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AN EXPERIMENTAL EVALUATION OF FIELD SOBRIETY TESTS IN THE MARINE ENVIRONMENT

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Executive Summary

This Report describes an investigation of the accuracy of Field Sobriety Tests (FSTs) when used in the marine environment. FST's are non-chemical tests of intoxication which are used in highway law enforcement. These tests rely on the observation and measurement of the effect of alcohol intoxication on behaviors such as coordination, visual tracking and balance. It has been suggested that such behaviors might be degraded by the stressors encountered in the marine environment thereby invalidating them for such use. The purpose of this study was to determine if there was any decrease in the accuracy of the tests when used on individuals in recreational boating conditions.

In the study 97 volunteers (matched in age and sex to the population of individuals arrested by marine law enforcement agents) were dosed with alcohol in a setting closely approximating that encountered in recreational boating. The subjects were given four drinks over a three and one half hour exposure period. The dosages were calculated to cause the subject to reach Blood Alcohol Concentrations (BACs) of 0.12%, 0.08%, or 0%. During this exposure period the subjects spent approximately one and one half hours on the water at various speeds in an open high performance outboard type boat.

The subjects' BACs were estimated through FST procedures by marine law enforcement agents experienced in the use of such procedures. The FSTs were conducted both on the water and on land.

The officers' estimates were correlated with measurements of BAC obtained using breath testing units. The correlations obtained were similar to and consistent with correlations between FST estimates of BAC and breath test measurements found in studies conducted to simulate the highway environment.

Indices of the officer's performance in correctly determining whether a subject did or did not exceed an intoxication criteria were calculated. These indices revealed that; when used in a conservative manner FST tests used on the water will result in the arrest of a significantly greater number of intoxicated boaters than would observation and interrogation methods now used and would probably result in a very low level of false arrests.

This study was carried out for the U.S. Coast Guard's Office of Boating, Public and Consumer Affairs and Office of Engineering by the Transportation Systems Center, in cooperation with the International Association of Chiefs of Police, and the Coast Guard's Reserve Training Center at Yorktown VA. Contractual support was provided by Dunlap and Associates.

1.0 INTRODUCTION

1.1 Objective

The objective of this study was to determine the usefulness of field sobriety tests in assisting the marine law enforcement officer in determining if boat operators are intoxicated. This is part of the Coast Guard's effort to support local marine law enforcement. This study was performed in cooperation with the International Association of Chiefs of Police (IACP), which will use the information generated in assembling a boating safety manual focusing on the issue of alcohol detection.

Field sobriety tests have been verified as useful techniques in the detection of the intoxicated automobile operator. Since certain stressors are present in the boating environment which are not present on the highway, it is necessary to evaluate the effectiveness of these tests in the marine environment. It has been hypothesized that stressors inherent in marine operations (i.e., the effects of heat, spray, boat motion, vibration, glare) may cause boaters (whether intoxicated or sober) to perform poorly on field sobriety tests. It is, therefore, the intent of this study to determine the effectiveness of field sobriety tests in aiding the officer to differentiate between sober and intoxicated boat operators who have been exposed to the same marine environmental conditions.

In practice, when an officer suspects that a boater is operating while intoxicated, he or she will stop the boat and observe the appearance, demeanor, and behavior of the suspect. The officer may then ask the suspect to perform certain field sobriety tests. The results of these observations and tests are used to determine whether to detain the boater in order to obtain the breath, blood or urine sample required to perform a chemical test to determine the boater's BAC. Detention of an individual who does not exceed the legal limit is an inconvenience to the boater and a waste of time for the officer. This is true even in cases where the officer carries a portable breath tester because he or she must wait approximately ten minutes before taking the sample in order to eliminate the possibility that alcohol remaining in the mouth will contaminate the sample.

When chemical tests of BAC are used as evidence, they are frequently challenged based on the accuracy of the test instruments, the procedures followed, and the custody of the evidence. The results of valid field sobriety tests could be used not only to increase the accuracy of arrest/release decisions made by the marine officer but also as evidence in court procedures.

1.2 Study Background

Boating safety statistics compiled by the U.S. Coast Guard (Boating Statistics 1984) indicate that approximately 1,200 lives are lost each year in recreational boating accidents. The role of alcohol as contributing to the cause of these accidents is not known.

In order to investigate the role of alcohol in recreational boating safety, the U.S. Coast Guard contracted with the Transportation Research Board of the National Research Council to identify and develop a list of research efforts which would

improve our understanding of the role of alcohol intoxication in marine safety and support law enforcement efforts.

In February 1986 the TRB report "Workshop on Alcohol-Related Accidents in Recreational Boating" was published. The Coast Guard selected three of the efforts from the report and arranged for support from the Transportation Systems Center in their conduct.

The efforts selected were:

1. Assessment of the increased risk associated with alcohol intoxication in recreational boating.
2. Identification and evaluation of remote detection cues for alcohol intoxication in recreational boat operators.
3. Assessment of the effectiveness of non-chemical tests of intoxication in the marine environment.

This report describes the third effort.

1.3 Background - Field Sobriety Testing

The police officer in the field may use a number of tools in assessing the sobriety of a suspect, including: observation, interrogation, a series of performance tests known as "field sobriety tests", and Portable Breath Testing (PBT) units. The evidence derived through the accumulation of information provided by these indicators of intoxication is used in the process of developing probable cause for an OUI (Operating Under the Influence) arrest. PBTs provide a quick and reliable estimate of blood alcohol concentration (BAC). It must be understood that very few states have marine implied consent laws (laws which require a boat operator to submit to a PBT or other chemical BAC test). In marine law enforcement, when used, PBTs support the establishment of probable cause for arrest and are generally not the sole source of evidence. In states where there are no marine per se laws (specified legal BAC limit for intoxication) impairment must be proven, field sobriety testing can provide this type of evidence. In general, the determination of a case is usually based on the accumulation of evidence and rarely rests on only one indicator of possible guilt. In this study the non-chemical behavioral indicators of intoxication are evaluated.

Currently, highway officers use a recognized battery of field sobriety tests, which have been validated as an effective means for assessing impaired behavior. A specified criteria has been established for "normal" behavior within each of these tests. After the officer has ruled out the possibility of impairment due to age, physical condition, illness, disability or fatigue, it is assumed that deviations from "normal" performance are attributable to intoxication.

The results of this testing are used to support the officer's contention that there exists probable cause to arrest the operator. Many of these tests are also routinely used by marine law enforcement officers in identifying the OUI boater. However,

until now these tests have not been systematically examined for their validity of use in the marine environment.

An assessment of "Psychophysical Tests for DWI (Driving While Intoxicated) Arrest" was performed for the U.S. Department of Transportation, NHTSA, by Burns and Moskowitz (1977). They examined the effectiveness of six tests for their sensitivity as predictors of impairment attributable to alcohol consumption. All six tests were found to be "alcohol sensitive". The officers were found to make correct arrest/release decisions for 76% of the participants. The six tests studied were: One-Leg Stand, Walk and Turn, Horizontal Gaze Nystagmus, Finger to Nose, Finger Count, and Tracing. Of these six tests, Walk and Turn, One-Leg Stand, and Horizontal Gaze Nystagmus were identified as the three "best predictors" of intoxication.

Tharp, Burns, and Moskowitz (1981) studied the effectiveness of the abbreviated test battery. When officers used the Walk and Turn, One-Leg Stand, and Horizontal Gaze Nystagmus they were able to correctly classify 81% of the subjects as being above or below 0.10% BAC.

In the present study, five of the six above mentioned "alcohol sensitive" tests were examined in the marine environment. The Tracing task was omitted since paper and pencil tasks are difficult for all boaters to perform (regardless of alcohol consumption) due to the motion of a boat as it is affected by waves and wakes. Two additional field sobriety tests were added to this basic battery, since they are currently used in marine law enforcement and are considered to be effective by the states using them (CA., MD., and OH.). They are the Alphabet Recital and Hand Pat Test. These tests are easily and quickly administered in the marine environment.

2.0 METHOD

This was a controlled experimental study in which field sobriety tests commonly used in highway law enforcement were studied in the marine environment. Their effectiveness as predictors of BAC was assessed. Ninety-seven subjects from a population of Coast Guard, Army, and Marine personnel in the Yorktown, VA. area, participated in the study.

All study procedures involving the use of human subjects were reviewed by an "Institutional Review Board", which was convened by Dunlap and Associates. This was an independent committee whose primary concern was for the safety of the subjects. All study procedures were approved by the committee.

Subjects were dosed, with measured mixtures of grain alcohol and fruit juice, to one of three levels of Blood Alcohol Concentration (BAC) in accordance with their drinking history and body weight. The three target BAC levels were 0.00%, 0.08%, and 0.12%. Dosing occurred mainly on land (three drinks during a two hour period), with the final fourth drink consumed on the boat. Subjects were exposed to the marine environment, i.e., a 90 minute boat ride as passenger. A BAC measurement was taken on the boat prior to commencing field sobriety testing. Field sobriety tests were then given on the boat by a team of three marine law enforcement officers. One officer (rater #1) served as the lead officer, administering the tests while the other two officers observed. All officers administered the Horizontal Gaze Nystagmus individually, since it requires face-to-face contact with the suspect in order to rate performance. After giving a test or pair of tests (as designated) each officer on the team gave a written estimate of the subject's BAC level. Estimates of each officer were kept confidential so that one officer could not be influenced by the estimate of others. The subject was then transported to land. Field sobriety tests were then given on land by the same team of three officers. One officer (rater #2) served as the lead officer, administering the tests while the other two officers observed. All officers administered the Horizontal Gaze Nystagmus (HGN) individually. After giving a test or pair of tests (as designated) each officer on the team gave a written estimate of the subject's BAC level.

The sequence of testing was similar to actual arrest procedures. In such procedures the officer begins by interviewing the suspect, proceeds to easily administered performance tests, then administers the horizontal gaze nystagmus (provided that the officer is trained in administering this test). If at this point the officer feels relatively certain that the person may be intoxicated, he or she is transported to shore where balance tests can be administered.

Throughout the process the officer assesses the suspect's abilities and impairments and revises his or her estimate of the suspect's BAC. The intention was to replicate this process in this study.

2.1 Design

In order to determine the effectiveness of the field sobriety tests in aiding the officers to identify subjects who are intoxicated (generally at or above 0.10% in most states), three experimental groups were dosed to a reach target BAC levels and

tested. Each of the three groups was composed of approximately one third of the 97 subjects.

	<u>Subjects</u>	<u>Dose Range</u>	<u>Target BAC Level</u>
<u>Group A</u>	32	0.10% to 0.14%	0.12%
<u>Group B</u>	33	0.06% to 0.10%	0.08%
<u>Group C</u>	32	0.00%	0.00%

In the original proposal for this study it was intended that the three groups would be further divided in half in order to test for an order-effect for the tests believed to be the least accurate (the Alphabet Recital, Thumb to Finger Count, Hand Pat, and Finger to Nose). The orders of testing for each half of the subjects was to vary slightly, i.e., the order of the four performance tests would be reversed and the order of the two balance tests would be reversed as follows:

ORDER 1 (49 Subjects)

Interrogation
Behavioral Observation
1st BAC Estimate

Alphabet Recital
Hand Pat
2nd BAC Estimate

Finger to Nose
Thumb to Finger Count
3rd BAC Estimate

Horizontal Gaze Nystagmus
4th BAC Estimate

On Land - HGN
5th BAC Estimate

On Land - Walk and Turn
One Leg Stand
6th BAC Estimate

ORDER 2 (48 Subjects)

Interrogation
Behavioral Observation
1st Bac Estimate

Thumb to Finger Count
Finger to Nose
2nd BAC Estimate

Hand Pat
Alphabet Recital
3rd BAC Estimate

Horizontal Gaze Nystagmus
4th BAC Estimate

On Land - HGN
5th BAC Estimate

On Land - One Leg Stand
Walk and Turn
6th BAC Estimate

However, difficulties arose in obtaining a firm commitment for the participation of all 96 subjects. The experimental design used required 96 subjects.) When the study began it was uncertain whether enough subjects would participate and the decision

was made to begin testing subjects using Order 1 only and abandon the effort to test for an order effect.

2.2. Field Sobriety Tests Used

Interrogation and Observation

During a routine OUI investigation, the initial contact which the officer has with the suspect provides a period for interrogation and observation. During the first few moments of contact, the officer engages the suspect in conversation in order to have an opportunity to observe the suspects ability to answer simple questions and to demonstrate orientation to person, time, and place.

While conducting the interrogation the officer makes observations regarding the subject's appearance and manner. Observations may include cues obtained through checking: clothes, breath, attitude, facial coloration, eyes, pupils, speech, unusual actions. Often officers in the field are not provided with a formal checklist of items, but rely on recall in making their observations.

In order to insure that both teams of officers conducted a similar observation process, a list of typical questions was provided from which the officer could conduct the interrogation process. Officers were instructed to phrase the questions in their own style so that language and the situation in general would not be awkward or stilted.

This list was extracted from the Ohio Department of Natural Resources, Division of Watercraft, "Alcohol Influence Report". Similar checklists are in use in California, Maryland, and in several other states. The appendix includes a copy of interrogation questions, observation checklist, and scoring sheets for all testing.

Alphabet Recital

The suspect is asked to recite the alphabet from A through Z. In some locales, officers ask the suspect to recite from the middle of the alphabet, specifying a letter to begin at, for example, "recite the alphabet starting from the letter J". This is done, since it requires more thinking on the part of the suspect and may show confusion and lack of reasoning on the part of the suspect. However, for purposes of the study, the suspect was asked to recite from A through Z. In some court proceedings judges have been known to consider mid-alphabet recital as an attempt by the officer to confuse the suspect. Therefore, the method most widely accepted in a court of law as evidence of possible intoxication was used in this study.

Hand Pat

The suspect is instructed to hold both palms out, facing up. The left hand is kept stationary while clapping the palms together. When the palm is struck the person counts ONE. He then turns the right hand over and claps the back side

of the palm and counts TWO. The suspect continues to clap alternating palm and back side of palm and counting ONE, TWO.

The suspect is asked to count out loud and to increase his speed clapping and counting.

Finger to Nose

The suspect is seated and asked to put his hands at his side. With eyes closed and head tilted back slightly, he is asked to touch the tip of his nose with the tip of his index finger. When the officer says RIGHT the person uses his right hand. When the officer says LEFT the suspect uses his left hand.

Finger Count

The suspect is asked to touch and count each finger in succession, counting aloud. He touches thumb to finger and counts the four fingers aloud 1-2-3-4 and then reverses counting 4-3-2-1. He is instructed that each time he counts he should try to go a little faster.

Horizontal Gaze Nystagmus (HGN)

This test measures the involuntary lateral jerking motion of the eyes. It occurs upon lateral gaze when BAC exceeds .06 (Burns and Moskowitz, 1977).

The suspect is asked to look at the tip of a pencil. Keeping his head still, he is asked to track the tip of the pencil with his eyes while the officer moves it.

Walk and Turn

This is a test of balance and was, therefore, given on land. It is also a test of the person's ability to follow simple instructions and to divide his attention between listening to the officer and maintaining a specific standing position.

The suspect is instructed to stand on a line with his right foot in front of the left. He is instructed that the right heel should touch his left toe.

The suspect is instructed to take NINE heel-to-toe steps down the line, turn around, and take NINE heel-to-toe steps back. In turning around, the suspect turns by pivoting on one foot. He is asked to keep the foot on the line and use the other foot to turn himself around with several small steps. Hands are kept at the sides at all times. The suspect is instructed to watch his feet at all times, and count the steps out loud.

One-Leg Stand

This is a test of balance and was, therefore, given on land. It is also a test of the suspect's ability to follow simple instructions.

The suspect is asked to stand with his heels together and his arms down at his sides. He is asked to raise one leg so that his heel is about six inches off the

ground and to hold that position. While watching his raised foot the person is to count from 1001 to 1030.

2.3 Subjects and Raters

2.3.1. Subject Description

Ninety-seven subjects participated in the study. The subjects were all military personnel from various facilities in the Yorktown, VA. area. The majority of subjects were Coast Guard personnel from The Reserve Training Center (RTC) Yorktown, the site of the study. The remainder of subjects were from Coast Guard Fifth District, Marines from the Naval Weapons Station, and Army personnel from Fort Eustis.

Subjects participated on a voluntary basis. They were given a number to be used throughout the study and assured that all data would be confidential. Men between the ages of 21 to 42 were the participants. The rationale for concentrating testing on the male rather than a mixed male-female sample is explained below. The appendix includes the age distribution for subjects.

Subject Age

Range = 21 to 42 years

Mean = 27 years

Mode = 21 years (19% of all subjects)

In a review of arrest data for intoxicated boat operation for the two year period of 1985 and 1986 it was found that the over-whelming majority of arrests involved men within the age group of 21 to 40. This review of arrest records was initially performed for Task 2 of this project, which involved the identification of possible remote detection cues of intoxication. Arrest records were reviewed in the two states of Ohio and Maryland and two counties in California (San Joaquin County and Lake Shasta). Furthermore, in Task 1 of this project, Accident Reports of fatal boating accidents occurring in California and North Carolina (the two states which have kept the most complete records of fatal boating accidents) were reviewed. This data indicated that the majority of fatal boating accident victims were men.

2.3.2. Subject Screening

Screening was conducted by Dunlap and Associates. A notice was posted or appeared in the newsletter of the facilities from which subjects volunteered. Potential subjects were informed that this was a controlled study concerning the effects of alcohol on boaters. Male subjects between the ages of 21 to 50 were solicited (A sample Announcement appears in the appendix).

Potential subjects were initially screened either on the telephone prior to participation or in-person immediately before participation. They were asked about their age, boating experience, susceptibility to seasickness, medical condition, and drinking history. Based on answers to these questions, the person was selected or

rejected for participation. If selected, an appointment was set for participation in the study.

