempt to impose this minor type of compulsion to take the chemical test will fare no better than the nonstatutory California practice, at least when there is an objection by the defense.²⁴⁰

E. Reluctant Consent; Refusal But No Resistance

There seems to be little constitutional difference between persons who consent reluctantly to take chemical tests and those who at first refuse but eventually submit to the test without resistance.²⁴¹

the contrary, it has been held that failure to incriminate one's self can result in denial of removal of one's case from state to federal court, *Maryland v. Soper*, 270 U.S. 9; in refusal of a military commission, *Orloff v. Willoughby*, 345 U.S. 83; in denial of a discharge in bankruptcy, *Kaufman v. Hurwitz*, 176 F.2d 210; and in numerous other adverse consequences. . . .

See, however, note 240 *infra*.

²³⁹ N.C. GEN. STAT. § 20-16.2(b) (1965). The present version of the *Uniform Vehicle Code* does not recommend a provision authorizing introduction of refusal testimony, but this provision is in UNIFORM CHEMICAL TEST FOR INTOXICATION ACT § 8.

²⁴⁰ This appears to be a very close question. Telling the jury of the refusal seems so slight a thing compared with forcing a defendant to take a test against his will or suspending his driver's license that I feel some members of the Court would balk at striking down the North Carolina statutory procedure. Yet, for me, pure logic impels the conclusion that evidence of refusal would be inadmissible. If the method of compelling the permissible result (submission to the test) is itself an independent violation of the privilege against self-incrimination, the legitimacy of the result desired and the relative innocuousness of the constitutional transgression would appear to be immaterial. Legal interpretations of the privilege have historically tended to be hard and fast. In *Schmerber*, for example, Mr. Justice Black in his dissent complains that "it is a strange hierarchy of values that allows the State to extract a human being's blood to convict him of a crime . . . but proscribes compelled production of his lifeless papers." *Schmerber v. California*, 384 U.S. 757, 775 (1966).

The best argument for the North Carolina practice might be as follows: North Carolina's compulsion is designed to result in *submissions* to tests—not refusals—and any self-incrimination stems not from the compulsion itself but from a policy choice on the part of the defendant; the sanction for refusal should not be viewed independently but as a part of a reasonable statutory procedure admittedly calculated to accomplish a constitutional end. This view is stoutly held by one of my colleagues. He would restrict the first paragraph of the *Schmerber* footnote quoted in the text to the problem of "concomitant blurring" while a defendant is being compelled to take a test. He would also stress the fact that the California practice of introducing evidence of refusal seemingly condemned in the second paragraph is not an integral part of a reasonable statute—and that as the scope of the privilege against self-incrimination is expanded the Court will have to depart from prior hard-and-fast applications and come to a standard of reasonableness. For an analysis agreeing that comment on refusal to take the test is probably not prohibited, see GEORGE, CONSTITUTIONAL LIMITATIONS ON EVIDENCE IN CRIMINAL CASES 85-86 (1966). See also *People v. Suddath*, 52 Cal. Rptr. 377 (Dist. Ct. App. 1966).

²⁴¹ *Schmerber* refused to take a Breathalyzer test but at first consented

Both classes are clearly compelled²⁴² to take the test and the crucial issue is the nature of the compulsion rather than anything else.²⁴³

The person who persists in his refusal may well be able to frustrate the nonforcible administration of breath or urine tests, in which cooperation of the person tested is required, but *Schmerber* holds that taking blood—under hospital conditions, at least²⁴⁴—is only a minor intrusion and in the usual case is just as available as any other type of test. *Schmerber* does mention, however, the unusual case in which the person to be tested has an extreme fear or religious scruples concerning the needle, and raises the question whether the state might not have to prove an alternative test for such a person.²⁴⁵

to the blood test. Before the blood was extracted, however, he withdrew his consent. Brief for Respondent, p. 5, *Schmerber v. California*, 384 U.S. 757 (1966).

As to this reverse application of the point made in the text, compare *Miranda v. Arizona* 384 U.S. 436, 473-74 (1966):

If the individual indicates in any manner, at any time prior to or during questioning, that he wishes to remain silent, the interrogation must cease. At this point he has shown that he intends to exercise his Fifth Amendment privilege; any statement taken after the person invokes his privilege cannot be other than the product of compulsion, subtle or otherwise. . . .

