LABORATORY PROFICIENCY TESTING PROGRAM

SUPPLEMENTARY REPORT

SAMPLES 1-5

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PREFACE

The analyses summarized in this report are intended for use as a supplement to previously distributed reports.

The Proficiency Testing Project, initiated in the fall of 1974, is a research study of how to prepare and distribute specific samples; how to analyze laboratory results; and how to report those results in a meaningful manner. Participation in the program is voluntary--involving 235 laboratories. To date, 10 samples representing five categories of evidence examination have been distributed. They are controlled substances, firearms evidence, blood, glass, and paint. A Test Report has been published for each of these samples; each report being a statistical summary of the findings of the participating laboratories.

This report is the first of a series of supplementary reports which evaluates results from a grouping of samples. The observations are based on data which has been reported in the individual test reports for those samples.

The citing of any product or method in this report is done solely for reporting purposes and does not constitute an endorsement by the project sponsors.

Comments or suggestions relating to any portion of this report or of the program in general will be appreciated.

December 1975

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INTRODUCTION

The basic tenet of the Proficiency Testing Program being conducted by the Forensic Science Foundation is that the Proficiency samples should, in as far as possible, be handled according to normal laboratory procedures. Laboratories are consequently given minimal direction as to the manner of reporting results.

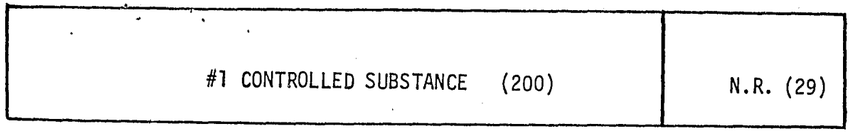
The diversity of the form of the responses to the first five Proficiency Test Samples has lead the Project Advisory Committee to conclude that a rigorous statistical analysis of test results would not be feasible for all samples or for certain sections of individual samples.

There are several reasons for this. First, a statistically valid number of responses is not available in some instances. An example of this is seen in Test Sample #3, in which two laboratories out of 154 reported data on Esterase D. Second, a reported response is, in some jurisdictions, tempered by statutory or policy considerations which are unrelated to the proficiency of the laboratory. An example of this is seen in those laboratories correctly reporting a "barbituric acid derivative" or a "Barbiturate" for Test Sample #1. Third, the responses to the test samples were often so abbreviated as to provide little insight into the methodology used in performing the examinations. An example of this is seen in the laboratories correctly reporting secobarbital for Test Sample #1, and stating they had used "a color test and microcrystalline tests."

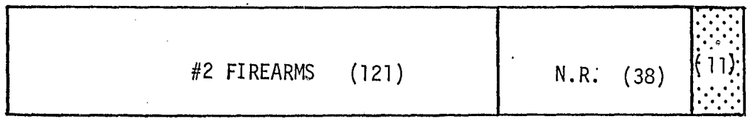
The Project Advisory Committee does believe, however, that many significant trends are demonstrated in the responses returned, and that a number of generalizations can be made which are fully supported by the nature and quality of the responses.

The following report collects these generalizations and observations from the first five Proficiency Test Samples.

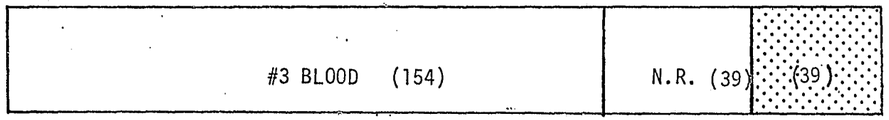
RESPONSE RATES



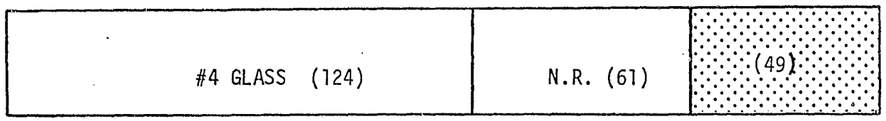
Participation rate = 87%



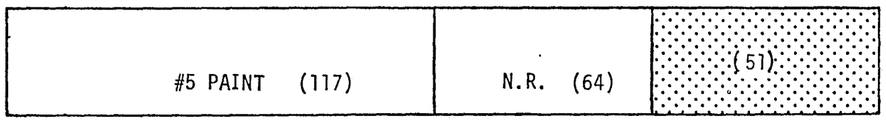
Participation rate = 78%



Participation rate = 81%



Participation rate = 68%



Participation rate = 65%

N.R. = No Response

= Do not perform this type of analysis (Not requested in Test #1)

TEST #1 - CONTROLLED SUBSTANCE

The controlled substance, Sodium Pentobarbital, sent out as Test Sample #1 was correctly identified by 185 of the 200 laboratories reporting. This represents 92.5% of the laboratories participating. A response of "barbiturate" or "a barbituric acid derivative" was considered a correct response, since a number of jurisdictions are not required by statutory considerations to carry the analysis beyond this point.