During a face-to-face interview (either prior to the day of participation or immediately before participation) the subject completed a "Subject Selection Instrument" (see appendix). The results of this questionnaire were used by Dunlap and Associates in assigning subjects to one of the three dosing groups. This was done in order to appropriately assign drinkers in accordance with their drinking history and habits.

This instrument produces two scores. The first score is the sum of the response weights for Question 1 through 11, and reflects the quantity, frequency and circumstances of the subject's typical drinking situations. The second score is the sum of the response rates for Questions 12 through 19, and reflects the subject's manifestation of generally accepted indications of "heavy" drinking. Questions 12 through 19 were derived from the Michigan "Alcoholism Screening Test".

Previous applications of the instrument by Dunlap and Associates led to establishment of the following "heavy" drinker score threshold:

1. a score of 25 or more on Questions 1-11, irrespective of the score on Questions 12-19; or,
2. a score of 18-24 on Questions 1-11, provided that a positive score (1 or more) is obtained on Questions 12-19.

The questionnaire score criteria used for the assignment of subjects to the three groups is included in appendix.

2.3.3. Raters/Marine Law Enforcement Officers

Two marine law enforcement officers from Maryland Department of Natural Resources and four marine law enforcement officers from Ohio Department of Watercraft served as raters for the study. All officers were experienced in field sobriety testing and arrest procedures.

Officer experience in marine law enforcement ranged from four to fifteen years. The majority of officers had nine or more years of experience (only one officer had four years of experience). All the officers had completed extensive training in field sobriety testing. They were certified in the administration of Field Sobriety Testing and had specific certification in Horizontal Gaze Nystagmus. Five of the six officers worked primarily in the field, while one of the officers worked primarily in an administrative and training capacity. Specifics on each of the officers are listed in appendix.

2.4. Facilities and Equipment

Facilities and equipment were jointly provided by RTC Yorktown and TSC. RTC Yorktown provided the physical site for the study including the rooms used for subject preparation and recovery. TSC provided all breath testing equipment.

2.4.1. Study Site

Two rooms in the Gymnasium Complex at RTC Yorktown were used for briefing, dosing, and recovery of subjects. Room #1 was used for the medical screening of subjects which took place prior to dosing. It also housed the breath testing equipment and breath-technician, dosing apparatus and dosing-technician. Room #2 was the area in which the subjects drank their drinks. Cards, magazines, and movies were provided for their entertainment during dosing. This room was also used for recovery, i.e., after being tested subjects returned to this room while waiting for their BAC to be confirmed to be 0.00% prior to release.

Wormley Creek was the docking area from which the boats were launched and returned. Figure 1 depicts the waterfront area. This area is about half a mile from the Gymnasium Complex. Therefore, a van was used to transport subjects to the dock.

2.4.2. Boats

Motor boats in the 16 to 18 foot range were used to provide the 90 minute boat ride for each subject. These were boats rented from U.S. Army, Fort Eustis. This particular type and size of boat was used since "Boating Statistics 1984" compiled by the U.S. Coast Guard indicate that the majority of fatal recreational boating accidents occur in boats that are less than 16 feet or 16 feet but less than 26 feet. In addition, the previously mentioned arrest data indicated the majority of OUI arrests to involve operators of boats in this type and size.

The boats used by the officers from which they conducted the on-water testing were 16 to 18 foot "Boston Whaler" type boats. They are typical of the boats they would usually be operating on patrol.

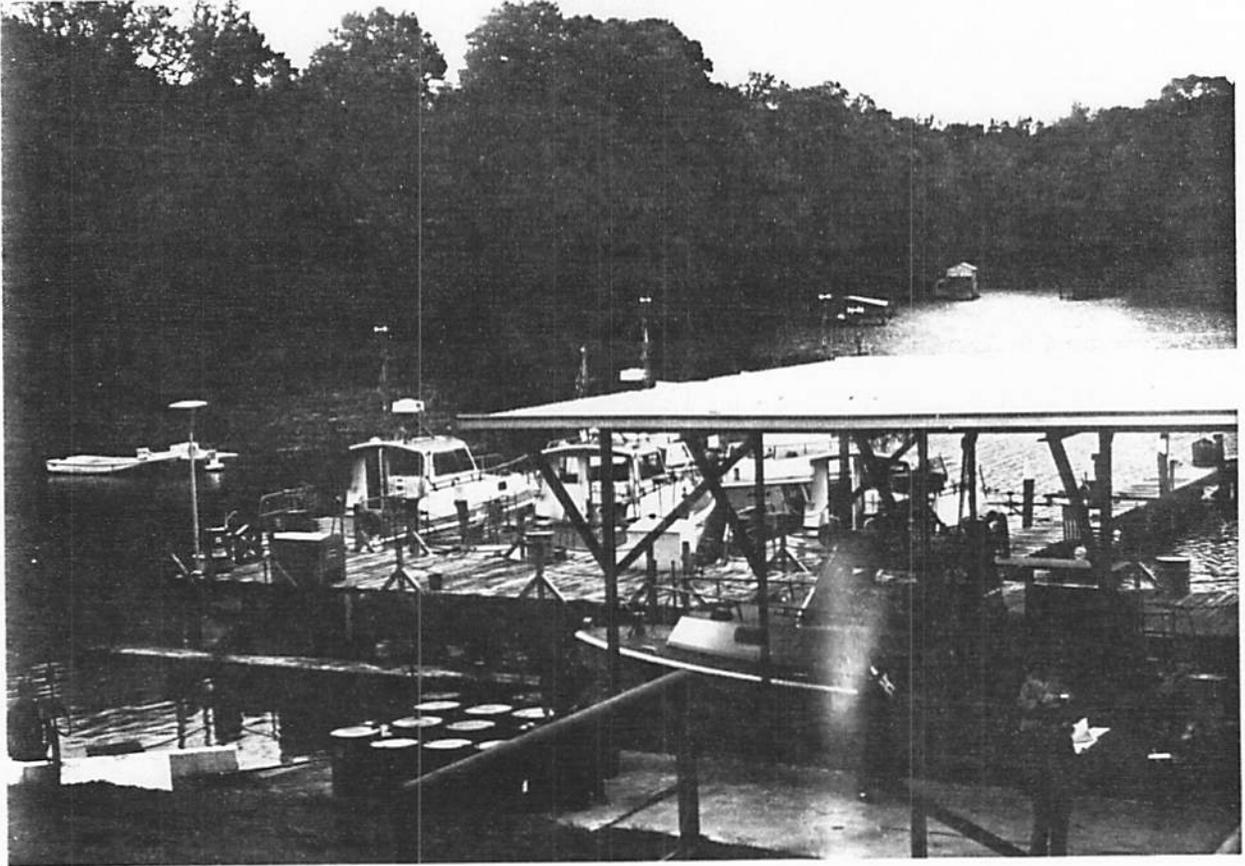
2.4.3. Dosing Schedule and Apparatus

The appendix includes the schedule followed for dosing subjects on each day. Some variations from the schedule occurred due to no-shows and late arrivals of subjects.

The appendix includes the nominal dosing levels employed for the subjects. Dosing was done with 190-proof (95%) grain alcohol. The drinks consisted of the appropriate alcohol dose and approximately 9 ounces of orange, grapefruit or tomato juice. The kind of juice used was dependent on the preference of the subject. For the Group C subjects (0.00% BAC), the drinks consisted of the preferred juice with approximately 4 milliliters of grain alcohol "floated" on top (i.e., the Group C subjects consumed a total of about 16 milliliters of grain alcohol over the four drinks served.) In no case did the Group C subjects register other than 0.00% on any of the breath tests given. In addition, no subject registered other than 0.00% on the first breath test of the day.

The actual doses given to the subjects varied somewhat from the nominal figures. Early on, the attempt was to "fine-tune" for the on the water testing. There were also variations in individual absorption rates due primarily to differences in stomach contents at the start of the dosing sessions. Dose levels were adjusted to attempt to compensate for such factors.

FIGURE 1
WATERFRONT AREA



The actual dose received by each subject along with the subjects number, group assignment, and body weight are presented in the appendix.

2.4.4. Breath Testing Equipment

Breath testing equipment was provided by TSC. All breath testing done on land, i.e., in the dosing area, was performed on the Seimens Alcomat. This highly accurate instrument uses an infrared absorption sensor. It provides a three-digit read-out of BAC. The machine provides a digital display on a small screen and also a printed display on a paper tape. For all on-land breath testing there were two tests performed for each round of testing in order to insure the accuracy of the reading.

Breath testing done on the boat, prior to the officers beginning the field sobriety testing, was performed with the Alcometer S-D2, a product of Lion Laboratories, Ltd. This is a small, portable, hand-held, light-weight instrument uses a fuel cell sensor. It provides a modified three-digit display of BAC. The last digit is rounded to the closest 0 or 5 reading, for example, 0.054% is rounded to a reading of 0.055%.

In order to determine the accuracy of the rater's estimates of BAC these estimates were compared to the BAC readings taken with the Alcometer PBT prior to field sobriety testing. For purposes of discussion the PBT readings are referred to as the "actual BAC" even though they are really breath based estimates of arterial blood alcohol concentration.

The accuracy of the reading obtained from the fuel cell PBT reading was checked against the Gas Chromatograph . Each PBT reading was compared to the readings obtained through breath testing using the Seimens Alcomat. Each PBT reading was compared to the Alcomat reading taken prior to boarding the boat and the reading taken immediately upon return to the recovery area following field sobriety testing. In 96 of the 97 cases the readings from both instruments (PBT and Alcomat) were compatible. One reading on the PBT was unrealistically high, which may have been due to the subject belching and, therefore, elevating the PBT reading. In this one case the actual BAC was adjusted for the analysis, i.e., made consistent with the Alcomat readings.

Both types of instruments were used by trained study personnel and the BAC readings were not revealed to the officers or subjects throughout the testing day. Both types of instruments were periodically checked for correct calibration. Both instruments were used with a disposable mouth-piece for each subject.

2.4.5. Routine and Emergency Medical Personnel

Medical personnel were provided by RTC Yorktown in order to conduct a routine medical examination prior to each subject's participation in the study. The appendix includes a copy of the "Medical Report" form.

During the examination the following items were checked: pulse, blood pressure, temperature, respiration. The subject was also questioned regarding recent consumption of any prescribed or over-the-counter medication. Based on the results

of this examination, the person would be certified as qualified or not qualified to participate in a controlled drinking study.

Throughout the study emergency medical assistance was on-call. RTC Yorktown has on-grounds medical facilities which were available for use in the event of illness or injury of any participant.

2.5. Preliminary Procedures

This section describes in detail the preliminary procedures followed before actual testing. These procedures include the establishment of a testing schedule, prerequisite environmental conditions under which testing could occur, instruction to subjects and officers regarding participation.

2.5.1. Testing Schedule

Two subjects were scheduled to arrive per hour. The first two subject arrived at 07:00 hours. With this schedule up to fourteen subjects per day could be tested during daylight hours. The target number for subjects was twelve per day. Due to no-shows and cancellations, on several days less than twelve subjects were tested. Subsequently, on other days extra subjects were tested. The most subjects tested in one day was thirteen. All testing was completed within nine days.

2.5.2. Environmental Conditions

All testing was conducted from May 11 through May 21, 1987 on the James River in Yorktown, VA. Testing was conducted during relatively mild summer-like weather conditions. The intention was to conduct testing during the typical weather conditions experienced by the average recreational boater. Furthermore, "Coast Guard Boating Statistics" indicate that the majority of fatal boating accidents occur during daylight hours in calm waters, little or no wind, good visibility, and water temperature of 60 to 79 degrees fahrenheit.

No testing was conducted under adverse conditions, such as, high winds and disturbed sea state. On the average the temperature was approximately 80 to 85 degrees, ranging from 65 to 95 degrees. Testing was conducted on both sunny and cloudy days. Testing was also conducted under conditions of light rain. No testing was conducting during heavy rain. All testing was conducted during daylight hours.

2.5.3. Subject Briefing

Subjects were informed regarding the day's proceedings as soon as they arrived for participation (see Briefing Sheet in appendix). They were told that their participation would be for approximately seven or eight hours. They were told that a medical technician would be giving them a brief medical examination in order to certify that they were ready for participation.

Each subject was told that he would be expected to consume a glass of fruit juice with a measured amount of alcohol each 40 minutes until three glasses had been

consumed. Before and after each drink he would be given a breath test. Following the third drink and breath test, he would be asked to board a boat for a 90 minute boat trip. During the trip he would be asked to consume a fourth drink. After the boat trip a breath test would be taken on the water and the subject's boat brought along side the officers' boat. The three police officers would then give the subjects standard field sobriety tests.

Subjects were instructed to act as if the situation was an actual encounter with a police officer and as if the person was indeed in danger of arrest. Subjects were instructed to perform as well as possible on each test. The seriousness of the scenario was emphasized. It was the job of the subject to convince the officers that he was sober.

Subjects were also informed that after testing they would receive a meal and periodic breath tests in order to monitor the elimination of alcohol from their bodies. When the alcohol content level was at 0.00% the subject would be released. During the briefing subjects were asked to sign an "Informed Consent Form" (see appendix).

2.5.4. Officer/Rater Briefing

Prior to beginning on Day 1 the officers were trained in the use of the "Scoring Sheets". It was explained that the six officers would be working in two teams of three officers. Officers were designated as belonging to Team 1 (Rater #1, #2, #3) and Team 2 (Rater #1, #2, #3). Two subjects would be tested simultaneously, i.e., one being tested by each team.

Rater #1 from each team served as the lead-officer during the on-the-boat testing. Rater #1 would greet and question the suspect and give all instructions for The Alphabet Recital, Hand Pat, Finger to Nose, Finger Count. All three officers would be observing for the behavioral indicators of intoxication and would be observing the results of the tests given by the lead-officer. The HGN was to be given by all three officers, since this test requires a face-to-face position by each suspect and officer in order for the officer to make an accurate rating. Therefore, the lead-officer (Rater #1) would give the HGN, then Rater #2, and then Rater #3 would give the test.

For the on-the-land testing again each officer gave the HGN. Then Rater #2 from each team served as the lead-officer for the two on-land tests: The Walk and Turn, and One-Leg Stand.

During the course of testing each officer was to make a BAC estimate after each test or pair of tests (as designated). With the results of each test the officer would have more information on the subject's abilities or level of impairment. Therefore, the BAC estimate may change as more information is received. Officers were instructed to make their estimates in accordance with their opinion at the moment, based on what they had seen thus far.

Officers were instructed to keep their scoring and BAC estimates confidential. They were not to look at each other's score sheets and were not to discuss their opinions on the subject's performance or BAC level. They were also cautioned to be mindful

of their gestures and facial expressions and to guard against indicating their opinions in this manner. They were informed that an observer would be present at all times throughout testing in order to inform them of any cues which they may inadvertently be giving to each other.

2.6. Study Procedures

This section describes, in detail, the procedures experienced by the subjects and officers throughout their participation in the study. Procedures are discussed for: preparing subjects for dosing, dosing of subjects, exposing subjects to the marine environment, field sobriety testing on the boat and on land, and subject monitoring and release.

2.6.1 Subject Arrival, Briefing, and Medical Examination

As previously mentioned, subjects arrived in groups of two. Two subjects arrived each hour beginning at 07:00 through 12:00. Subjects were briefed regarding their participation in the study. Subjects completed the screening questionnaires (if not previously completed prior to the day of participation). The medical examination was given. Each subject was then certified as ready or not ready for participation by the medical coreman.

The dosing technician questioned the subject regarding what he had for breakfast in order to adjust the dose considering differences in absorption rates due to stomach content. Subjects had been asked to limit their breakfast to a "light meal" of toast or cereal. However, not all subjects adhered to the request and it was necessary to question them regarding their meal.

The dosing technician then mixed the drink in order to begin elevation or no elevation (for the placebo group) of the subject's BAC level in accordance with the subject's group assignment. Before giving the subject the first drink a breath sample was taken by the breath technician.

This process took approximately 30 minutes. For a subject arriving at 0700, he would be ready for dosing at 07:30.

2.6.2. Dosing on Land

The first drink was given. The subject consumed the drink during the first 20 to 30 minutes of the 40 minute period, then after waiting ten minutes a breath test was given. Throughout the study, the subjects did not drink or smoke for ten minutes prior to breath testing, since this would have interfered with a proper BAC reading. At no time prior to field sobriety testing did subjects consume food, since this would have affected the subject's alcohol absorption rate. Movies, magazines, cards, were provided for the subjects to entertain themselves during dosing.

Drink #2 was given and consumed during the first 20 to 30 minutes of the next forty minute period. After waiting ten minutes a breath test was given. Drink #3 was given and consumed during the first 20 to 30 minutes of the next forty minute period. After waiting ten minutes a breath test was given.

Following the consumption of the three drinks, each subject was escorted to a boat. An escort accompanied the subject in order to insure his safety. The launching area was approximately a quarter-mile from the dosing area. The subjects were transported by van to Wormley Creek where they boarded a boat. Generally one subject rode on the boat with one boat operator and the escort. Due to periodic mechanical difficulty with some of the boats, at times two subjects rode in the same boat.

2.6.3. Dosing on the Boat

After the subject had been underway for approximately ten minutes he was given the fourth drink. This drink was pre-mixed by the dosing technician on shore and carried along by the escort.

2.6.4. Rendezvous with the Police Boat

After being underway for ninety minutes, the boat operators radioed the boat launch area to announce their approach. Each team of officers were waiting aboard a boat for one subject to test. One subject boat and one police boat were rafted together. (The two sets of subject and police boats were stationed approximately 100 to 200 yards from each other, i.e., a sufficient distance to insure non-interference.) The officers usually stayed in their boats (three in each boat) while the subjects stayed in their boat (one in each boat, accompanied by escort and operator). In the field officers usually conduct field sobriety testing from their own boats and do not board the suspect's boat unless necessary. The officer is at risk when he boards the suspect's boat. Figure 2 shows the position of boats during testing.