²⁴² See text accompanying notes 265-66 *infra*. See also note 221 *supra*.

²⁴³ If the compulsion used is unlawful, it follows that any test taken as a result of it would be subject to exclusion. If use of evidence of refusal to take the test is ruled unconstitutional, this means that a statute such as North Carolina's is subject to attack. N.C. GEN. STAT. § 20-16.2(b) (1965) is unusual in providing for introduction of refusal evidence in court on the drunk driving trial as the sole sanction for refusal.

The situation may be different in states in which the threat to revoke or suspend the driver license is the compulsion. There, a statute or a court decision also authorizing comment to the jury upon refusals to take the test could probably be shown to be so secondary in effect as not to exert any significant influence upon a defendant's decision to take the test. And in any event, if the constitutional prohibition became clear, the jurisdiction offering the test could make it plain that the sole compelling factor operative is the threat to the license.

²⁴⁴ *Schmerber v. California*, 384 U.S. 757, 771-72 (1966):

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

²⁴⁵ *Id.* at 771.

F. Use of Force or Threat of Violence to Compel Test

Although *Schmerber* depended upon old precedents relating to fingerprints, having defendants try on clothing, and the like²⁴⁶ in reaching its distinction between testimonial and nontestimonial compulsions, the opinion indicated that "inappropriate force"²⁴⁷ would not be allowed to compel a test. This may be much less force than is generally understood to be permissible to compel a man to have his fingerprints taken, for example. It seems quite conceivable, in fact, that physical force may eventually be ruled out entirely as a permissible kind of compulsion.²⁴⁸

The implied-consent laws seem to be highly desirable in that they usually give a right of refusal²⁴⁹ and substitute a legal compulsion for any type of physical or psychological compulsion to be imposed at the discretion of the police.

G. Testing an Unconscious Person

Schmerber specifically reaffirmed "this aspect"²⁵⁰ of *Breithaupt v. Abram*—that it is not a violation of fourteenth amendment due process for the state to order a withdrawal of the blood of an unconscious person "by a physician in a simple, medically acceptable manner in a hospital environment."²⁵¹

To the extent that the blood withdrawal in *Breithaupt* was an unlawful search²⁵² under the fourth amendment, however, it seems the result in that case will be changed by an exclusionary rule of *Mapp v. Ohio*.²⁵³ This brings into issue whether the state now has to get a search warrant or arrest an unconscious man in a hospital to justify the search involved in extracting or otherwise obtaining a physical sample for chemical analysis and later possible incriminating use

²⁴⁶ The Court cited a good deal of authority and quoted from the opinion of Mr. Justice Holmes in *Holt v. United States*, 218 U.S. 245 (1910). For an extensive discussion of cases, see DONIGAN 133-54.

²⁴⁷ *Schmerber v. California*, 384 U.S. 757, 760 n.4 (1966): "It would be a different case if the police initiated the violence, refused to respect a reasonable request to undergo a different form of testing, or responded to resistance with inappropriate force."

²⁴⁸ This is pure hunch on my part, based on evolving due process concepts. See text accompanying notes 265-66 *infra*. See also note 221 *supra*.

²⁴⁹ See note 232 *supra*.

²⁵⁰ *Schmerber v. California*, 384 U.S. 757, 760 (1966).

²⁵¹ *Ibid.* Compare note 244 *supra*.

²⁵² *Schmerber* made it clear that taking blood from a person was a search coming within the fourth amendment.

²⁵³ 367 U.S. 643 (1961).

in evidence.²⁵⁴ It may be that some "reasonable-search" exception analogous to that of *Carroll v. United States*²⁵⁵ might be permitted where there is strong cause and when there is no time (or available state procedure) for obtaining a search warrant and it is truly inconvenient and unnecessary for the police to make a formal arrest and then be subjected to the requirement of keeping the defendant in police custody while in the hospital. It should be kept in mind, however, that the Court will not be generous in creating additional *Carroll*-type exceptions to the rule requiring search warrants.