Fifteen laboratories reported incorrect or imperfect results. Of these, one laboratory found no drug material, one found Librium, and thirteen identified the material as some other barbiturate.

The Project Advisory Committee is in accord with the following general comments in regard to this Sample:

- The laboratories reporting "no drug" and "Librium" apparently used methodology which was not sufficient to the task. Although TLC and UV were used by many laboratories correctly reporting pentobarbital, it is apparent that much more emphasis was placed on GC, IR, and microcrystalline tests.

- Of the 13 laboratories reporting a barbiturate other than pentobarbital, TLC was used in seven instances, GC in six instances, IR in ten instances, and microcrystalline tests in three instances. The Project Advisory Committee can conclude that either one or both of the following may have occurred:

  Δ Mislabelled or contaminated primary standard,

  Δ Misinterpretation of the test results by the operator resulting from carelessness or lack of experience. Examples of this area would include the misinterpretation of IR spectra, the failure to properly recognize and interpret crystal forms, and other types of operator error.

TEST #2 - FIREARMS EXAMINATION

Analysis of the responses to Test Sample #2, Firearms, reveals that the test actually addressed two separate areas:

1) The ability of the laboratory to examine and measure the evidence, and
2) The extent of the data maintained by the laboratory on class characteristics of firearms.

The Project Advisory Committee is in accord with the following general comments in regard to this Sample.

- Reporting that projectile Item #1 could have been fired in <u>any</u> .38 caliber weapon, or that projectile Item #3 could have been fired in <u>any</u> .380 automatic pistol, would seem to be a questionable practice. The Project Advisory Committee recognizes the responsibility of the laboratory not to exclude possible weapons. However, the class characteristics of the evidence do, in fact, exclude certain weapons. Failure to indicate either possible weapons, or, alternatively, improbable weapons, could well result in a situation where the investigating officers needlessly channel investigative effort into following improbable weapons, squandering time that could be used more profitably elsewhere.

  This statement, however, should not in any way be construed as in opposition to the practice of many laboratories of appending a general statement to the effect that the list of possible weapons may not be inclusive.

- The Committee recognizes that the class characteristics of weapons do not, in many instances, permit an unequivocal determination of manufacturer and/or model to be made. However, the weapon involved in Items #1 and #2 was a Smith and Wesson, and the weapon involved in Items #3 and #4 was a Beretta. The Project Advisory Committee is in accord that correct responses to the questions regarding possible weapons should have specifically mentioned Smith and Wesson and Beretta in some form.

  In connection with Item #1, 8% of the responses failed to mention Smith and Wesson. In connection with Item #3, 26% of the responses failed to report Beretta. In connection with Item #4, 43% of the responses failed to report Beretta.

- It is apparent from the responses to this test sample that some laboratories have access to data on class characteristics that were not available or not invoked by other laboratories. These data are fragmented to such an extent that it

is apparently not being used uniformly, and possibly are not being used efficiently. The Project Advisory Committee urges LEAA/NILECJ or other groups to consider the compilation and publication of firearms class characteristics under one cover.

TEST #3 - BLOOD ANALYSIS

Type B blood was reported correctly by 148 of the 154 laboratories participating.

Five laboratories reported results at variance with type B blood. Two reported type AB, two reported type O, and one lab failed to find any indication of either blood group antigen or blood group antibody.

The Project Advisory Committee is in accord with the following general comments in regard to this sample:

- One of the laboratories reporting type O conducted only a test for the antibody. The Project Advisory Committee believes that the Lattes test or other test for blood group antibodies is, by itself, insufficient for purposes of forensic blood-stain analysis.

- In the remaining four instances, the absorption elution technique was attempted. Errors here may have arisen from inexperience or carelessness on the part of the examiner.

Type MN blood was reported correctly by 15 of 25 laboratories attempting this system. This represents 60% of the attempts.

The Project Advisory Committee is in accord with the following general comments in regard to this sample:

- All of the laboratories attempting the MN typing used the absorption elution method. Each of the 9 laboratories reporting type M had also used the absorption elution technique in the ABO typing, and had correctly typed the stain as type B. The Project Advisory Committee concludes that the errors may well be attributable to considerations other than technique. MN antisera is widely held to be treacherous, and the erroneous results may possibly be attributed to poor antisera.