2.6.5. Testing BAC on Boat

Before the officers began the interrogation, observation, and field sobriety testing, a BAC test was given to the subject by the observer. The test was performed with the portable breath unit and the test results were kept secret from the subject and officers. Figure 3 depicts the breath testing. This test was performed in order to determine the subject's BAC level prior to testing so that, during data analysis, the officer's estimated BAC's could be compared to the actual BAC. Figure 4 represents the cumulative distribution of the BACs measured on the boat immediately prior to FST. The BACs measured are found in Table 1.

2.6.6. Field Sobriety Testing on the Boat

The procedure described to the officers during the "Officer/Rater Briefing" was followed during the nine day testing period. Testing occurred as follows:

The lead officer (who was Rater #1) was designated to perform the on-boat testing began questioning the subject, using the "Interview" section of the scoring sheet as a model. The officer phrased the questions in his own words. Meanwhile, the other two officers were listening and watching. All three officers made observations in accordance with the "Observation" section of the scoring sheet. Then each of the

FIGURE 2
POSITION OF BOATS DURING TESTING



FIGURE 3
BREATH TESTING PRIOR TO FIELD SOBRIETY TESTING



Figure 4

Cumulative Distribution of BACs

Prior to FST

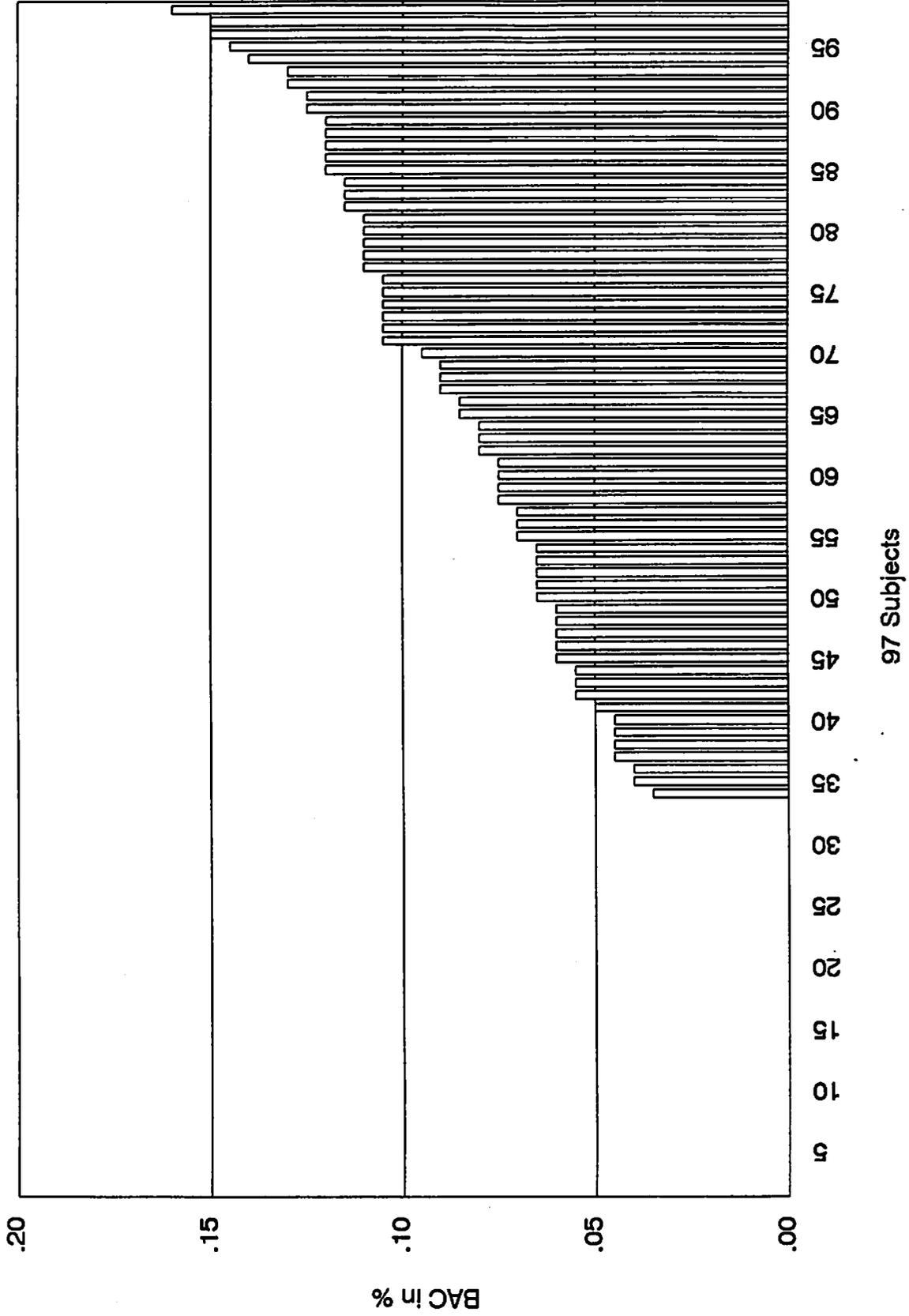


TABLE 1
BACs MEASURED PRIOR TO FST

.001	.071
.001	.071
.001	.071
.001	.071
.001	.071
.001	.071
.001	.071
.001	.081
.001	.081
.001	.081
.001	.081
.001	.081
.001	.081
.001	.081
.001	.081
.001	.091
.001	.091
.001	.091
.001	.091
.001	.091
.001	.091
.001	.101
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.001	.111
.041	.121
.041	.121
.041	.121
.051	.121
.051	.121
.051	.121
.051	.121
.051	.121
.061	.131
.061	.131
.061	.131
.061	.131
.061	.141
.061	.151
.061	.151
.061	.151
.071	.161

three officers made a BAC estimate on his/her scoring sheet. Each officer could not see the estimate of the other officers.

Then Rater #1 began the field sobriety testing. The "Alphabet Recital" was given by Rater #1 and individually scored by each rater in confidence on his/her scoring sheet. The "Hand Pat" test was given by Rater #1 and individually scored by each officer in confidence on his/her scoring sheet. After these two tests had been given the rates wrote down a BAC estimate for the subject. This estimate was based on the information received thus far.

Then Rater #1 gave the subject the "Finger to Nose" test. Each rater individually scored the subject's performance. Rater #1 then gave the subject the "Finger Count" test and again each officer individually scored the subject's performance. After these two test had been given the raters wrote down a BAC estimate for the subject. This estimate was based on the information received thus far.

Rater #1 gave the HGN test (depicted in Figure 5) and rated performance and wrote down a BAC estimate. Then the other two officers in turn gave the HGN, rated performance, and wrote down a BAC estimate. Once again, this estimate was based on the information received thus far.

At this point the subject was transported back to land.

2.6.7. Field Sobriety Testing on Land

Rater #2 in the team of three always served as the lead officer on land. This was done in order to reduce variance associated with subject exposure to different lead officers.

The lead officer on land gave the HGN, rated performance and gave a BAC estimate. Then the other two officers in turn did the same.

The subject was given ten minutes to attain "land-legs", i.e., stabilize balance. in order to perform the balance tests to follow.

The lead officer gave the "Walk and Turn" test (depicted in Figure 6) while the other two raters observed. All three officers individually recorded performance and wrote down a BAC estimate. This estimate was based on the information received thus far.

The lead officer gave the "One-Leg Stand" test while the other two officers observed. All three officers individually recorded performance and wrote down a BAC estimate. This estimate was based on the information received thus far.

2.6.8. Monitor and Release of Subject

The subject was then transported by van back to the Recovery Area. A breath test was taken on the Lion Alcolmeter S-D2 in order to later confirm the reliability of the on-boat BAC reading taken with the portable device.

FIGURE 5
ADMINISTERING THE HGN TEST ON THE BOAT



FIGURE 6
ADMINISTERING THE WALK AND TURN TEST ON LAND



The subject was then given lunch. Breath tests were given periodically and when the subject reached a 0.00% BAC he was released.

2.6.9. Officer Debriefing and Feedback Sessions

Each evening, following the testing of the last two subjects, a debriefing session was held. Any logistical problems which had arisen during the day were discussed. The officers were told the actual BAC for each subject tested that day. This feedback regarding actual BAC is representative of realistic arrest procedures. In the field, after the suspect has been given a chemical BAC test, the officer is told the score by the testing technician.

3.0 ANALYSIS

As indicated in the "Methods" section, the raters estimated the subject's BAC immediately after the following testing procedures:

<u>Tests Administered</u>	<u>BAC Estimates</u>
Interview and Observation	First
Alphabet Recital and Hand Pat	Second
Finger to Nose and Finger Count	Third
Horizontal Gaze Nystagmus on Boat	Fourth
Horizontal Gaze Nystagmus on Land	Fifth
Walk and Turn, One Leg Stand (Cumulative)	Sixth

All BAC estimates of all raters combined and all individual raters were included in the data analysis, with one exception. One of the six raters (Team 1, Rater 3) was experienced in the administrative and training aspects of marine law enforcement, but did not have experience in the implementation of OUI arrest procedures in the field. The appendix includes a list of the experience of all raters. This particular rater had no recent history of making arrests, while the other five officers had such OUI arrest experience. In examining the correlation between individual officer's Cumulative Rating (BAC estimate given after administering all tests) and the BAC (as measured by PBT) over three time periods, as seen in Table 2 and Figure 7, it was found that this officer's first three days of performance in the study were very erratic. Performance for this officer improved dramatically. By Day 4 the correlation between the cumulative rating and the measured BAC had stabilized. Therefore the data analysis includes only those ratings provided by the officer after day three. Improvement was probably achieved through exposure to the testing in the field and the daily Feedback Session described above. Examination of Figure 7 indicates no apparent trend of improvement for all raters over the two week period. However, four of the raters showed varying levels of improvement from the first to the second time period.

In order to provide an index of the accuracy with which the raters estimate the BACs which was consistent by the prior study (Burns and Moskowitz, op.cit.), Pearson correlation coefficients were computed between the BACs and the mean estimates of:

- both teams of raters, (the mean BAC estimates of the three team members for each of the two teams was compared with the measured BAC of subjects each team rated)
- each rater individually (the BAC estimates given by individual raters were compared with the measured BACs of the subjects rated)

Another index of accuracy was also used, the absolute deviation between the BAC estimate and the actual BAC. This measure is easily interpreted and the statistical significance of differences in this rating are readily tested using Student's t test.

Indices were also developed which measure the raters performance in determining whether a subject's BAC exceeded a set point. This procedure provides information on the probability that an officer will correctly discriminate individuals who are legally intoxicated from those that are not.

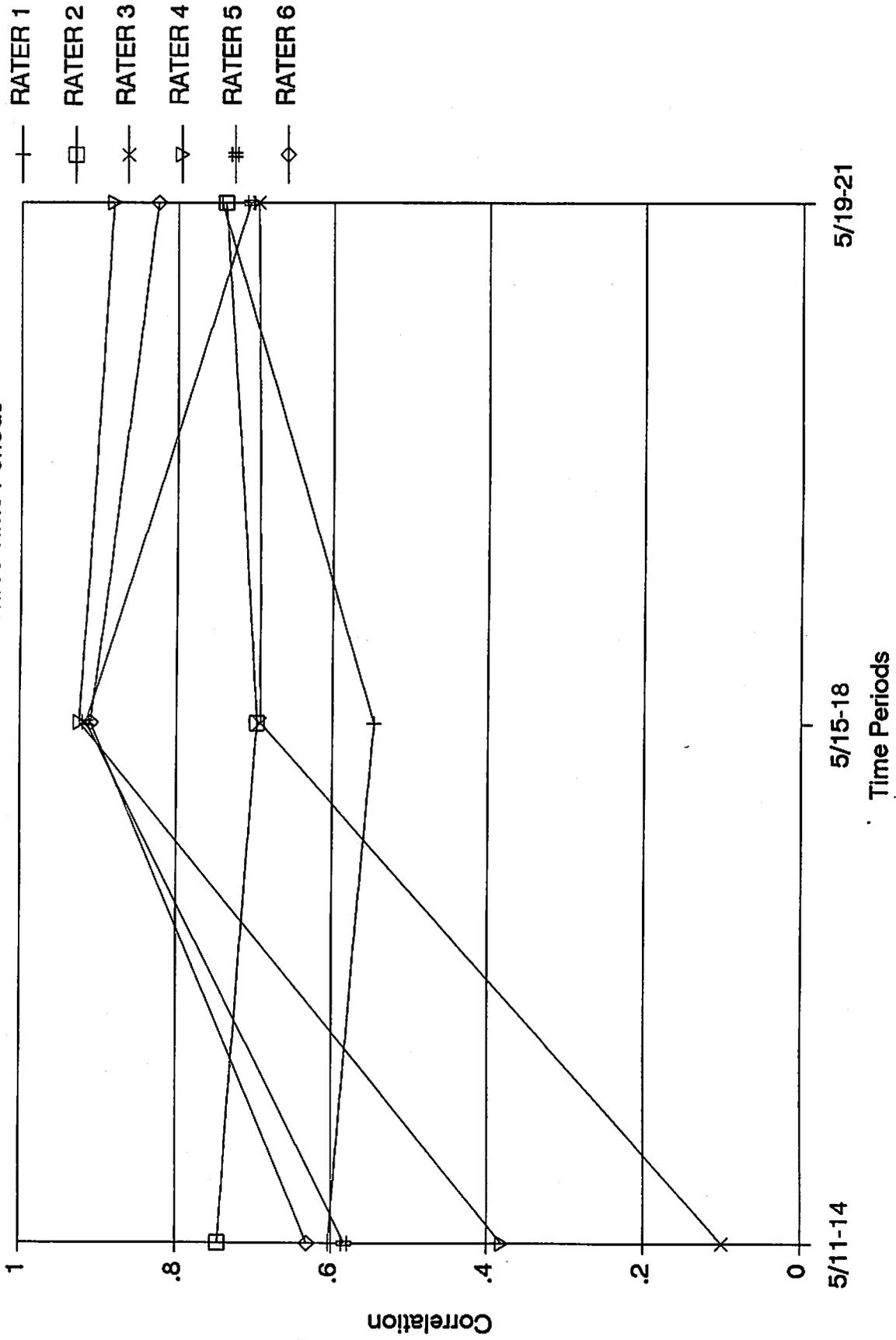
Table 2

Correlation of Individual Raters Cumulative Estimate with BAC Over Three Time Periods

	5/11-14	5/15-18	5/19-21
RATER 1	.604	.547	.744
RATER 2	.746	.697	.739
RATER 3	.100	.693	.697
RATER 4	.381	.924	.882
RATER 5	.583	.916	.707
RATER 6	.631	.910	.825
Mean	.508	.781	.766

Figure 7

Correlation of Individual Rater's Cumulative Estimate with BAC Over Three Time Periods



4.0 RESULTS

4.1 Correlations between estimates of BAC and measured BAC

4.1.1 Overall correlation between BAC estimates Actual BAC

Figure 8 depicts the R's calculated for all combined raters, i.e., estimates on all 97 subjects. It shows that in this study there was an increased correlation between the officers' estimates and the actual BAC as the officers proceeded from the first estimate through the sixth (cumulative) and final estimate. As more information on the subject's level of impairment became apparent through administration of the tests, the officers' estimates more closely approximated the actual BAC.

While the methodology used by Burns and Moskowitz, (op.cit.) is not completely comparable it is interesting to note that the mean correlation for all raters between measured BAC and the final cumulative rating was .704 and the value found by Burns and Moskowitz, (op.cit.) was .669.

4.1.2 Correlation between individual rater's estimates and actual BACs

Figure 9 depicts the relative contribution of each officer's estimates toward the mean correlation between all raters' estimates and actual BAC. As an aid in examining the performance of each rater and the ability of the field sobriety tests to improve the individual rater's estimates, Table 3 lists the correlations between individual rater's estimates and actual BAC. These correlations are depicted graphically in Figure 10.

4.2 Tests of absolute difference between estimated BACs and actual BACs

The absolute deviation between the BAC estimate and the actual BAC is expressed as a % BAC. For example a highly accurate rater's estimates on the average differed from the actual BACs by 0.023% BAC and a less accurate rater's estimate differed by 0.074% BAC. T tests were used to determine if the absolute values of the differences between PBT measured BACs and officers' estimates of BAC at the different stages in the FST procedure could have been attributed to chance.

To determine if the accuracy of the estimates of BAC differed significantly from the first estimate 0.0467% BAC (based on interview and observation) to the last estimate 0.027% BAC (based on the entire field sobriety test battery), a t test was performed. The results of the t test indicated that the difference in accuracy was statistically significant and had a probability of being due to chance of less than 0.001% ($t = -4.19$). Therefore, the raters' estimates of BAC using the FST were significantly improved over those achieved based on observation and interrogation.