H. Chemical Testing and Search and Seizure

Schmerber specifically affirmed the taking of blood in that case as a reasonable search without warrant incident to a lawful arrest.²⁵⁶ This was done in such a narrow way, however, that it creates some doubts as to procedure in the usual drunk-driving case in which a defendant is taken to a headquarters location that happens to be near the office of a warrant-issuing official. First, the Court ruled out the statements of old cases that there was an automatic *right* to search the person of the defendant incident to all arrests—at least when the scope of the search would include "intrusions beyond the body's surface."²⁵⁷ The case seems to hold that it takes *more* than mere probable cause to believe that an incriminating amount of

²⁵⁴ A similar situation may arise when the sample of blood was originally taken as a matter of medical routine and not at the request of the police. In this case, however, there are doctor-patient privilege problems that do not arise when the doctor is acting *for* the police. See generally DONIGAN 106-12.

²⁵⁵ 267 U.S. 132 (1925). On the point discussed in the text, see note 259 *infra*.

²⁵⁶ The arrest was also without warrant. Although the misdemeanor of drunk driving did not occur in the presence of the arresting officer, he had reasonable cause to believe a felony had been committed since California law in effect made it a felony to injure anyone while driving drunk. The arrest of the defendant was in fact made for the felony, though the charges were later dropped. *Schmerber v. California*, 384 U.S. 757, 768-69 n.12 (1966). Brief of Respondent, p. 5.

This aspect of the case raises an interesting question for jurisdictions such as North Carolina which have arrest laws that are narrower than those of California. N.C. GEN. STAT. § 15-41(b) (1965) permits arrests for felonies committed out of the presence of the officer only when "the officer has reasonable ground to believe that the person . . . will evade arrest if not immediately taken into custody." Query as to the effect of the *Mapp* exclusionary rule upon arrests that are valid by constitutional standards but which are unlawful because of failure to meet state statutory requirements.

²⁵⁷ *Schmerber v. California*, 384 U.S. 757, 769 (1966).

alcohol will be found in the blood before the bodily intrusion is justified:

In the absence of a *clear indication* that in fact such evidence will be found, these fundamental human interests require law officers to suffer the risk that such evidence may disappear unless there is an immediate search.

Although the facts which established probable cause *to arrest* in this case *also* suggested the *required* relevance and *likely success* of a test of petitioner's blood for alcohol, the question remains whether the arresting officer was permitted to draw these inferences himself, or was required instead to procure a warrant before proceeding with the test. . . .²⁵⁸

Then, in discussing whether the search could take place as an incident of the arrest and without a search warrant,²⁵⁹ the Court praised the interposition of the "neutral and detached magistrate"²⁶⁰ and upheld the warrantless search with this narrow language:

The officer in the present case, however, might reasonably have believed that he was confronted with an emergency, in

²⁵⁸ *Id.* at 770. (Emphasis added.)

²⁵⁹ The rule of *Preston v. United States*, 376 U.S. 364 (1964), concerning search incident to arrest was not mentioned by the Court except in connection with its decision that the officer may well have thought himself confronted with an emergency situation in which he had no time to get a warrant. *Preston* has been read by some as outlawing all searches incident to arrest except when conducted at the same time and place as the arrest. See *James v. Louisiana*, 382 U.S. 36 (1965); see also *Stoner v. California*, 376 U.S. 483, 486 (1964). These cases dealt, however, with search of places rather than of persons. The time-place problem did not arise in *Schmerber* because the arresting officer actually made the formal arrest (for a felony) in the hospital.

In the usual case it might be argued that the arrest in a constitutional sense occurs when there is a clear restraint upon the freedom of the defendant at the traffic scene. Thus it is obvious that a rigid interpretation of *Preston*, *Stoner*, and *James* so as to require a search warrant for a chemical-test specimen unless the test is made at the time and place of the arrest would constitute a major obstacle to chemical testing in many states. The right of continued search of *persons* in police custody is apparently an unsettled question. There was a second search of the defendant at police headquarters in *Beck v. Ohio*, 379 U.S. 89 (1964), and it passed without comment, but the disposition of that case made discussion of this aspect of the search issue unnecessary.