  The Project Advisory Committee urges LEAA/NILECJ to investigate the possibility of funding research projects to develop more reliable antisera for the MN system, as well as other antisera specifically for forensic purposes.

- The incorrect responses relative to the Rh typing illustrates a significant point; the frequency of occurrence of certain Rh factors in such that a single error may exert a profound influence in the interpretation of typing data.

- Of the 154 laboratories responding to this Test Sample, only 20 attempted the PGM type, only 15 attempted the EAP type, only 2 attempted to perform a Haptoglobin determination, 3 attempted the AK type, and 10 attempted the Hemoglobin type.

  The Project Advisory Committee recognizes that in this instance, the blood samples were distinguishable by ABO typing alone. However, the Committee believes that the Crime Laboratories in the nation cannot rely upon ABO grouping alone as a general rule. Laboratories doing so are ignoring the very powerful discriminating abilities of the isoenzyme and serum protein techniques. There is a rapidly growing awareness of the value of these techniques in the criminal justice system. The skill inventories required to conduct these examinations should be within the reach of virtually any laboratory conducting forensic blood testing. The capital outlay for equipment is modest, and the techniques are neither controversial nor untested. The Project Advisory Committee considers the number of laboratories conducting these examinations to be deficient, and urges laboratories not now conducting these examinations to systematically build a capability in this area.

TEST #4 - GLASS ANALYSIS

Test Sample #4 was reported correctly by 118 of the 124 laboratories responding. This represents 95.2% of the laboratories participating.

Six laboratories responded that the glass samples could have shared a common origin, or that their tests were inconclusive.

The Project Advisory Committee is in accord with the following general comments in regard to this sample:

- The Committee does not condemn in any way the reporting of inconclusive results, when appropriate. Situations in which such a response would be appropriate might include an inadequate amount of evidence, a contaminated sample, or where the sample possesses few inherent charazterizing features. This is not the case in this test sample. The state of the art in criminalistics is certainly advanced to the point that these samples of glass should be easily distinguished by techniques available to any laboratory attempting to conduct glass examinations. The Project Advisory Committee believes that an inconclusive report in this sample is not supportable.

  The two inconclusive responses emerged out of different situations. In one case, the methodology employed was insufficient; in the other case exhaustive data were produced to demonstrate the dissimilarities between the two samples, but the operator apparently failed to interpret the data properly.

- Laboratories should exercise great caution in relying upon a single technique for the characterization of evidence.

- Of the four laboratories reporting that the samples could have shared a common origin, all incorrectly performed or interpreted refractive index determinations. This would appear to be an area deserving some attention.

TEST #5 - AUTOMOBILE PAINT EXAMINATION

Test Sample #5 was reported correctly by 93 of the 117 laboratories responding. This represents 79% of the laboratories participating.

Twenty-four laboratories reported results at variance with the manufacturers' statement and the results of the referee laboratories. Twenty-two laboratories reported that Item A could have had a common origin with both Items B and C, one laboratory reported inconclusive results.

The Project Advisory Committee is in accord with the following general comments in regard to this sample.

- The Committee does not condemn in any way the reporting of inconclusive results, when appropriate. Situations in which such a response would be appropriate might include an inadequate amount of evidence, a contaminated sample, or where the sample possesses few inherent characterizing features. This is not the case in this test sample. The state of the art in criminalistics is certainly advanced to the point that these samples of paint should be easily distinguished by techniques available to any laboratory attempting to conduct paint examinations. The Project Advisory Committee believes that an inconclusive report in this sample is not supportable.

- The laboratory reporting that neither Item B or C could have shared a common origin with Item A relied upon a spectrographic analysis but provided no details. The Project Advisory Committee believes that a spectrographic analysis alone is not sufficient to characterize paint for forensic purposes.

- Many of the remaining twenty-two laboratories reporting that all three paints could have shared a common origin failed to make proper use of solubility tests; solubility tests possess the inherent ability to distinguish Item C from Item A and Item B. It should be noted, however, that a number of the laboratories that reported that all three paints were indistinguishable did make use of solubility tests. The Project Advisory Committee concludes that these tests were either interpreted incorrectly, or that inappropriate solvents were employed. No test is infallible, and solubility tests, like all others, must be properly conducted and properly interpreted.