In order to determine if there was an overall improvement in accuracy between the on-boat nystagmus test and the on land cumulative estimate a t test was performed. The accuracy of the estimated BACs of all raters combined did not differ significantly from the fourth estimate 0.029% BAC (Gaze Nystagmus on boat) to the

Figure 8
**Correlation Between All Estimates
 and Measured BAC**

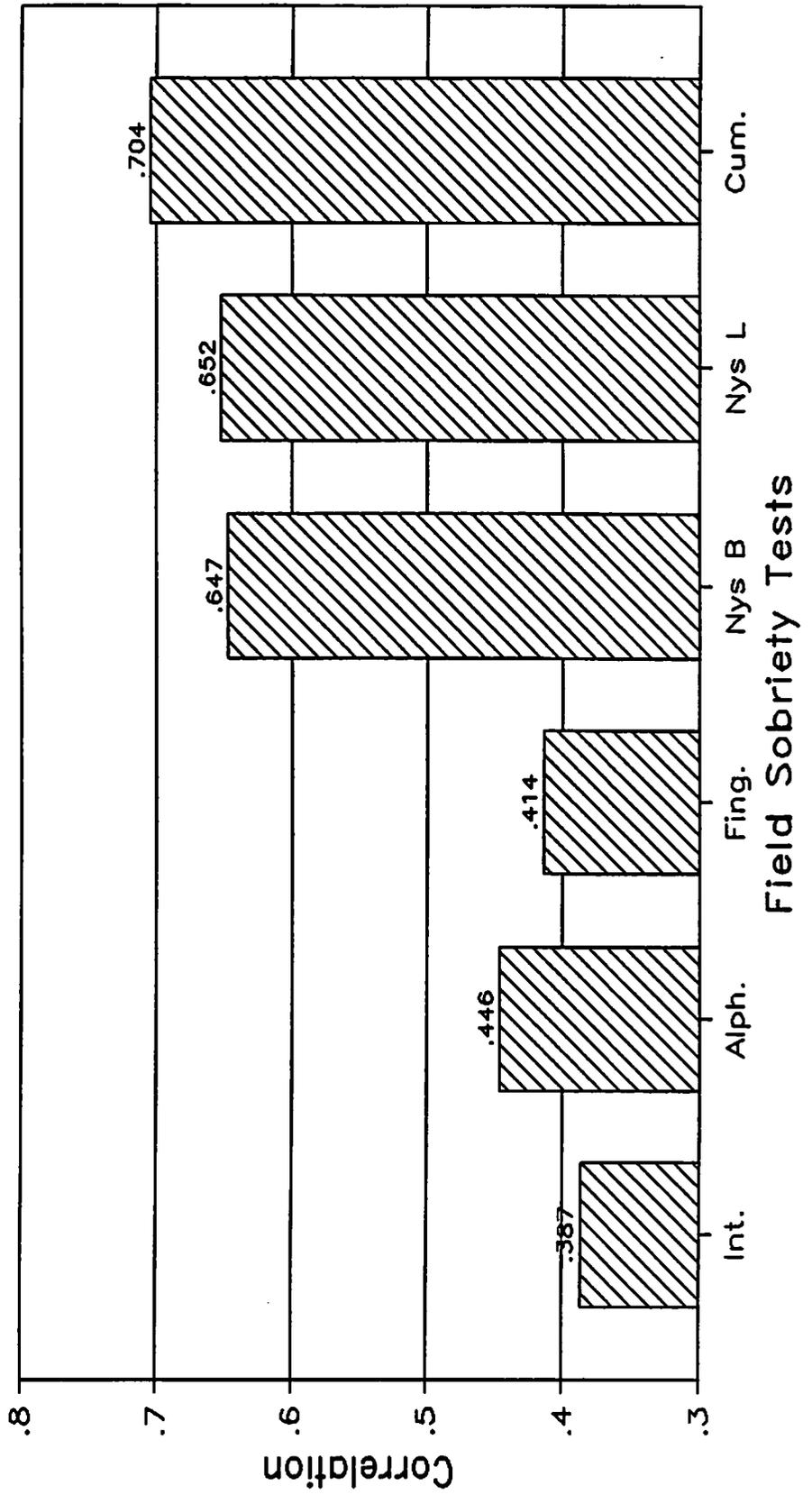


Figure 9
 Mean Correlation Between
 Officers' Estimates & BAC

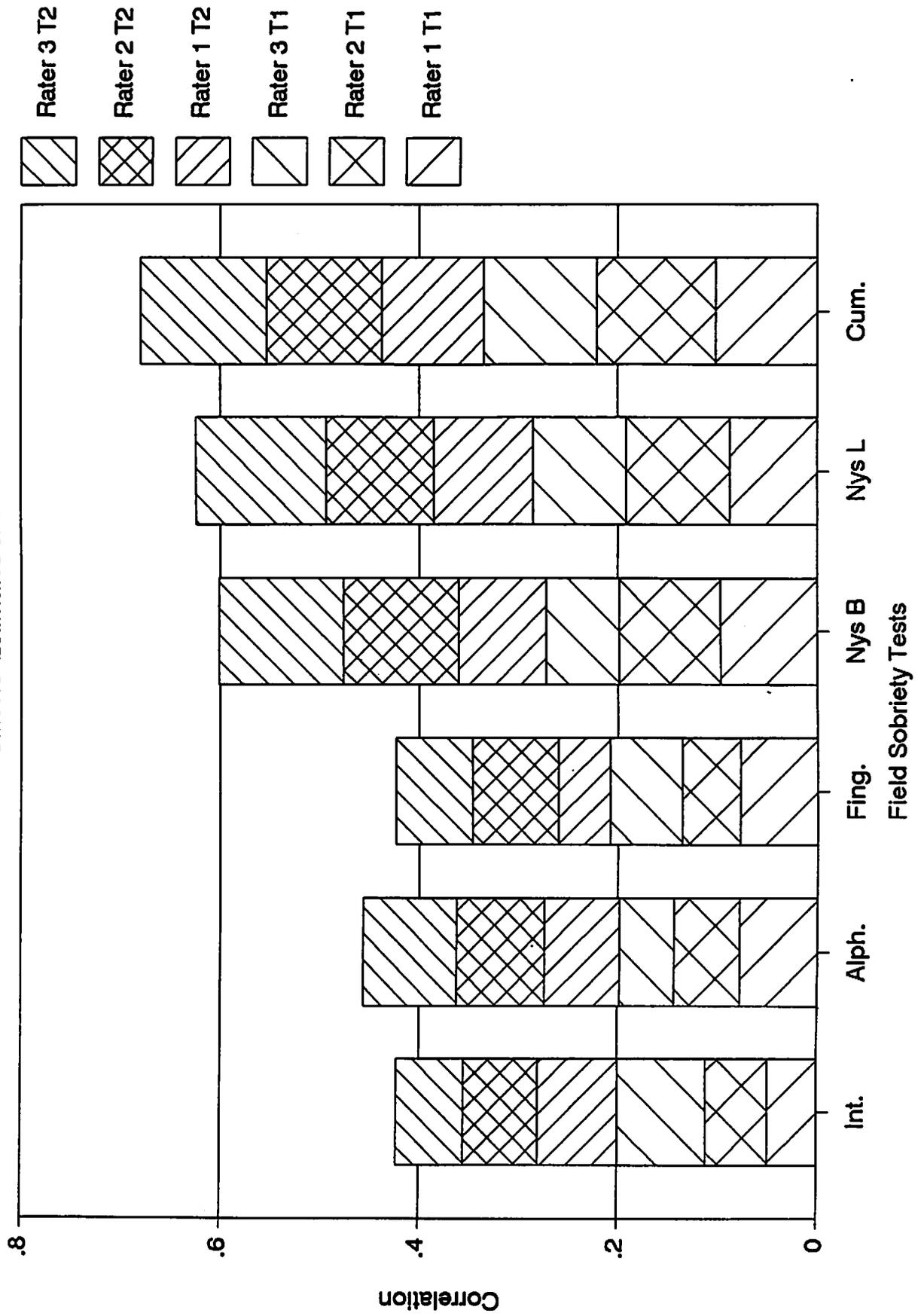


Figure 10

Correlation between Individual Officer's Estimates and Measured BAC

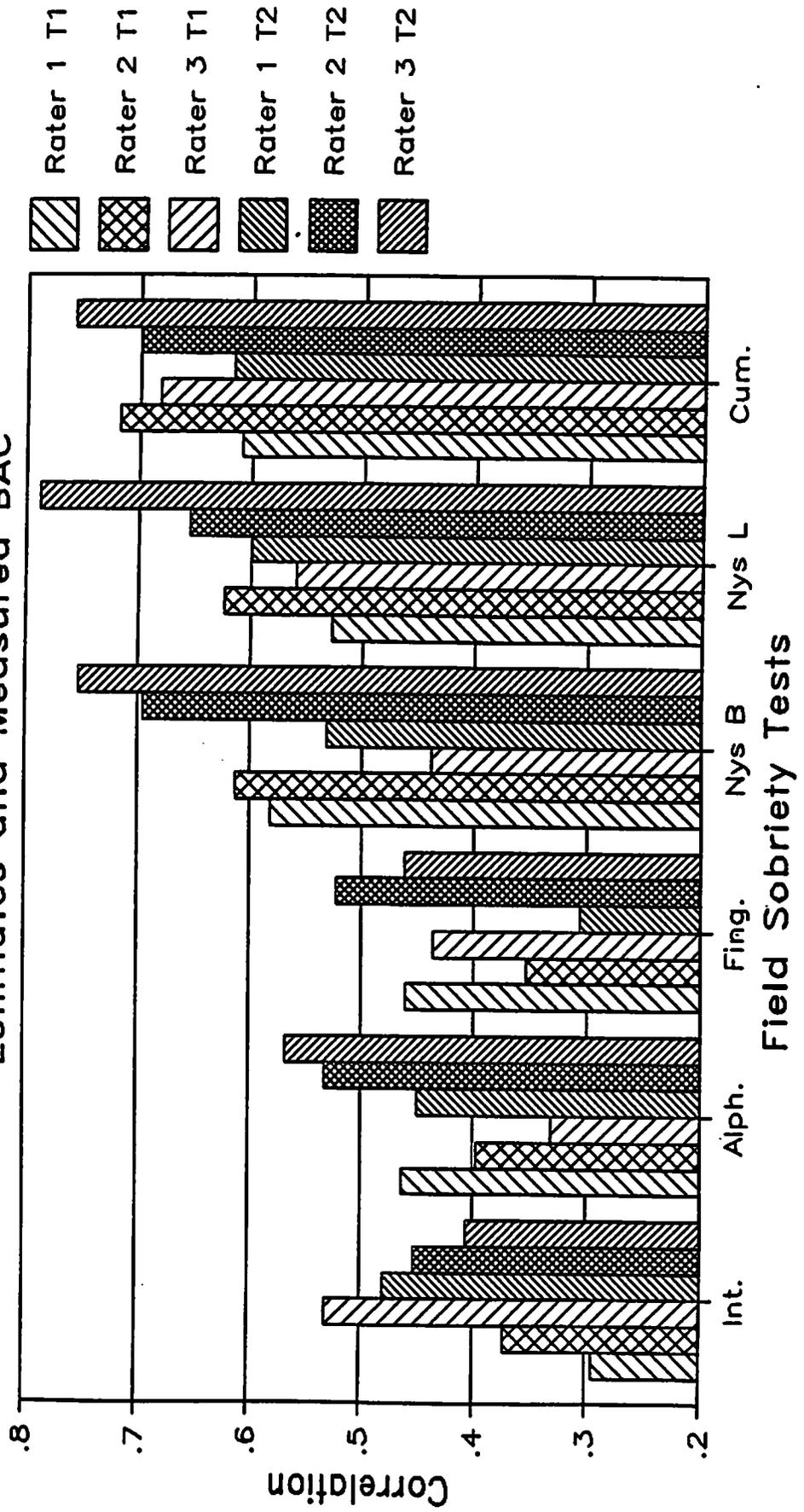


Table 3

Correlation Between Individual
Rater's Estimates & BAC

	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagmus On Boat	Nystagmus On Land	Cumulative Walk & Turn One-Leg-Stand
Rater 1 Team 1	.294	.463	.460	.581	.527	.609
Rater 2 Team 1	.373	.397	.353	.612	.623	.717
Rater 3 Team 1	.531	.331	.436	.438	.559	.681
Rater 1 Team 2	.479	.449	.306	.531	.599	.616
Rater 2 Team 2	.452	.532	.522	.695	.654	.699
Rater 3 Team 2	.406	.567	.461	.752	.787	.757
Mean R	.423	.457	.423	.602	.625	.680

last estimate based on the entire field sobriety test battery, including on-land testing 0.027% BAC (t = -1.32). Therefore, it would seem that on the whole, the small improvement in accuracy between the estimate following the on-boat HGN and the cumulative estimate was not statistically significant. The group of officers did not improve the accuracy of their estimates, as a result of the on-land testing.

Table 4 represents the absolute differences between estimated and measured BAC for each rater for the first, fourth, and sixth estimates.

	<u>Obs. & Inter.</u>	<u>On Boat Nvs.</u>	<u>Cum.</u>
Rater 1 T1	0.052%	0.034%	0.040%
Rater 2 T1	0.043%	0.035%	0.030%
Rater 3 T1	0.083%	0.078%	0.070%
Rater 1 T2	0.047%	0.032%	0.028%
Rater 2 T2	0.050%	0.026%	0.025%
Rater 3 T2	0.052%	0.023%	0.023%

To determine which of the improvements in the individual rater's estimates between the first and last estimates was statistically significant t tests were performed.

<u>Team 1</u>	<u>t value¹</u>
Rater 1	-1.49
Rater 2	-2.34*
Rater 3	-1.44
<u>Team 2</u>	
Rater 1	-3.54***
Rater 2	-4.33***
Rater 3	-4.69***

Although all of the raters improved the accuracy of their estimates the improvements in raters 1 and 3 on team 1 were not statistically significant.

In order to determine if the improvement in individual rater's estimates between the observation based estimate and the on boat nystagmus based estimates were attributable chance t tests were performed. The differences between the first estimate of BAC and the fourth estimate of BAC indicated:

<u>Team 1</u>	<u>t value</u>
Rater 1	-2.78**
Rater 2	-1.21
Rater 3	-0.20
<u>Team 2</u>	
Rater 1	-3.25**
Rater 2	-4.35***
Rater 3	-4.93***

1

* = P < .05
 ** = P < .01
 *** = P < .001

Although all of the raters improved the accuracy of their estimates the improvements in raters 2 and 3 on team 1 were not statistically significant.

To determine if the improvement in each of the individual rater's estimates between on-boat testing and the cumulative estimate was statistically significant, t tests were performed. The differences between the fourth estimate of BAC and the sixth estimate of BAC indicated:

<u>Team 1</u>	<u>t value</u>
Rater 1	1.68
Rater 2	-2.66**
Rater 3	-2.03*
<u>Team 2</u>	
Rater 1	-1.76
Rater 2	-0.44
Rater 3	0.00

Only two of the six raters demonstrated a significant improvement ($p < 0.05\%$) in estimating BAC from the fourth to the sixth estimate. The two raters were on Team 1, Rater 2 and 3.

4.3 Arrest/Release Decision

While the correlation between the estimates achieved using the FSTs and the PBT indicate overall accuracy, a more practical question is how well did the use of the FST procedures aid the officers in making correct decisions to arrest or release subjects at specified criteria levels of arrest and conviction?

In order to explore use of the field sobriety tests in making arrest/release decisions indices of discrimination were prepared. These indices describe how well an officer can estimate whether an individual's BAC is greater than or less than a set criterion. Two main indices were used: the "True Arrest Index" (TAI) and the "True Release Index" (TRI). The compliment of these indices are the "False Arrest Index" (FAI) and the "False Release Index" (FRI).

These terms are defined as:

True Arrest Index

the proportion of individuals with BACs greater than or equal to a set criteria, who were judged by the rater as having BACs greater than or equal to that criteria.

False Release Index

the proportion of individuals with BACs greater than a certain criteria, who were judged by the rater as having BACs less than that criteria.

False Arrest Index

the proportion of individuals with BACs less than a set criteria, who were judged by the rater as having BACs greater than or equal to that criteria.

True Release Index

the proportion of individuals with BACs less than a certain criteria, who were judged by the rater as having BACs less than that criteria.

The true arrest index and the false release index sum to 100% of all subjects with

BACs at or above the set convict point criteria and similarly the true release index and false arrest index sum to 100% of all subjects below the convict point.

In order to determine if the officers' true arrest and true release indices improved with different criteria the following BACs were used to compute the indices: 0.08%, 0.10%, and 0.12%.

Indices were computed to simulate the following conditions:

1. identification of all individuals with BACs equal to or greater than 0.10% when the conviction criteria is equal to or greater than 0.10%.
2. identification of all individuals with BACs equal to or greater than 0.08% when the conviction criteria is equal to or greater than 0.08%.
3. conservative identification of all individuals with BACs equal to or greater than 0.10% by arresting only individuals who were estimated to have BACs equal to or greater than 0.12%.
4. conservative identification of all individuals with BACs equal to or greater than 0.08% by arresting only individuals who were estimated to have BACs equal to or greater than 0.10%.
5. liberal identification of all individuals with BACs equal to or greater than 0.10% by arresting individuals who were estimated to have BACs equal to or greater than 0.08%.

4.3.1 Criteria for Arrest at \Rightarrow 0.10% (equal to or greater than 0.10%) Criteria for Conviction at \Rightarrow 0.10%

Figure 11 depicts the decision indices for the scenario in which the conviction criteria was equal to or greater than 0.10% and the officers' criteria for arrest was equal to or greater than 0.10%.

Table 5 lists the overall arrest/release decisions for all officers for each of the six estimates of BAC. By the last BAC estimate (following administering the entire test battery) the officers would have arrested 75% of the subjects having BACs of equal to or greater than 0.10% and would have falsely released 25% of the subjects having BACs of equal to or greater than 0.10%, i.e., estimating that their BACs were less than 0.10%. The officers would have correctly released 86% of the subjects having BACs less than 0.10% and would have falsely arrested 14% of the subjects having BACs less than 0.10%.