Where the defendant is already in police custody and there is—as there usually is—abundant probable cause of the defendant's impairment, it seems somewhat formalistic to require a search warrant before a breath or a urine specimen may be taken. (There may be different considerations with respect to blood withdrawals.) Yet as noted in the text at note 255 *supra*, the Court will be slow to create additional *Carroll*-type exceptions to the rule requiring search warrants.

²⁶⁰ *Johnson v. United States*, 333 U.S. 10, 14 (1948).

which the delay necessary to obtain a warrant, under the circumstances, threatened "the destruction of evidence," *Preston v. United States*, 376 U.S. 364, 367. We are told that the percentage of alcohol in the blood begins to diminish shortly after drinking stops, as the body functions to eliminate it from the system. *Particularly in a case such as this*, where time had to be taken to bring the accused to a hospital and to investigate the scene of the accident, there was no time to seek out a magistrate and secure a warrant. *Given these special facts*, we conclude that the attempt to secure evidence of blood-alcohol content in this case was an appropriate incident to petitioner's arrest.²⁶¹

It remains to be seen whether the restrictive language above is nothing more than habitual judicial caution in limiting the holding to the facts of the case or whether it indicates the imposition of a search warrant requirement for the withdrawal of blood when there is time to get one.²⁶²

This article has several times indicated my preference for breath tests in today's enforcement situation. It seems appropriate, therefore, to ask how much of the restrictiveness of *Schmerber* is tied to the fact that blood withdrawal intrudes below the body's surface. Must the evidentiary indications of the need for a chemical test meet the more-than-probable-cause requirement before a breath or urine test can be compelled? If the base factors are verbalized as "interests in human dignity and privacy which the Fourth Amendment protects,"²⁶³ many would argue that the holding would apply to urine as well as blood tests. Those who would assert a pervasive "zone of privacy"²⁶⁴ would probably wish to apply the same stringent threshold requirements even to breath tests. The same considerations may also hold as to the potential get-a-warrant-if-there-is-time rule.

I. Types of Permissible Compulsion

The extent and type of the compulsion that might be used has been touched on briefly above in the sections on implied-consent sanctions and on use of force. My personal opinion is that the

²⁶¹ *Schmerber v. California*, 384 U.S. 757, 770-71 (1966). (Emphasis added.)

²⁶² If such a warrant requirement is imposed, it may require legislation in a number of states to broaden the class of objects for which search warrants may issue. In North Carolina, for example, search warrants could not be obtained for blood or breath samples in misdemeanor cases. Cf. N.C. GEN. STAT. § 15-25.2 (1965).

²⁶³ *Schmerber v. California*, 384 U.S. 757, 769-70 (1966).

²⁶⁴ *Id.* at 778 (dissenting opinion).

future cases will begin to narrow the permissible use of force and perhaps rule it out altogether. It is not impossible for the Court to adopt by analogy²⁶⁵ the old "voluntariness" test in confessions cases that has now been superseded by the warning requirements of *Miranda v. Arizona*. There one already has a developed body of law that rules out force, threats, and promises and then goes on to delineate how much psychological pressure is too much.²⁶⁶

The "voluntariness" test in its present form is essentially an application of the due-process requirement. This basic requirement also governs the extent of compulsion allowable in chemical test cases. The abuses that led the Court to hold that the "voluntariness" test, as enforced in the lower courts, did not sufficiently protect the constitutional rights of persons subjected to in-custody interrogation to my mind do not carry over into chemical testing of drunken drivers.

J. Right to Have Counsel Present During Test

The Court rejected Schmerber's contention that since he had refused the test on the advice of counsel to force him to take it anyhow was a denial of the right to counsel. The Court indicated that consequences of the right to counsel are not enlarged by a lawyer's having "erroneously advised"²⁶⁷ his client. The Court then closed its brief paragraph on the right to counsel: "No issue of counsel's ability to assist petitioner in respect of any rights he did possess is presented. The limited claim thus made must be rejected."²⁶⁸

It is clear that this does not end the matter. The procedural hurdles to be placed before police exercising their "right" to test suspected drunk drivers will inevitably be bound up with the aftermath of the interrogation restrictions in *Miranda v. Arizona* and the procedures that are finally evolved to meet the requirements of

²⁶⁵ See note 225 *supra*.

²⁶⁶ See, e.g., *Miranda v. Arizona*, 384 U.S. 436, 508-09 (1966) (dissenting opinion):

[T]he Court has developed an elaborate, sophisticated, and sensitive approach to admissibility of confessions. It is "judicial" in its treatment of one case at a time, . . . flexible in its ability to respond to the endless mutations of fact presented, and ever more familiar to the lower courts. Of course, strict certainty is not obtained in this developing process, but this it often so with constitutional principles, and disagreement is usually confined to that borderland of close cases where it matters least.

²⁶⁷ *Schmerber v. California*, 384 U.S. 757, 766 (1966).

²⁶⁸ *Ibid.*

that case. Schmerber, the Court noted, was told by the officer "that he was under arrest and that he was entitled to the services of an attorney, and that he could remain silent and that anything that he told me would be used against him in evidence."²⁶⁹ The question of warnings will be discussed below.

The ordinary lawyer probably cannot assist a defendant undergoing a chemical test or being observed while performing physical coordination tests—assuming that the lawyer has no right to put a stop to the testing. His greatest value would be that of an outside observer who could perhaps insure the integrity of the results of the test or call attention to any serious discrepancies between the facts observed by the officers and their later testimony in court.²⁷⁰ *Miranda* attests that these considerations are by no means minor, but there may be more efficient ways of accomplishing the result desired. Of course, if because of *Miranda* the lawyer is going to be there anyhow during the questioning period, letting the lawyer stay to observe the testing may be the simplest solution.

K. Need for a Warning Before Questioning

The four-part warning²⁷¹ required by *Miranda* does not appear to be limited to felonies or the more serious misdemeanors²⁷² al-

²⁶⁹ *Id.* at 769.

²⁷⁰ See ERWIN § 26.09[1]. The suggestion has been made, however, that in implied-consent states a lawyer may be quite helpful in assisting a defendant who must decide whether to refuse or take the test offered.

²⁷¹ See Watts, *Memorandum to Officials Concerned with the Administration of Criminal Justice*, Popular Government, Sept. 1966, p. 9, 10:

An absolute requirement must be met as to warning the accused of his rights before any incriminating information elicited during an in-custody interrogation can be used against the accused in court. No matter how intelligent and educated the accused, the warning *must* be given beforehand. And, it applies to admissions and exculpatory statements as well as confessions—if they are in fact incriminating in effect and are sought to be used against the accused.

The warning is in four parts:

(1) The accused must be told of his right to remain silent.
(2) The accused must be told that what he does say may be used in court against him.

(3) The accused must be told that he has a right to have a lawyer present during the interrogation.

(4) The accused must be told that he has a right to an appointed lawyer if he cannot afford to hire one.

²⁷² *Id.* at 13-14:

The Court did not specify whether the rule applied to all cases or whether it applied only to felonies. In fact, the Court has left unanswered the full scope of the right-to-counsel requirement of *Gideon v. Wainwright*, 372 U.S. 335 (1963). A recent opinion has held that

though it is clear that the police abuses during interrogation which led to the *Miranda* rule primarily occur in the serious felony cases. *Miranda* does, however, limit the application of its warning requirement to "in-custody interrogation" as opposed to simple investigatory questioning. Assuming that the *Miranda* rule will apply to the more serious traffic offenses such as drunk driving, it is necessary to see when the four-part warning would be required.

In the ordinary case, the investigatory phase of a traffic case out on the highway appears not to come under the *Miranda* holding. The accused has not been isolated²⁷³ by the police from the support of others and there is no unrelenting series of questions to force incriminating admissions from the driver. It is not hard, however, to imagine traffic cases in the middle of the night, in isolated areas, or in which the driver is asked to sit in the investigating officer's automobile during the questioning. Here, there could well be an in-custody situation to which the *Miranda* rule would apply.²⁷⁴ The basic rule is—when the form of questioning shifts from that of "interview" to "interrogation," the warnings must be given. Physical location seems to be a secondary consideration.

the right to a jury in contempt cases applies when the punishment exceeds imprisonment for six months. *Cheff v. Schnackenberg* . . . [384 U.S. 373 (1966)]. Some see this as the level of punishment at which the states must begin to furnish counsel to indigents.