These results were achieved through use of the entire field sobriety test battery, i.e., all on-boat and on-land tests. This battery includes the three tests which were found to be the "best reduced battery" of field sobriety tests which were studied for use in the highway situation. In the 1977 Burns and Moskowitz study of "Psychophysical Tests for DWI Arrests", they found that at the 0.10% criteria the officers correctly decided to arrest 84% of the cases having BACs equal to or greater than 0.10%, and for less than 0.10% they made the correct decision to release 73% of the time. By computing the mean of all correct decisions made by the officers, it was found that the officers made correct decisions in 76% of all decisions made, i.e., correctly classifying 76% of the subjects with regard to a BAC of 0.10%. By way of comparison, in the current study by computing the mean of all correct decisions made by the officers, it was found that the raters made correct decisions in 80% of all decisions made, (i.e., the officers correctly classified 80% of the subjects with regard to a BAC of 0.10%).

Figure 11

Arrest Decision Point > = .10%

Convict Point > = .10%

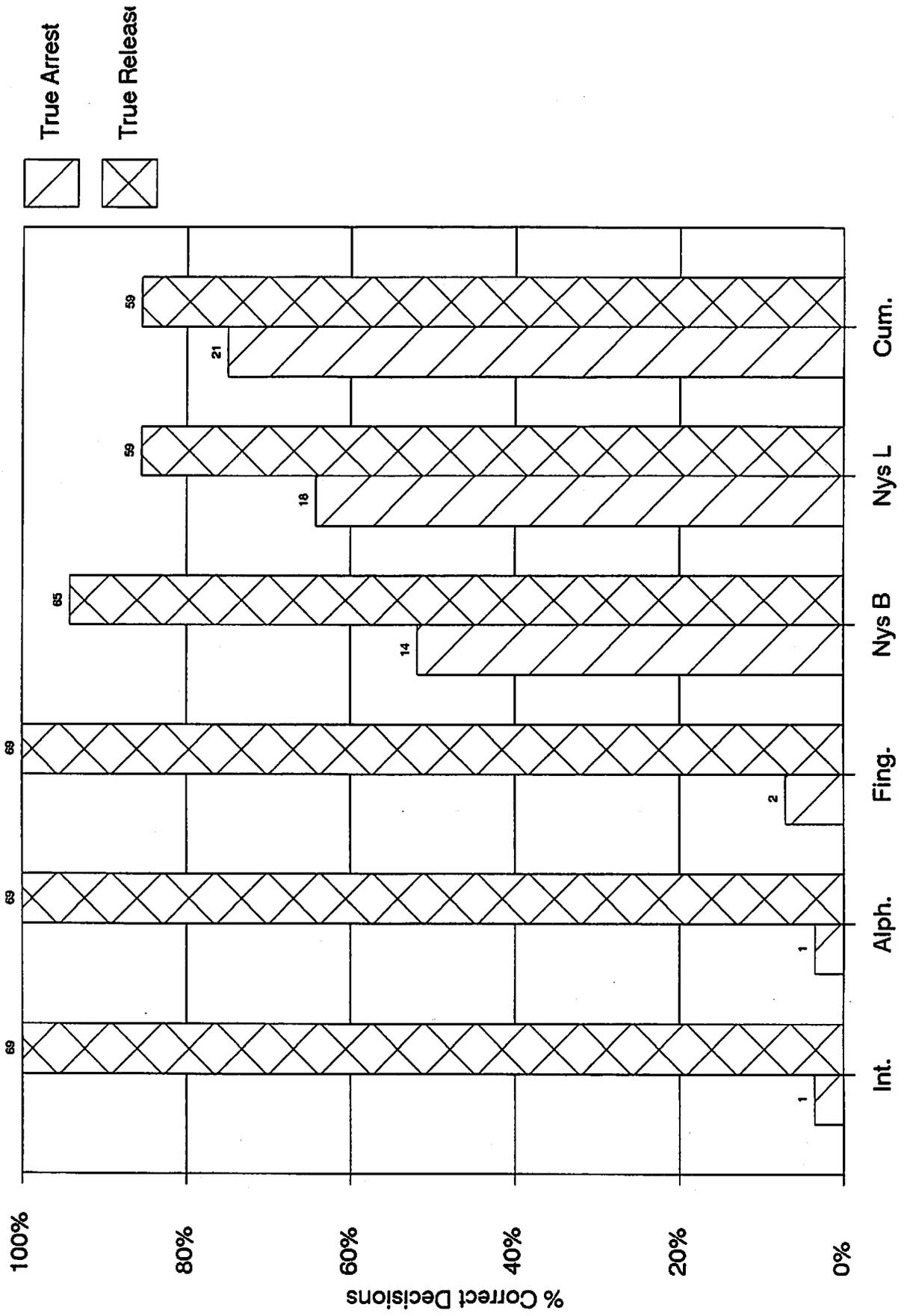


Table 5

Overall Arrest / Release Decision Estimates
 Arrest BAC >= 0.10%, Convict BAC >= 0.10%

Decision Type	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagmus On Boat	Nystagmus On Land	Cumulative Walk & Turn One-Leg-Stand
True Arrest	3.57%	3.57%	7.14%	51.85%	64.29%	75.00%
True Release	100.00%	100.00%	100.00%	94.20%	85.51%	85.51%
All Subjects	97.000	97.000	97.000	96.000	97.000	97.000
Subs >= 0.10%	28.000	28.000	28.000	27.000	28.000	28.000

The officers in the Burns and Moskowitz study indicated that they would have arrested 101 persons, 47 of whom had BACs less than 0.10%, i.e., an error rate of 47%. This high rate of false arrests was attributed to the fact that this was a laboratory study and was not indicative of the real arrest situation in the field. They stated that, officers in the field are reluctant to err in the direction of false arrests, and observations indicate that the most common error probably is a false negative. This type of reasoning was confirmed by the officers who participated in the current study.

In the 1981 Tharp, Burns, and Moskowitz study of "Development and Field Test of Psychophysical Tests for DWI Arrest", they found that at the 0.10% criteria the officers correctly decided to arrest 64% of the cases having BACs equal to or greater than 0.10%, and for less than 0.10% they made the correct decision to release 88% of the time. By computing the mean of all correct decisions made by the officers, it was found that the officers made correct decisions in 81% of all decisions made, i.e., correctly classifying 81% of the subjects in regard to BAC of 0.10%. The officers in that study indicated that they would have arrested 118 persons, 38 of whom had BACs less than 0.10%, i.e., an error rate of 32%.

It should be noted these arrest decisions cannot be directly projected to actual performance, because none of the subjects the present study reached very high BACs (>0.16%) the officers' decision processes were made slightly more difficult. In actual patrols officers will encounter a small number of extremely intoxicated individuals. This individuals are presumably more readily detected as intoxicated. Therefore under actual conditions the officers's true arrest indices may be improved.

The results of the current (Yorktown) study are compatible with the findings of the two previously mentioned studies by Burns and Moskowitz, and Tharp, et al. The following table summarizes the findings of the three studies:

	Yorktown		
	<u>Nvs.B. Cum.</u>	<u>B. & M.</u>	<u>T.,B.& M.</u>
True Arrest Index	52%	75%	84%
False Release Index	48%	25%	16%
True Release Index	94%	86%	73%
False Arrest Index	06%	14%	27%

A difference among the three studies lies in the percentage of subjects who would have been falsely arrested, i.e., subjects with BACs less than 0.10% who would have been classified as having BACs equal to or greater than 0.10%. The officers in the current study would have falsely arrested 14% of these subjects, while the officers in the previous studies would have falsely arrested 47% (Burns and Moskowitz, 1971) and 32% (Tharp, et al., 1981).

4.3.2 Criteria for Arrest at =>0.08% Criteria for Conviction at =>0.08%

Figure 12 depicts the decision indices for the scenario in which the conviction criteria was equal to or greater than 0.08% and the officers' criteria for arrest was equal to or greater than 0.08%. Table 6 lists the overall arrest/release decisions for all officers for each of the six estimates of BAC. By the last BAC estimate (following administering the entire test battery) the officers would have arrested 86%

of the subjects having BACs equal to or greater than 0.08%, Inversely, the officers would have falsely released 14% of the subjects having BACs equal to or greater than 0.08%. The officers would have correctly released 80% of the subjects having BACs less than 0.08%. Inversely, the officers would have falsely arrested 20% of the subjects having BACs less than 0.08%. It follows logically that if a lower arrest/conviction criteria is set, more subjects are subsequently arrested, however, it is at the cost of a greater number of false arrests.

4.3.3 Criteria for Arrest at \Rightarrow 0.12% Criteria for Conviction at \Rightarrow 0.10%

Figure 13 depicts the decision indices for the scenario in which the conviction criteria was equal to or greater than 0% and the officers' criteria for arrest was equal to or greater than 0.12%. Table 7 lists the overall arrest/release decisions for all officers for each of the six estimates of BAC. This scenario represents a situation in which the officer is being conservative in making the decision to arrest. Often officers in the field will make such a decision in order to increase the probability of a true arrest and decrease the probability of a false arrest. Officers often arrest at an estimated BAC which exceeds the BAC needed for conviction, since a significant amount of time is lost in transporting the suspect to the site of the breathalyzer unit. During this transport time the suspect's BAC level can decrease, for example, approximately .015% per hour elimination rate dependent on rate of absorption and body weight. Therefore, the officer feels more confident when arresting the suspect who is estimated to be 0.02% above the conviction criteria.

In this scenario, by the last BAC estimate (following administration of the entire test battery) the officers would have arrested 39% of the subjects having BACs equal to or greater than 0.12%. Inversely, the officers would have falsely released 61% of the subjects having BACs equal to or greater than 0.12%, i.e., estimating that their BACs were less than 0.12%. The officers would have correctly released 97% of the subjects having BACs less than 0.12%. Inversely, the officers would have falsely arrested 3% of the subjects having BACs less than 0.12%. Logically, since the officers are being more conservative in their decisions to arrest, many fewer subjects would have been arrested than in the two previous scenarios, i.e., 39%. When being conservative the officers are indeed making fewer arrests, however, the benefit appears in a true release rate of 97%. Therefore, more of the guilty are being released but less of the innocent are being arrested. In addition, the arrests rate appears to be disproportionately low, since in this study very few subjects actually had BACs equal to or above 0.12%. Once the officers suspected this fact, they might have concentrated their estimates closer to a maximum of 0.10% BAC.

4.3.4 Criteria for Arrest at \Rightarrow 0.10% Criteria for Conviction at \Rightarrow 0.08%

Figure 14 depicts the decision indices for the scenario in which the conviction criteria was equal to or greater than 0.08% and the officers' criteria for arrest was equal to or greater than 0%. Table 8 lists the overall arrest/release decisions for all officers for each of the six estimates of BAC. By the last BAC estimate (following administering the entire tests battery) the officers would have arrested 68% of the subjects having BACs equal to or greater than 0%. Inversely, the officers would have falsely released 32% of the subjects having BACs equal to or above 0%, i.e., estimating that their BACs were less than 0%. The officers would have correctly released 90% of the subjects having BACs less than 0%. Inversely, the officers would have falsely arrested 10% of the subjects having BACs less than 0%.

Table 6

Overall Arrest / Release Decision Estimates
 Arrest BAC>=0.08%, Convict BAC>=0.08%

Decision Type	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagnus On Boat	Nystagnus On Land	Cumulative Walk & Turn One-Leg-Stand
True Arrest	8.11%	24.32%	24.32%	69.44%	81.08%	86.49%
True Release	98.33%	98.33%	96.67%	85.00%	81.67%	80.00%
Subjects	97.000	97.000	97.000	96.000	97.000	97.000
Subs >=0.08%	37.000	37.000	37.000	36.000	37.000	37.000

Figure 12

Arrest Decision Point > = .08%

Convict Point > = .08%

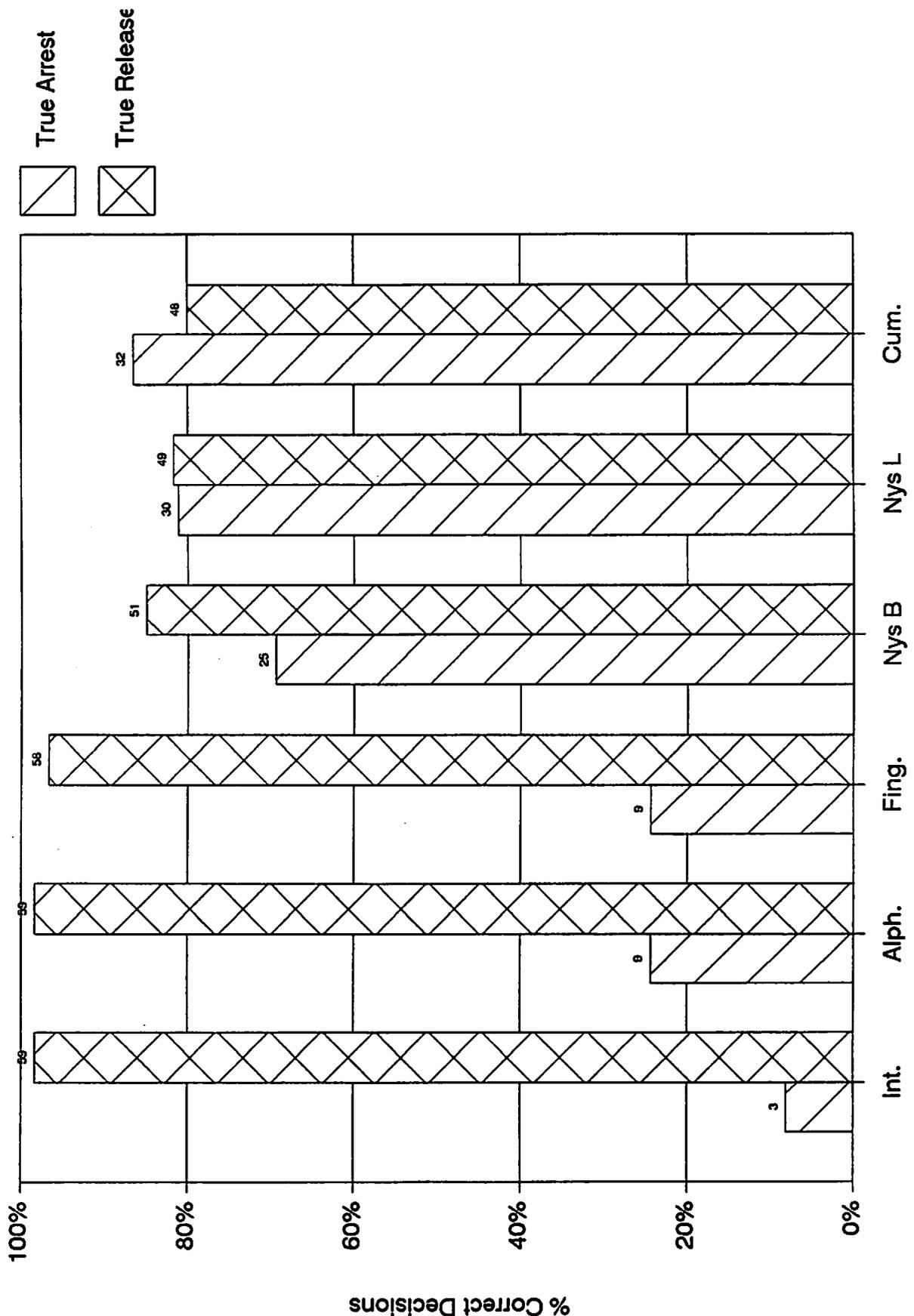


Figure 13

Arrest Decision Point $> = .12\%$

Convict Point $> = .10\%$

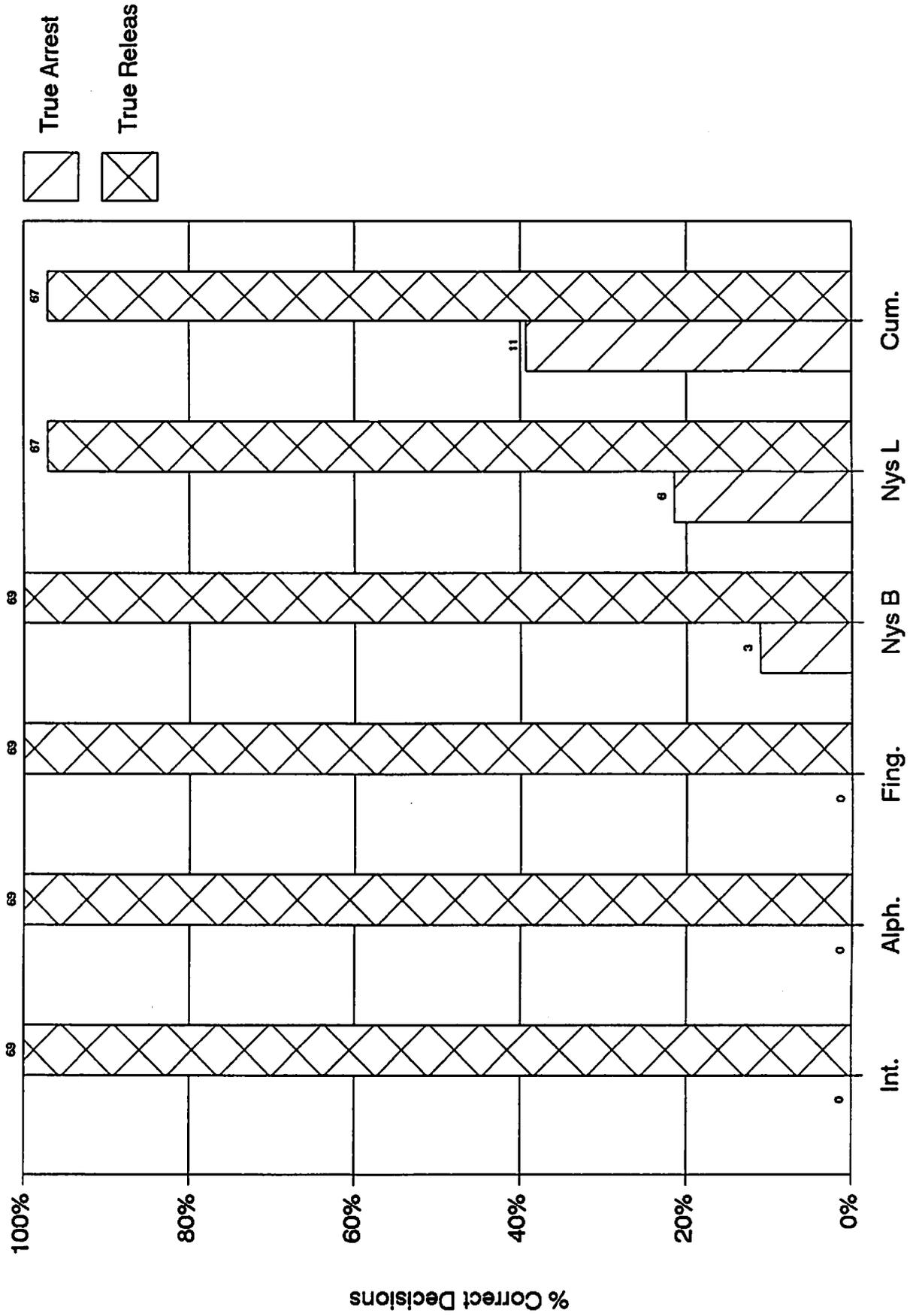


Table 7

Overall Arrest / Release Decision Estimates
 Arrest BAC>=0.12%, Convict BAC>=0.10%