Since the warning requirement involves the Fifth Amendment privilege against self-incrimination just as fully as the Sixth Amendment right to counsel, the chances are good that the warning rule will apply across the board. In its in-court operation, the privilege against self-incrimination has always been understood to apply to all cases, no matter how minor. Also, if any misdemeanor is serious enough to require in-custody interrogation, it is probably a serious enough case that the right to counsel will exist and the right to a warning will be required. . . .

²⁷³ See *Miranda v. Arizona*, 384 U.S. 436, 455 (1966):

In essence, it [interrogation technique] is this: To be alone with the subject is essential to prevent distraction and to deprive him of any outside support. . . . It is important to keep the subject off balance, for example, by trading on his insecurity about himself or his surroundings. . . .

See also *id.* at 475: "Since the State is responsible for establishing the isolated circumstances under which the interrogation takes place . . ."

²⁷⁴ *Id.* at 477:

The principles announced today deal with the protection which must be given to the privilege against self-incrimination when the individual is first subjected to police interrogation while in custody at the station or otherwise deprived of his freedom of action in any way. It is at this point that our adversary system of criminal proceedings commences

Rather than bother with the elaborate warnings, the chemical-test operator may be tempted to set up a police procedure whereby no warnings would be given, all "interrogation" of the drunk driver would be eliminated, and there would be a gathering of "physical" evidence only. This is probably not wise. The warnings required by *Miranda* should be given whenever there is the least belief that they might be required. It is not so much the warnings themselves but the follow-through provisions that will eliminate effective questioning.²⁷⁵ Presumably the follow through would be required only as to interrogation designed to elicit "testimonial" answers. The police, within limits, could continue investigation and testing procedures that do not amount to "interrogation" or that are designed to measure physical responses only.

In this light, it would be helpful to examine the sections of the Alcoholic Influence Report Form to see whether they recommend asking questions that will call for testimonial answers.

The top portion of the form dealing with name, address, age, race, sex, weight,²⁷⁶ operator's license number, and the like are pure interview-type questions and probably would not come under *Miranda*.

The section on Observations apparently requires no questions at all and would not be in issue.

The section on Performance Tests requires only physical responses of a noncommunicative nature, and *Schmerber* appears to be a square holding that these do not come within the privilege against self-incrimination when reasonably conducted.²⁷⁷

²⁷⁵ See Watts, *supra* note 271 at 10-11:

If the accused cannot afford a lawyer and requests that one be appointed, the state has two choices: (1) get him a lawyer or (2) stop asking questions.

If the accused indicates that he will utilize his right to remain silent, the interrogation must stop. . . . If the accused asks for a lawyer, the interrogation must stop till the (retained or appointed) lawyer gets there. If the accused answers some questions but then, when the net seems to be closing in on him, indicates he will say no more, the interrogation must stop at that time. . . .

If a lawyer is present to advise the accused as to his answers, the police can probably continue asking questions despite the silence of the accused at least a short while. . . .

²⁷⁶ In some instances the defendant's weight may be an incriminating factor when there is taken into account information as to how much he drank in how short a time. The biological variables are such, however, that a good estimate of weight would be just as useful as the exact weight figure obtained from the lips of the defendant.

²⁷⁷ See *Schmerber v. California*, 384 U.S. 757, 764-65 & nn.7 & 8 (1966).

The section on Observer's Opinion requires no questions.