Decision Type	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagmus On Boat	Nystagmus On Land	Cumulative Walk & Turn One-Leg-Stand
True Arrest	.00%	.00%	.00%	11.11%	21.43%	39.29%
True Release	100.00%	100.00%	100.00%	100.00%	97.10%	97.10%
Subjects	97.000	97.000	97.000	96.000	97.000	97.000
Subs >=0.10%	28.000	28.000	28.000	27.000	28.000	28.000

Figure 14

Arrest Decision Point > = .10%

Convict Point > = .08%

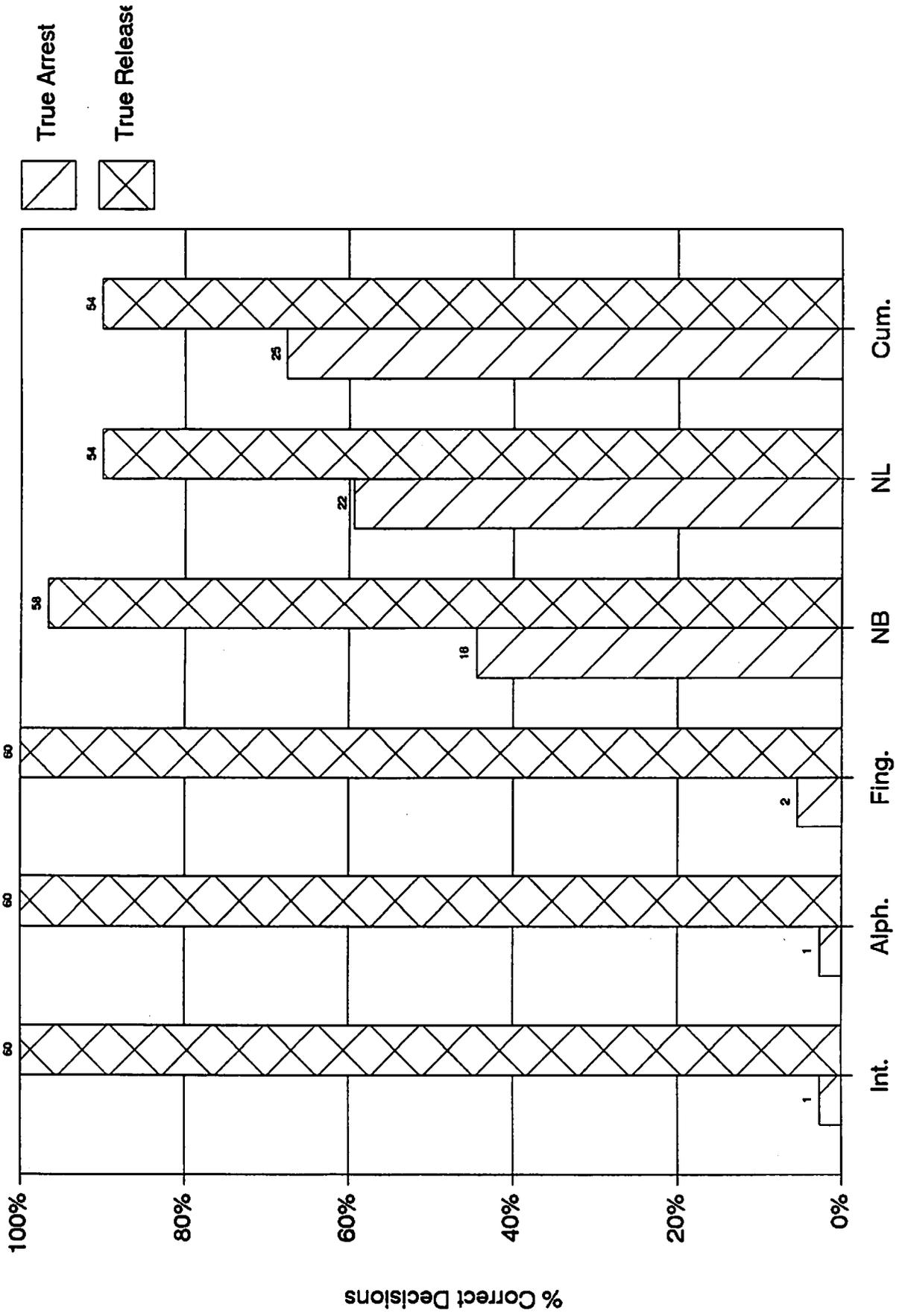


Table 8

Overall Arrest / Release Decision Estimates
 Arrest BAC >= 0.10%, Convict BAC >= 0.08%

Decision Type	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagmus On Boat	Nystagmus On Land	Cumulative Walk & Turn One-Leg-Stand
:: True Arrest	2.70%	2.70%	5.41%	44.44%	59.46%	67.57%
:% True Release	100.00%	100.00%	100.00%	96.67%	90.00%	90.00%
All Decisions BAC >= 0.08%	97.000 37.000	97.000 37.000	97.000 37.000	96.000 36.000	97.000 37.000	97.000 37.000

As in the previous scenario, at this set criteria the officers are taking a conservative position. When doing so, less true arrests are made and more true releases result.

4.3.5 Criteria for Arrest at \Rightarrow 0.08% Criteria for Conviction at \Rightarrow 0.10%

Figure 15 depicts the decision indices for the scenario in which the conviction criteria was equal to or greater than 0.08% and the officers' criteria for arrest was equal to or greater than 0.10%. Table 9 lists the overall arrest/release decisions for all officers for each of the six estimates of BAC. This is a situation in which the officers, in order to increase the number of true arrests, have lowered the BAC arrest criteria. Therefore, they would be arresting more suspects and releasing less suspects. By the last BAC estimate (following administering the entire test battery) the officers would have arrested 89% of the subjects having BACs equal to or greater than 0.08%. Inversely, the officers would have falsely released 11% of the subjects having BACs equal to or greater than 0.08%, i.e., estimating that their BACs were less than 0.08%. The officers would have correctly released 72% of the subjects having BACs less than 0.08%. Inversely, the officers would have falsely arrested 28% of the subjects having BACs less than 0.08%. Therefore, while more guilty suspects were arrested, more innocent suspects were also arrested.

4.4 Considering the Two-Phase Test Process

The above examination of arrest/release decisions applies to the situation in which the officer has given the entire test battery. This would be analogous to the officer in the field asking all suspects (regardless of the officer's estimate of BAC) to accompany him/her back to shore in order to perform the on-land testing. However, in actual OUI detection, the officer would most probably give the on-boat tests to a suspect and reserve on-land testing only for suspects who the officer felt somewhat confident in estimating their BAC as approximating the legal conviction criteria. It is, therefore, important that in the marine environment the OUI investigation be examined as a two phase process: 1.) on-boat testing and 2.) on-land testing.

In the highway situation it is routine procedure for the officer to administer on-land balance tests. The officer simply asks the suspect to step out of the car. Of course, the officer is always at risk when asking a suspect to step out of the car, but the officer does not have to transport the subject in order to perform the testing. However, the marine law enforcement officer would have to take the suspect to shore, a process which is quite time consuming. The officer needs to be fairly confident in his suspicions that the person is intoxicated before taking him/her to shore. It is, therefore, necessary that the arrest/decision index be examined for on-boat testing alone. The question is: How effective is the on-boat testing in aiding the officer to identify operators to be arrested for OUI?

As previously mentioned, Figure 11 and Table 5 refer to the decision indices for the scenario in which the conviction criteria was equal to or greater than 0.10% and the officers' criteria for arrest was equal to or greater than 0.10%. By the fourth BAC estimate (following the last on-boat test, i.e., horizontal gaze nystagmus) the officers would have arrested 52% of the subjects having BACs of equal to or greater than 0%. Inversely, the officers would have falsely released 48% of the subjects having BACs of equal to or greater than 0.10%, i.e., estimating that their BACs were less than

Figure 15

Arrest Decision Point > = .08%

Convict Point > = .10%

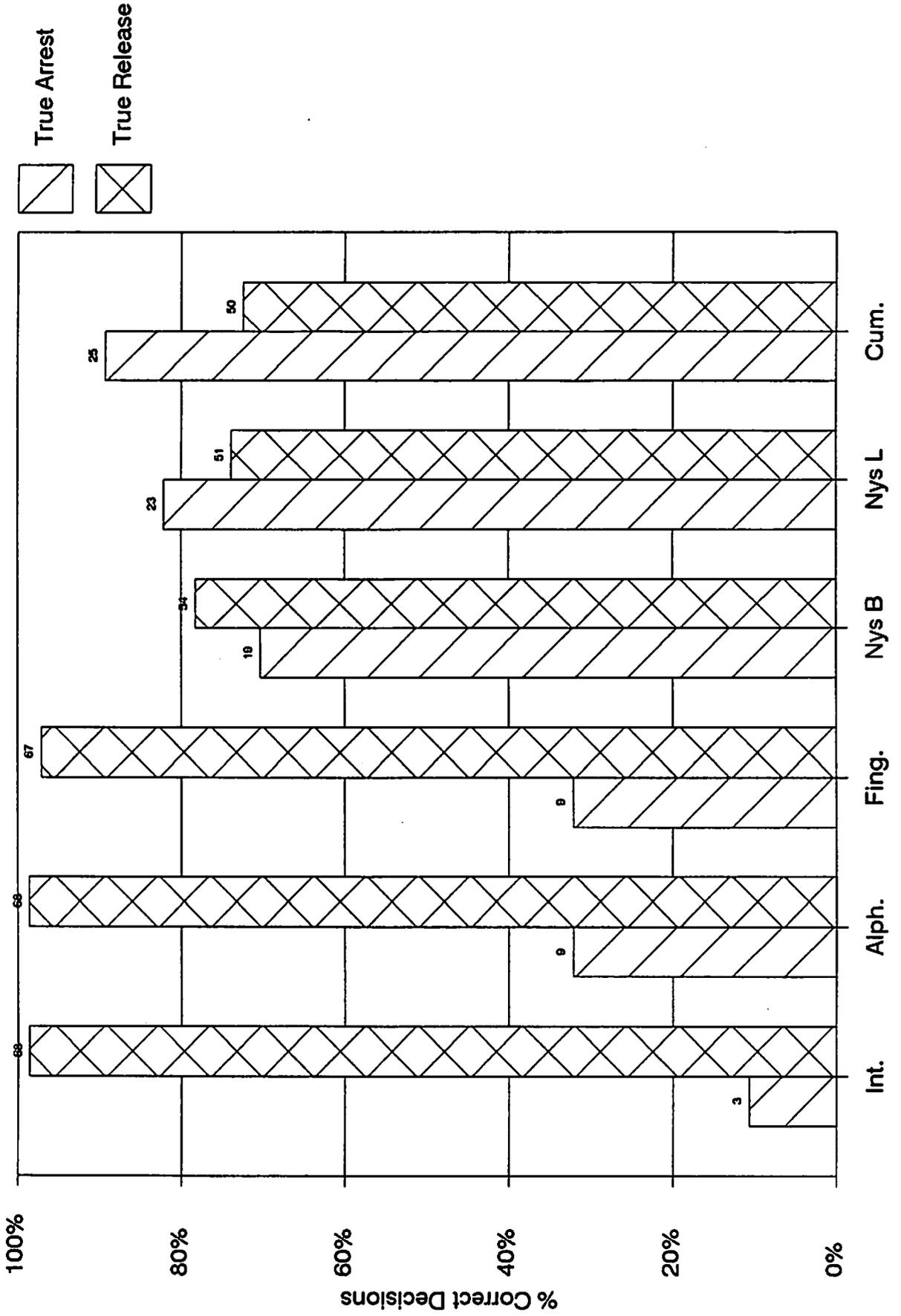


Table 9

Overall Arrest / Release Decision Estimates
 Arrest BAC>=0.08%, Convict BAC>=0.10%

Decision Type	Interview & Observation	Alpha. Recite. & Hand Pat	Finger Nose Finger Count	Nystagmus On Boat	Nystagmus On Land	Cumulative Walk & Turn One-Leg-Stand
True Arrest	10.71%	32.14%	32.14%	70.37%	82.14%	89.29%
True Release	98.55%	98.55%	97.10%	78.26%	73.91%	72.46%
All Decisions BAC>=.10%	97.000 28.000	97.000 28.000	97.000 28.000	96.000 27.000	97.000 28.000	97.000 28.000

0.10%. The officers would have correctly released 94% of the subjects having BACs less than 0.10%. Inversely, the officers would have falsely arrested 6% of the subjects having BACs less than 0.10%.

When these results are compared to the arrest/release decision indices which resulted from the officers administering the entire test battery, based on the results of on-boating testing alone officers arrested a fewer number of suspects with BACs equal to or greater than 0.10%, i.e., 52% versus 75%.

However, a positive result lies in the fact that based on the results of on-boating testing officers falsely arrested a fewer number of suspects with BACs less than 0.10%, i.e., 6% versus 14%.

5.0 CONCLUSIONS

The objective of this study was to determine the effectiveness of field sobriety tests in aiding the marine law enforcement officer in identifying intoxicated boat operators. The data indicates that the administration of the entire test battery significantly improved the accuracy of the officers' estimates of BAC. Further analysis revealed that the significant difference, i.e., improvement in the accuracy (of all raters combined) to estimate BAC occurred from the first BAC estimate (estimate based on interview and observation) to the fourth BAC estimate (estimate based on on-boat testing up to and including Horizontal Gaze Nystagmus on boat). No significant difference in the accuracy of estimate of all raters was found as a result of testing subsequent to the Horizontal Gaze Nystagmus on-boat. However, four of six individual raters demonstrated small but significant improvements in the accuracy of their BAC estimates as a result of the addition of on-land testing.

In examining the effectiveness of the entire test battery, it was found that in using an arrest/conviction decision criteria of 0.10%, the officers made correct decisions for 80% of the participants, i.e., categorizing the subjects as having BAC levels greater than or equal to 0.10% or less than 0.10%. By the last BAC estimate the officers would have arrested 75% of the subjects having BACs of equal to or greater than 0.10%. The officers would have correctly released 86% of the subjects having BACs less than 0.10%.

In examining the effectiveness of the on-boat tests alone, it was found that at the 0.10% level officers would have arrested 52% of the subjects having BACs greater than or equal to 0.10%. The officers would have correctly released 94% of the subjects having BACs less than 0.10%.

The marine OUI detection process should be viewed as a two stage process. The on-boat tests can be administered by the officer as a screening device. If, as a result of demonstrated performance on these tests, the officer feels increased confidence in his/her estimate that the operator is approximating a level of intoxication, the officer can then continue the detection process with Phase 2, on-land testing. Using the data from this study as an example of application of this process, after administration of the on-boat tests the officers had identified 52% of the subjects having BACs of greater than or equal to 0.10%. If they lowered their criteria (instead of criteria for arrest, viewing it as criteria for further investigation) to perhaps 0.08%, a greater number of suspects would have been detained for further testing on land. If subsequent on-land testing lead the officer to lower the estimated BAC, those suspects could have been released on-land.

As noted above due to practical considerations bearing on the time required to make an arrest and the inconvenience to the boater who is falsely arrested, the use of the on boat Nystagmus test with a conservative set point appears to be very reasonable. Such a procedure will provide the officer with a high level of confidence in the arrest procedure and will probably result enough arrests to provide a significant level of deterrence.

In addition to the use of the on-boat tests, it is recognized that portable breath testing units should be used as evidence (in states where permitted) and as screening devices. In states where the results of PBT tests can be used as evidence, they provide a quick and reliable reading of BAC which can support the officer's decision

to arrest. In states where PBT data cannot be used as evidence, such information could be used to improve the officer's confidence in his decision to arrest.

References

Burns, M. and Moskowitz, H. "Psychophysical Tests for DWI Arrest", (Contract No. DOT-HS-5-01242). Washington, D.C.: Department of Transportation, NHTSA, June 1977.

Tharp, V., Burns, M., and Moskowitz, H. "Development of Field Test of Psychophysical Tests for DWI Arrest", (Contract No. DOT-HS-8-01970). Washington, D.C.: Department of Transportation, NHTSA, March 1981.

APPENDIX

- **Scoring Sheets**
- **Age Distribution of Participants**
- **Participation Announcement**
- **Subject Selection Instrument**
- **Telephone Screening Instrument**
- **Alcohol Questionnaire**
- **Alcohol Questionnaire - Scoring Criteria**
- **Informed Consent Form**
- **Years of Experience in Marine Law Enforcement and OUI Arrest Experience of Officers**
- **Daily Dosing Schedule**
- **Nominal Dosing Levels**
- **Actual Dosing Levels**
- **Subject Briefing**
- **Medical Report**

SCORING SHEET

Subject #: _____
 Date: _____

Officer: _____
 Time: _____

INTERVIEW:

Officer introduces self to subject. Asks subject for some identification and asks subject's name, address, and phone number, while subject is looking for ID.

Officer asks: Response:

- Without looking at your watch, _____
 what time is it? _____
- What is today's date? _____
- What day of the week is it? _____
- When did you last eat? _____
- What did you eat? _____
- Where did you eat? _____
- When did you last sleep? _____
- How long did you sleep? _____
- Are you ill or injured? _____

OBSERVATIONS

CLOTHES	Condition: <input type="checkbox"/> DISORDERLY <input type="checkbox"/> DISARRANGED <input type="checkbox"/> SOILED <input type="checkbox"/> MUSSED <input type="checkbox"/> ORDERLY (Describe) _____
BREATH	Odor of Alcoholic Beverage: <input type="checkbox"/> STRONG <input type="checkbox"/> MODERATE <input type="checkbox"/> FAINT <input type="checkbox"/> NONE
ATTITUDE	<input type="checkbox"/> EXCITED <input type="checkbox"/> HILARIOUS <input type="checkbox"/> TALKATIVE <input type="checkbox"/> CAREFREE <input type="checkbox"/> SLEEPY <input type="checkbox"/> PROFANITY <input type="checkbox"/> COMBATIVE <input type="checkbox"/> INDIFFERENT <input type="checkbox"/> INSULTING <input type="checkbox"/> COCKY <input type="checkbox"/> COOPERATIVE <input type="checkbox"/> POLITE
COLOR OF FACE	<input type="checkbox"/> PALE <input type="checkbox"/> FLUSHED <input type="checkbox"/> NORMAL <input type="checkbox"/> OTHER _____
EYES	<input type="checkbox"/> BLOODSHOT <input type="checkbox"/> WATERY <input type="checkbox"/> NORMAL
PUPILS	<input type="checkbox"/> NOT EQUAL SIZE <input type="checkbox"/> CONTRACTED <input type="checkbox"/> DILATED <input type="checkbox"/> NORMAL
UNUSUAL ACTIONS	<input type="checkbox"/> HICCOUGHING <input type="checkbox"/> BELCHING <input type="checkbox"/> VOMITING <input type="checkbox"/> FIGHTING <input type="checkbox"/> CRYING <input type="checkbox"/> LAUGHING <input type="checkbox"/> NONE
SPEECH	<input type="checkbox"/> NOT UNDERSTANDABLE <input type="checkbox"/> MUMBLED <input type="checkbox"/> SLURRED <input type="checkbox"/> MUSH MOUTHED <input type="checkbox"/> CONFUSED <input type="checkbox"/> THICK TONGUED <input type="checkbox"/> STUTTERED <input type="checkbox"/> ACCENT <input type="checkbox"/> FAIR <input type="checkbox"/> GOOD
INDICATE OTHER UNUSUAL ACTIONS OR STATEMENTS, INCLUDING WHEN FIRST OBSERVED: _____ _____	

BAC ESTIMATE: _____

Subject #: _____

1. ALPHABET RECITAL

INSTRUCTIONS:

Please recite the alphabet A through Z.

SCORING:

Satisfactory	_____
Recited slowly	_____
Thick and slurred speech	_____
Omitted letters	_____
Unable to perform	_____

2. HAND PAT

INSTRUCTIONS:

Watch what I do so you will be able to do the same thing. Don't begin until I tell you. (officer demonstrates.) Hold both palms out, facing up. Keep the left hand stationary and clap your palms together and count ONE. Turn your right hand over and clap the back side of your palm and count TWO. Keep counting (still demonstrating) ONE, TWO until I tell you to stop. As you count I want you to increase your speed.

Do you understand? Ready? Begin.

Have the subject count ONE, TWO about 10 times.

SCORING:

Satisfactory	_____
Failed to alternate palm and back of hand	_____
Hit side of hand	_____
Slow	_____
Unable to perform	_____

BAC ESTIMATE: _____

Subject #: _____

3. FINGER TO NOSE

INSTRUCTIONS:

Subject is seated. Hands at his sides.

Watch what I do so you will be able to do the same thing. Don't begin until I tell you. (Officer demonstrates.) I want you to close your eyes, put your arms down to your sides, tilt your head back slightly and when I say **RIGHT**, bring the tip of your right index finger to the tip of your nose. Then return your arm down to your side. When I say **LEFT**, bring the tip of your left index finger to the tip of your nose. Then return your arm to the side.

Do you understand? Ready?

Interrupt if there is significant deviation from the instructions. Repeat demonstration. Give second trial or discontinue.

Have subject perform **RIGHT** and **LEFT** for 2 or more trials.

SCORING:

Sure, accurate	_____
Slow but accurate	_____
Uncertain, fumbled but touched	_____
Required repeated instructions/ demonstrations	_____
Did not return arm to starting position	_____
Touched with second and third finger joint, or with other finger, or with entire hand	_____
Missed completely	_____

Subject #: _____

4. FINGER COUNT

INSTRUCTIONS:

Watch what I do so you will be able to do the same thing. Don't begin until I tell you. I am going to touch my thumb and finger and count like this. (Demonstrate slowly and with slight exaggeration.) 1-2-3-4-4-3-2-1. Each time you do this, do it a little faster than the time before.

Do you understand? Ready? Begin.

Have subject count 1-2-3-4-4-3-2-1 three times.

Interrupt if there is significant deviation from the instructions. Repeat demonstration. Give second trial or discontinue.

SCORING:

Sure, accurate	_____
Confused, started over	_____
Counting error	_____
Did not correctly touch thumb to finger	_____
Required repeated instructions	_____
Unable to perform	_____

BAC ESTIMATE: _____

Subject #: _____

5. HORIZONTAL GAZE NYSTAGMUS

INSTRUCTIONS:

I am going to check your eyes. (If subject wears glasses ask him to remove them.) Please look at the tip of the pencil. Now, keep your head still and follow the tip of the pencil with your eyes. Only move your eyes, not your head. Do you understand? Watch the tip of the pencil.

(If the subject keeps moving his head, have him cup his chin with his hands.)

SCORING:

	Right Eye	Left Eye
1. Onset occurs before 45 degrees	_____	_____
2. Moderate/distinct nystagmus at extremes	_____	_____
3. Cannot smoothly follow a moving object	_____	_____
	Total Score:	_____

BAC ESTIMATE: _____

Subject #: _____

ON-LAND TESTING

6. HORIZONTAL GAZE NYSTAGMUS

INSTRUCTIONS:

I am going to check your eyes. (If subject wears glasses ask him to remove them.) Please look at the tip of the pencil. Now, keep your head still and follow the tip of the pencil with your eyes. Only move your eyes, not your head. Do you understand? Watch the tip of the pencil.

(If the subject keeps moving his head, have him cup his chin with his hands.)

SCORING:

	Right Eye	Left Eye
1. Onset occurs before 45 degrees	_____	_____
2. Moderate/distinct nystagmus at extremes	_____	_____
3. Cannot smoothly follow a moving object	_____	_____
Total Score:		_____

BAC ESTIMATE: _____

Subject #: _____

7. ONE-LEG STAND

INSTRUCTIONS:

I am going to test your balance. Please stand with your heels together and your arms down at your sides, like this. (Demonstrate position.)

When I tell you to begin, I want you to raise one leg so that your heel is about six inches off the ground, and hold that position. Watch the toe of your raised foot and at the same time count from 1001 to 1030...like this.(Assume the position and demonstrate how you want the subject to stand and count.)

Do you understand? (Do not continue until the subject indicates that he understands.) Begin by raising either your left or your right foot and counting.

SCORING:

- | | |
|--|-------|
| 1. Sways while balancing on one leg. | _____ |
| 2. Moves arms more than six inches to maintain balance. | _____ |
| 3. Hops on one leg to maintain balance. | _____ |
| 4. Puts foot down one or two times during thirty-second count.(Count this item only once.) | _____ |
| 5. Cannot do the test. (Puts foot down three or more times, or loses balance. Score this item five points. | _____ |

Total Score _____

Subject #: _____

8. WALK AND TURN

INSTRUCTIONS:

I am going to give you a test to check your balance. Please put your left foot on the line and then your right foot in front of it with your right heel touching your left toe. (Demonstrate the position.)

When I tell you to begin, take NINE heel-to-toe steps down the line, turn around, and take NINE heel-to-toe steps back. In turning around, make your turn by pivoting on one foot. Keep it on the line and use your other foot to turn yourself around with several small steps, like this. (Demonstrate) Keep your hands at your sides at all times, watch your feet at all times, and count your steps out loud. Do you understand? (Demonstrate again if subject does not understand.) Begin, and count your heel-to-toe steps out loud.

SCORING:

- | | |
|--|-------|
| 1. Loses balance during the instructions. | _____ |
| 2. Starts before the instructions are finished. | _____ |
| 3. Stops or pauses for several seconds while walking. | _____ |
| 4. Doesn't touch heel-to-toe. (Leaves more than 1/2 inch.) | _____ |
| 5. Steps off the line one or two times. (Count this item only once.) | _____ |
| 6. Raises one or both arms more than six inches to maintain balance. | _____ |
| 7. Doesn't turn correctly or loses balance during turn. | _____ |
| 8. Takes more or less than nine steps in each direction. | _____ |
| 9. Cannot do test. (Steps off the line three or more times, is in danger of falling, or otherwise demonstrates inability to complete the test. Score this item nine points.) | _____ |
| Total Score: | _____ |

BAC ESTIMATE: _____

AGE DISTRIBUTION OF BOATING SAFETY PARTICIPANTS

<u>Age</u>	<u>No</u>
21	20
22	7
23	6
24	7
25	9
26	7
27	3
28	2
29	8
30	6
31	8
32	-
33	5
34	-
35	-
36	1
37	2
38	3
39	2
40	-
41	-
42	<u>1</u>
Total	97



United States Coast Guard Reserve Training Center

PLAN OF THE DAY

Pride - Professionalism - Excellence

Captain WM. A. Doig, USCG, Commanding Officer

BOATING AND ALCOHOL STUDY: Volunteers are needed to participate in a strictly controlled study concerning the effects of alcohol on boaters. The study will be conducted by a private research group utilizing RTC facilities from 11-22 May 1987. Criteria for volunteers: Male, 21-50 years of age, be in good health. Volunteers will be asked to: Drink measured amounts of alcohol, take a one-hour boat ride, take breath tests, participate in several field sobriety tests. The study will be conducted between the hours of 0700 and 1200. (Times for volunteers to report in). Each volunteer will be required to participate for one 8-hour period during the 10-day study. All sessions will be medically supervised. After testing, participants will be given food and rest prior to being driven home. If interested, contact MLE School, X2184.

SUBJECT SELECTION INSTRUMENT

FIRST PART

1. On a typical occasion when you are drinking distilled spirits (that is, whiskey, gin, vodka, or beverages of that sort), how much of that type of beverage do you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure)

doesn't drink distilled spirits	_____	0
one shot	_____	1
two-three shots	_____	2
four-five shots	_____	4
six-seven shots	_____	6
eight-ten shots	_____	8
one pint	_____	10
one pint to one fifth	_____	15
more than one fifth	_____	20

2. On a typical occasion when you are drinking beer, ale, or malt liquor, how much of that type of beverage do you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure)

doesn't drink beer	_____	0
one 12-ounce bottle	_____	1
two-three bottles	_____	2
four-five bottles	_____	4
one-two six-packs	_____	10
more than two six-packs	_____	15

3. On a typical occasion when you are drinking wine, how much wine will you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure)

doesn't drink wine	_____	0
one glass (3-4 ounces)	_____	1
two-three glasses	_____	2
four-five glasses	_____	4
one bottle	_____	10
more than one bottle	_____	15

4. How often do you drink during the morning?

daily	_____	30
several/week	_____	25
once/week	_____	15
several/month	_____	10
once/month or less	_____	5
never	_____	0

5. How often do you drink at lunchtime?

daily	_____	8
several/week	_____	5
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

6. How often do you drink during the afternoon, that is, after lunch is over but before the cocktail hour begins?

daily	_____	15
several/week	_____	10
once/week	_____	7
several/month	_____	3
once/month or less	_____	1
never	_____	0

7. How often do you drink at dinnertime, that is, either just before dinner or during the meal itself?

daily	_____	5
several/week	_____	4
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

8. How often do you drink during the evening, that is, after dinner is over?

daily	_____	5
several/week	_____	4
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

9. Speaking once again about your own typical drinking occasions, would you say that you most often drink in a private home, a bar, a restaurant, or some other place?

private home	_____ 1
bar/restaurant	_____ 2
other (specify)	_____

10. Once again in relation to your own typical drinking occasions, would you say that you most often drink with members of your family, with friends, with barroom clientele, or alone?

family	_____ 1
friends	_____ 2
barroom clientele	_____ 4
alone	_____ 8

11. At this point, I want you to think about the drinking you have done during the past 12 months. In particular, on how many occasions during the past 12 months have you vomited as a result of drinking?

never	_____ 0
once	_____ -2
twice	_____ -5
several or more	_____ -8

(TOTAL SCORE, QUESTIONS 1 - 11: _____)

SECOND PART

12. Have you ever been told that you have alcohol-related kidney disorders, liver trouble, or cirrhosis? Yes ____ (1) No ____ (0)
13. Have you ever had Delirium Tremens, severe shaking, or hallucinations? Yes ____ (5) No ____ (0)
14. Have you ever awakened the morning after drinking and found you could not recall a part of the evening? Yes ____ (1) No ____ (0)
- 15a. Have you ever attended a meeting of Alcoholics Anonymous (AA) because of your own drinking? Yes ____ (1) No ____ (0)
- 15b. If no, has anyone ever seriously recommended that you attend such meetings? Yes ____ (1) No ____ (0)
16. Have you ever seen a clergyman, social worker, doctor, etc. for help with a problem related to your drinking? Yes ____ (1) No ____ (0)
17. Have you ever been in a hospital because of your drinking? Yes ____ (1) No ____ (0)
18. Have you ever been arrested for "drunk and disorderly" or "public intoxication?" Yes ____ No ____ If yes, how many times? ____ (x2)
19. Have you ever been arrested for "drunk driving," "driving while intoxicated," or "driving while under the influence of alcoholic beverages?" Yes ____ No ____ If yes, how many times? ____ (x2)

(TOTAL SCORE, QUESTIONS 12 - 19: ____)

TELEPHONE SCREENING INSTRUMENT

DATE:

NAME:

MALE

ADDRESS:

WEIGHT:

HEIGHT:

TELEPHONE NUMBER: DAY:

NIGHT:

1. AGE:

If less than 21 or greater than 50, tell them they do not qualify.

2. Are you presently taking any prescription or over-the-counter medication or drugs?

If yes, what? _____

3. Do you go out on a boat?

Often _____ Rarely _____ Never _____

4. Are you prone to seasickness?

Yes _____ No _____

5. Do you ever drink alcoholic beverages?

Yes _____ No _____

6. Have you ever been advised by a physician to abstain from or reduce the amount of drinking?

Yes _____ No _____

If Yes, Why?

7. How often do you consume alcohol?

daily _____
several/week _____
once/week _____
several/month _____
once/month or less _____
never _____

8. When you drink, do you usually drink

1-2 drinks _____
3-4 drinks _____
5-6 drinks _____
Over 6 _____

Explain to the caller that an initial screening will be necessary. It will involve filling out a questionnaire that will take 15-20 minutes. This must take place before the actual experiment.

Availability to Participate in Study

THANKS A LOT FOR YOUR INTEREST, AND WE'LL GET BACK TO YOU SOON.