The section on Chemical Test Data is unobjectionable so long as it refers to a test that was made under lawful conditions, but the portion covering refusals to take the test and requiring the officer to ask why the test was refused rather clearly verges into the testimonial area.²⁷⁸

The questions on the first portion of the Interview section on the reverse of the form are not intended to get testimonial answers. Asking the defendant whether he was driving, where he was going, what road he was on, what day it is, what time it is, etc., is done primarily to test the memory of the defendant and his orientation as to space and time. Thus confined, the questions are not under the *Miranda* rule. The condition of mental impairment is being tested. The only problem, however, is that the responses to the questions are likely to be incriminating testimonial answers. This may be especially true when the defendant is asked whether he was driving. Such answers are admissible if they come fortuitously during an "interview," but by the time that the full Alcoholic Influence Report Form sequence is imposed on the defendant, the nature of the proceeding has clearly passed beyond the true interview situation—despite the caption used on the form. *Schmerber* indicates plainly that when compulsion is used to gain physical evidence, the state may have to forego the use of testimonial evidence that it gets as a bonus.²⁷⁹ Of course if the *Miranda* warnings have been given and the defendant has nevertheless consented to be questioned, the answers could be used.

Most of the questions on the rest of the Interview section seems to require testimonial answers. When the defendant last ate, when he drank, how much, whether he is ill or under a doctor's care, etc., are all capable either of directly incriminating the defendant or of rebutting possible defenses he may later offer.

The block at the end of the Interview section asking for a specimen of the defendant's handwriting is unquestionably authorized under the authority of *Schmerber*.

L. The Future of Chemical Testing

The decision in *Schmerber* probably guarantees that the states

²⁷⁸ See quotation from *Schmerber* in text accompanying note 236 *supra*.

²⁷⁹ See first paragraph of quotation from *Schmerber* in text accompanying note 236 *supra*.

will continue to have the power to impose reasonable chemical-test submission requirements upon persons for whom there is probable cause to hold for so potentially dangerous an act as driving a vehicle on the highway—or off the highway when other persons or property may be endangered—while under the influence of intoxicating liquor or an impairing drug. If the traffic becomes dense enough and the hazard great enough, necessity might one day even fashion legal doctrines to allow random chemical tests of drivers without probable cause.

This assertion does not mean, however, that *Schmerber* will stand as a leading case. The vague feeling persists with many that it is somehow either unfair or a repugnant “police-state” practice to make the drunk driver convict himself by submitting to a chemical test. In light of the current re-examination of the constitutional rights of the citizen against governmental oppression, it is safe to say that the traditional precedents are not much comfort. The underlying constitutional issues remain ripe for redetermination and yet more redetermination.

Schmerber, as a restriction upon the application of *Miranda*, goes hand-in-hand with it and will stand or fall with it. But even if *Miranda* survives, which seems more likely than not, *Schmerber*'s rationale will come under attack. The old distinction between communicative and noncommunicative incriminations has been preserved for the time being, but it will not stand indefinitely unless supported by basic principle as well as history. The opinion of the Court in *Schmerber* gave little in the way of convincing justification for the distinction utilized, and this will be continuing source of trouble.²⁸⁰

²⁸⁰ See *Schmerber v. California*, 384 U.S. 757, 762 (1966):

If the scope of the privilege coincided with the complex of values it helps to protect, we might be obliged to conclude that the privilege was violated. . . . Compelled submission fails on one view to respect the “inviolability of the human personality.” Moreover, since it enables the State to rely on evidence forced from the accused, the compulsion violates at least one meaning of the requirement that the State procure the evidence against an accused “by its own independent labors.”

[T]he privilege has never been given the full scope which the values it helps to protect suggest. *History and a long line of authorities* in lower courts have consistently limited its protection (Emphasis added.)

Although the result of the analysis made there may give the privilege less scope than is desirable today, the analytical approach of Professor John T. McNaughton is persuasive and considerably less broad-gauged than that adopted by either the majority or the dissent in *Schmerber*. See McNaugh-

The likelihood is that in the continuing debate over the rights of the individual versus the government, new general principles based on the right of privacy will be fashioned. The new principles should represent somewhat less amorphous concepts than those now current and they should much more clearly define the limits of an individual's privacy. When that day comes, necessary chemical testing of hazard-producing drivers will undoubtedly be assured—and on a more satisfactory conceptual base than exists at present. Waiting until that day comes, *Schmerber* now stands temporary duty at the constitutional dike.

ton, *The Privilege Against Self-Incrimination: Its Constitutional Affection, Raison d'Etre and Miscellaneous Implications*, 51 J. CRIM. L., C. & P.S. 138 (1960).