Name: _____

Telephone No.: _____ Day _____

Evening _____

ALCOHOL QUESTIONNAIRE

FIRST PART

1. On a typical occasion when you are drinking distilled spirits (that is, whiskey, gin, vodka or beverages of that sort), how much of that type of beverage to you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure.)

doesn't drink distilled spirits	_____ 0
one shot	_____ 1
two-three shots	_____ 2
four-five shots	_____ 4
six-seven shots	_____ 6
eight-ten shots	_____ 8
one pint	_____ 10
one pint to one fifth	_____ 15
more than one fifth	_____ 20

2. On a typical occasion when you are drinking beer, ale, or malt liquor, how much of that type of beverage do you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure.)

doesn't drink beer	_____ 0
one 12-ounce bottle	_____ 1
two-three bottles	_____ 2
four-five bottles	_____ 4
one-two six-packs	_____ 10
more than two six-packs	_____ 15

3. On a typical occasion when you are drinking wine, how much wine will you usually consume?
(Interviewer: Check one response; if a range of quantity is cited, check the lower figure.)

doesn't drink wine	_____ 0
one glass (3-4 ounces)	_____ 1
two-three glasses	_____ 2
four-five glasses	_____ 4
one bottle	_____ 10
more than one bottle	_____ 15

4. How often do you drink during the morning?

daily	_____	30
several/week	_____	25
once/week	_____	15
several/month	_____	10
once/month or less	_____	5
never	_____	0

5. How often do you drink at lunchtime?

daily	_____	8
several/week	_____	5
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

6. How often do you drink during the afternoon, that is, after lunch is over but before the cocktail hour begins?

daily	_____	15
several/week	_____	10
once/week	_____	7
several/month	_____	3
once/month or less	_____	1
never	_____	0

7. How often do you drink at dinnertime, that is, either just before dinner or during the meal itself?

daily	_____	5
several/week	_____	4
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

8. How often do you drink during the evening, that is, after dinner is over?

daily	_____	5
several/week	_____	4
once/week	_____	3
several/month	_____	2
once/month or less	_____	1
never	_____	0

9. Speaking once again about your own typical drinking occasions, would you say that you most often drink in a private home, a bar, a restaurant, or some other place?

private home	_____	1
bar/restaurant	_____	2
other (specify)	_____	

10. Once again in relation to your own typical drinking occasions, would you say that you most often drink with members of your family, with friends, with barroom clientele, or alone?

family	_____	1
friends	_____	2
barroom clientele	_____	4
alone	_____	8

11. At this point, I want you to think about the drinking you have done during the past 12 months. In particular, on how many occasions during the past 12 months have you vomited as a result of drinking?

never	_____	0
once	_____	2
twice	_____	5
several or more	_____	8

TOTAL SCORE: Questions 1-11: _____

SECOND PART

12. Have you ever been told that you have alcohol-related kidney disorders, liver trouble, or cirrhosis? Yes ___(1) No ___(0)
13. Have you ever had Delirium Tremers, severe shaking, or hallucinations? Yes ___(5) (No ___(0))
14. Have you ever awakened the morning after drinking and found you could not recall a part of the evening? Yes ___(1) No ___(0)
- 15a. Have you ever attended a meeting of Alcoholics Anonymous (AA) because of your own drinking? Yes ___(1) No ___(0)
- 15b. If No, has anyone ever seriously recommended that you attend such meetings? Yes ___(1) No ___(0)
16. Have you ever seen a clergyman, social worker, doctor, etc., for help with a problem related to your drinking? Yes ___(1) No ___(0)
17. Have you ever been in a hospital because of your drinking? Yes ___(1) No ___(0)
18. Have you ever been arrested for "drunk and disorderly" or "public intoxication?" Yes ___(1) No ___(0) If Yes, how many times? ___(x2)
19. Have you ever been arrested for "drunk driving," "driving while intoxicated," or "driving while under the influence of alcoholic beverages?" Yes ___(1) No ___(0) If Yes, how many times? ___(x2)

TOTAL SCORE: QUESTIONS 12-19: _____

THIRD PART

20. Do you have any problems with your balance?

Yes _____ No _____

If yes, describe:

SCORE

Group A	18+ on Part 1 1+ on Part 2
	or
	25+ on Part 1 0 on Part 2
Group B	18 - 24 Part 1 0 Part 2
Group C	Below 18 on Part 1 0+ on Part 2

ASSIGNMENTS

1/3 from Group A
1/3 from Group B
1/3 from Group C

Group A can be assigned to Groups B & C

Group B can be assigned to Groups A & C

Group C can only be assigned to Group C

**Years of Experience in Marine Law Enforcement
and OUI Arrest Experience of Officers**

Team One Officer #	Law Enforcement Agency/ Dept. of Natural Resources	Yrs. of Experience	Arrests*
1	Ohio	9	35
2	Maryland	14	100
3	Ohio	9	0
Team Two			
Officer #			
1	Ohio	15	6
2	Ohio	4	20
3	Maryland	15	12

* Arrest - refers to arrests occurring during three boating seasons, approximately late May to early Sept. 1986, 1985, and 1984.

DOSING TASKS

0700 Obtain Dosing Schedule for day's subjects
0700-0715 Obtain S1&S2 weight and BT1 results
0715 Mix DK1 for S1&S2
0720 Serve DK1 to S1&S2
0800 Obtain S1&S2 BT2 results
0800 Mix DK2 for S1&S2
0805 Serve DK2 to S1&S2
0800-0815 Obtain S3&S4 weight and BT1 results
0815 Mix DK1 for S3&S4
0820 Serve DK1 to S3&S4
0845 Obtain S1&S2 BT3 results
0845 Mix DK3 for S1&S2
0850 Serve DK3 to S1&S2
0900 Obtain S3&S4 BT2 results
0900 Mix DK2 for S3&S4
0905 Serve DK2 to S3&S4
0900-0915 Obtain S5&S6 weight and BT1 results
0915 Mix DK1 for S5&S6
0920 Serve DK1 to S5&S6
0930 Obtain S1&S2 BT4 results
0930 Mix DK4 for S1&S2
0935 Serve DK4 to S1&S2 for transport to boat...
0945 Obtain S3&S4 BT3 results
0945 Mix DK3 for S3&S4
0950 Serve DK3 to S3&S4

1000 Obtain S5&S6 BT2 results
1000 Mix DK2 for S5&S6
1005 Serve DK2 to S5&S6
1000-1015 Obtain S7&S8 weight and BT1 results
1015 Mix DK1 for S7&S8
1020 Serve DK1 to S7&S8
1030 Obtain S3&S4 BT4 results
1030 Mix DK4 for S3&S4
1035 Serve DK4 to S3&S4 for transport to boat...
1045 Obtain S5&S6 BT3 results
1045 Mix DK3 for S5&S6
1050 Serve DK3 to S5&S6
1100 Obtain S7&S8 BT2 results
1100 Mix DK2 for S7&S8
1105 Serve DK2 to S7&S8
1100-1115 Obtain S9&S10 weight and BT1 results
1115 Mix DK1 for S9&S10
1120 Serve DK1 to S9&S10
1130 Obtain S5&S6 BT4 results
1130 Mix DK4 for S5&S6
1135 Serve DK4 to S5&S6 for transport to boat...
1145 Obtain S7&S8 BT3 results
1145 Mix DK3 for S7&S8
1150 Serve DK3 to S7&S8
1200 Obtain S9&S10 BT2 results
1200 Mix DK2 for S9&S10
1205 Serve DK2 to S9&S10

1200-1215 Obtain S11&S12 weight and BT1 results
 1215 Mix DK1 for S11&S12
 1220 Serve DK1 to S11&S12
 1230 Obtain S7&S8 BT4 results
 1235 Mix DK4 for S7&S8
 1238 Serve DK4 to S7&S8 for transport to boat...
 1245 Obtain S9&S10 BT3 results
 1248 Mix DK3 for S9&S10
 1251 Serve DK3 to S9&S10
 1300 Obtain S11&S12 BT2 results
 1305 Mix DK2 for S11&S12
 1308 Serve DK2 to S11&S12
 1311 Obtain S9&S10 BT4 results
 1315 Mix DK4 for S9&S10
 1318 Serve DK4 to S9&S10 for transport to boat...
 1345 Obtain S11&S12 BT3 results
 1348 Mix DK3 for S11&S12
 1350 Serve DK3 to S11&S12
 1430 Obtain S11&S12 BT4 results
 1435 Mix DK4 for S11&S12
 1438 Serve DK4 to S11&S12 for transport to boat...

Note: Obtain BT5 Results for each pair hourly starting at noon to have feedback on dosing accuracy.

EXHIBIT 2
NOMINAL DOSING LEVELS

WEIGHT	GROUP B (BAC Target .06)		GROUP A (BAC Target .12)	
	Milliliters		Milliliters	
	Per Drink	Total	Per Drink	Total
120-130	18	72	25	100
131-140	19	76	27	108
141-150	20	80	29	116
151-160	22	88	31	124
161-170	23	92	33	132
171-180	24	96	35	140
181-190	26	104	37	148
191-200	27	108	39	156
201-210	28	112	41	164
211-220	30	120	43	172
221-230	31	124	45	180
231-240	32	128	47	188
241-250	34	136	48	192

**EXHIBIT 3
ACTUAL DOSING LEVELS**

SUBJECT NUMBER	GROUP	WEIGHT	TOTAL DOSE (MILLILITERS)
Monday 5/11/87			
7-1	A	No Show	---
8-1	B	205	104
9-1	A	166	124
10-1	B	204	106
11-1	C	186	16
12-1	C	208	16
Tuesday 5/12/87			
1-2	A	174	132
2-2	A	175	132
3-2	B	186	94
4-2	A	199	148
5-2	C	172	16
6-2	B	199	96
7-2	A	197	148
8-2	B	157	76
9-2	C	Withdrawn for Emergency Leave	
10-2	C	252	16
11-2		No Show	---
12-2	C	149	16
Wednesday 5/13/87			
1-3	A	183	140
2-3	C	173	16
3-3	B	205	106
4-3	A	182	140
5-3	C	173	16
6-3	C	221	16
7-3	A	174	132
8-3	B	193	103
9-3	A	198	150
10-3	B	162	86
11-3	B	160	85
12-3	C	215	16
Thursday 5/14/87			
1-4	C	205	16
2-4	B	178	100
3-4	A	140	113
4-4	B	139	55
(Note: Subject 4-4 arrived late and received only drinks 3&4)			
5-4	A	192	156
6-4	A	207	160
7-4	A	211	169
8-4	C	158	16
9-4	B	195	109

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10-4	C	198	16
11-4	E	196	129
12-4	C	212	16

Friday 5/15/87

1-5	B	141	76
2-5	C	192	16
3-5	A	161	139
4-5	A	177	150
5-5	B	176	102
6-5	B	176	105
7-5	C	155	16
8-5	No Show		---
9-5	C	131	16
10-5	C	210	16
11-5	No Show		---
12-5	A	137	116

Monday 5/18/87

1-6	B	209	112
2-6	B	197	115
3-6	B	189	104
4-6	B	174	91
5-6	A	213	189
6-6	A	174	147
7-6	A	201	164
8-6	A	173	145
9-6	C	182	16
10-6	No Show		---
11-6	C	193	16
12-6	C	195	16
13-6	C	180	16
14-6	B	202	112

Tuesday 5/19/87

1-7	A	157	129
2-7	A	208	159
3-7	B	161	99
4-7	A	227	180
5-7	C	174	16
6-7	B	152	97
7-7	A	196	149
8-7	No Show		---
9-7	No Show		---
10-7	No Show		---
11-7	C	224	16
12-7	B	212	125

Wednesday 5/20/87

1-8	A	146	123
2-8	B	195	102
3-8	C	164	16

4-8	A	180	140
5-8	C	205	13
6-8	A	144	107
7-8	A	202	164
8-8	E	212	100
9-8	C	188	140
10-8	E	166	104
11-8	B	184	111
12-8	No Show		---
13-8	B	201	112
14-8	C	167	16

Thursday 5/21/87

1-9	A	240	191
2-9	A	31	140
3-9	C	176	11
4-9	C	208	11
5-9	E	218	14
6-9	C	162	100
7-9	B	182	111
8-9	B	67	90
9-9	B	130	104
10-9	B	179	102
11-9	B	207	16
12-9	B	191	11
13-9	B	210	11

EXHIBIT 3
ACTUAL DOSING LEVELS

SUBJECT NUMBER	GROUP	WEIGHT	TOTAL DOSE (MILLILITERS)
Monday 5/11/87			
7-1	A	No Show	---
8-1	B	205	104
9-1	A	166	124
10-1	B	204	106
11-1	C	186	16
12-1	C	208	16
Tuesday 5/12/87			
1-2	A	174	132
2-2	A	175	132
3-2	B	186	94
4-2	A	199	148
5-2	C	172	16
6-2	B	199	96
7-2	A	197	148
8-2	B	157	76
9-2	C	Withdrawn for Emergency Leave	
10-2	C	252	16
11-2		No Show	---
12-2	C	149	16
Wednesday 5/13/87			
1-3	A	183	140
2-3	C	173	16
3-3	B	205	106
4-3	A	182	140
5-3	C	173	16
6-3	C	221	16
7-3	A	174	132
8-3	B	193	103
9-3	A	198	150
10-3	B	162	86
11-3	B	160	85
12-3	C	215	16
Thursday 5/14/87			
1-4	C	208	16
2-4	B	178	100
3-4	A	140	113
4-4	B	139	55
(Note: Subject 4-4 arrived late and received only drinks 3&4)			
5-4	A	192	156
6-4	A	207	160
7-4	A	211	169
8-4	C	158	16
9-4	B	195	109

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10-4	C	198	
11-4	B	196	14
12-4	C	212	129
			16

Friday 5/15/87

1-5	B	141	
2-5	C	198	76
3-5	A	161	12
4-5	A	177	139
5-5	B	176	150
6-5	B	176	102
7-5	C	155	105
8-5	No Show		14
9-5	C	131	---
10-5	D	210	16
11-5	No Show		14
12-5	A	137	---
			112

Monday 5/18/87

1-6	B	208	
2-6	B	197	112
3-6	B	188	115
4-6	B	174	104
5-6	B	233	92
6-6	A	174	188
7-6	B	202	147
8-6	B	173	164
9-6	C	182	145
10-6	No Show		14
11-6	C	193	---
12-6	C	198	16
13-6	C	162	16
14-6	B	202	16
			112

Tuesday 5/19/87

1-7	A	187	
2-7	A	208	129
3-7	B	161	158
4-7	A	227	99
5-7	C	174	180
6-7	B	152	14
7-7	A	196	97
8-7	No Show		145
9-7	No Show		---
10-7	No Show		---
11-7	No Show		---
12-7	C	224	14
	B	212	125

Wednesday 5/20/87

1-8	A	146	
2-8	B	195	123
3-8	C	164	102
			14

4-B	A	150	140
5-B	C	205	18
6-B	A	144	123
7-B	A	202	164
8-B	B	212	120
9-B	B	188	149
10-B	B	189	104
11-B	B	184	111
12-B	No Show		---
13-B	B	201	112
14-B	C	167	16

Thursday 5/21/87

1-A	A	240	191
2-A	A	131	149
3-A	C	176	11
4-A	C	209	11
5-A	C	213	11
6-A	A	182	137
7-A	B	182	111
8-A	B	167	99
9-A	B	189	104
10-A	B	174	102
11-A	C	207	16
12-A	C	191	16
13-A	C	217	16

MEDICAL REPORT

Name: _____

Height: _____

Address: _____

Weight: _____

Age: _____

Phone: _____

Pulse: _____

Blood Pressure: _____

Heart: _____

Temp: _____

Respiration: _____

Color: _____

Are you presently taking any prescription or over-the-counter medication or drugs? Yes _____ No _____

If yes, what? _____

Examination Date: _____

Subject is/is not qualified to participate in controlled drinking study.

Yes _____ No _____

Examininer: _____

BRIEFING

Introduction

I am _____

As you know, we are requesting volunteers to participate in a research project to evaluate standard methods for testing intoxication. Today I am going to ask you to fill out a brief questionnaire to help us with our planning. Someone will call you in the next day or two to confirm the time and date of your participation. We are planning to start the project on May 11 and run it for about two weeks so your session will be somewhere during that time.

I will now go through the procedure so that you will understand what will be expected of you.

At the agreed upon time, you will arrive at the site of the study, where you will be expected to spend approximately 7 hours. Soon after your arrival, an attending nurse will conduct a brief medical screening. The nurse will check your blood pressure, temperature and pulse and ask about any medication you might be taking. The nurse will remain in attendance throughout the study. You will then be asked to consume a glass of fruit juice with a measured amount of alcohol each 40 minutes until three glasses have been consumed. Before and after each drink you will be asked to provide a breath sample by blowing into an automatic alcohol testing device. Following the third drink and breath test, you will be asked to board a boat for a boat trip. During the trip you will be asked to consume a 4th drink followed by another breath test. Police officers will then board the boat and administer standard sobriety tests. At the end of this trip, the boat will be docked and boarded by police officers who will give you further standard sobriety tests. You will be escorted off the boat. You will be given a meal and then asked to provide breath samples for testing at regular intervals to monitor the elimination of alcohol from your body. When your alcohol content level is at acceptable and legal limits for sobriety you will be transported to your place of residence.

You will be asked to sign an Informed Consent Form, a copy of which has been given to you for review.

Are there any questions?

Now you can proceed with completing the questionnaire. Please be assured that your responses will be considered private and confidential information and will only be seen by myself or people from my company. When the project is over it will be destroyed. If you have any questions while you are doing this please come up to see me.

INFORMED CONSENT FORM

Gentlemen:

I have agreed to participate in a research project to evaluate standard methods for testing intoxication. My consent to participate in this experimental research project does not in any way imply or constitute employment with the Federal Government or Dunlap and Associates, Inc. (D&A).

I understand the following conditions:

At an agreed upon time, I will arrive at the site of the study, where I shall expect to spend approximately 8 hours. Soon after my arrival, an attending nurse will conduct a brief medical screening and will remain in attendance throughout the study. I will then be asked to consume a glass of fruit juice with a measured amount of alcohol each 40 minutes until three glasses have been consumed. Before and after each drink I will be asked to provide a breath sample by blowing into an automatic alcohol testing device. Following the third drink and breath test, I will be asked to board a boat for a boat trip. During the trip I will be asked to consume a 4th drink followed by another breath test. Police officers will then board the boat and administer standard sobriety tests. At the end of this trip, the boat will be docked and boarded by police officers who will give me further standard sobriety tests. I will be escorted off the boat. I will be given a meal and then asked to provide breath samples for testing at regular intervals to monitor the elimination of alcohol from my body. When my alcohol content level is at acceptable and legal limits for sobriety I will be transported to my place of residence.

There has been no coercion, element of fraud or deceit, undue moral suasion or other adverse pressure brought to bear in my volunteering for this study. I have done so of my own free will and I can request that my participation be terminated at any time if in my opinion I have reached the physical or mental state where continuation becomes undesirable.

I am over the age of 21 years and I have no known physical or medical infirmities nor am I presently using any medication or drugs which make my participation in this program dangerous to my well-being or to that of others. I also understand that any information I provide to the study personnel will be kept in total confidence and will only be used anonymously in statistical combination with information from other participants and that the Alcohol Questionnaire that I completed will be destroyed at the end of the study.

My relationship to the Federal Government and D&A is that of a volunteer participant in a research project and nothing contained herein shall be construed as creating any other relationship. I hereby release and hold harmless D&A, their respective agents, servants and employees from any and all claims arising from my participation in or the conduct of the management of the program herein contemplated.

Witness

Signature

Date

Address

Telephone No.