- Several laboratories reported similar or identical results for all paints when subjected to pyrolysis-gas chromatography. The error here may be due to either or both of the following:

  - Δ Inexperience or carelessness on the part of the examiner, or,
  - Δ Improper operating conditions for this type of instrumental approach.

- A number of other laboratories reporting that all three samples were indistinguishable provided so little detail with respect to methodology that the Project Advisory Committee is unable to draw any meaningful conclusions regarding weaknesses or possible sources of error.

APPENDIX

FIGURE 1 Lab Code A-_____

PROFICIENCY TESTING PROGRAM

TEST NO. 1

Examine according to your normal laboratory procedures and complete portion(s) below which complies with your laboratory policy.

1. (a) What is the controlled (narcotic or dangerous drug) substance _____

(b) Indicate method(s) used.

2. (a) Please add any other data (quantitative-qualitative) that you routinely develop.

(b) Indicate method(s) used.

IMPORTANT

DO NOT SIGN THIS DATA SHEET OR IN ANY OTHER WAY IDENTIFY YOUR LABORATORY.

RETURN COPY TO: KENNETH S. FIELD, FORENSIC SCIENCES FOUNDATION, SUITE 515, 11400 ROCKVILLE PIKE, ROCKVILLE, MARYLAND 20852.

FIGURE 2

QUICK REPORT

Proficiency Testing Program

Test No. 1

Thank you for returning your data sheets and results. The controlled (Narcotic or dangerous drug) substance was PENTOBARBITAL. According to the manufacturer the sample is a blend with a nominal value of 74% SODIUM PENTOBARBITAL. Results submitted by two Referee Laboratories have an average value of 71% Sodium Pentobarbital. At a later date a complete report will be sent to you including the results submitted by all laboratories (by Code Numbers).

FIGURE 3

DATA SHEET - TEST #2

LAB CODE A- _____

☐ CHECK HERE (AND RETURN IF YOU DO NOT PERFORM FIREARMS ANALYSIS)

DATA SHEET

PROFICIENCY TESTING PROGRAM
TEST NO. 2

Examine according to your normal laboratory procedures and complete portion(s) below which complies with your laboratory policy.

I. PROBABLE WEAPONS(S)

1. *This question refers to the projectile identified with a three digit number.*

What is the most probable weapon(s) from which this projectile was fired (type - make - model - caliber)?

2. *This question refers to the cartridge case identified with a three digit number.*

What is the most probable weapon(s) from which this cartridge case was ejected (type - make - model - caliber)?

3. *This question refers to the cartridge case identified with an "X".*

What is the most probable weapon(s) from which this cartridge case was ejected (type - make - model - caliber)?

4. *This question refers to the projectile which has no special "test" marks.*

What is the most probable weapon(s) from which this projectile was fired (type - make - model - caliber)?

LAB CODE A-_____

DATA SHEET

PROFICIENCY TESTING PROGRAM
TEST NO. 2

II. ADDITIONAL INFORMATION ROUTINELY DEVELOPED

1. Projectile marked with three digit number

a. Other Data (Numbers of lands, groves, direction of twist, weight, dimensions, cannelure, probable load, etc.)

b. Indicate Methods

2. Cartridge case marked with three digit number

a. Other Data (Position of extractor, ejector, form of firing pin impression, etc.)

b. Indicate Methods

3. Cartridge case marked with an "X".

a. Other Data (Position of extractor, ejector, form of firing pin impression, etc.

b. Indicate Methods

4. Projectile with no special "test" marks

a. Other Data (Number of lands, groves, direction of twist, weight, dimension, cannelure, probable load, etc.)

b. Indicate Methods

IMPORTANT

DO NOT SIGN THIS DATA SHEET OR IN ANY OTHER WAY IDENTIFY YOUR LABORATORY.

RETURN COPY TO: KENNETH S. FIELD
FORENSIC SCIENCES FOUNDATION, INC.
11400 ROCKVILLE PIKE, SUITE 515
ROCKVILLE, MARYLAND 20852

FIGURE 4

QUICK REPORT

Proficiency Testing Program

Test #2

Firearms Analysis

Thank you for returning your data sheets and test results. The four firearms items sent to you were prepared as follows:

Item #1 ("A"and three digit marked lead projectile) and Item #2 (three digit marked cartridge case) were prepared by firing 200 rounds of a .38 Special Remington (R-P), 158 grain lead ammunition of one lot in a .38 Smith and Wesson Special, M&P revolver, Ser. No. C222994, frame-crane #33244, blue-steel, having a five inch barrel and being in fair to good condition.

Item #3 ("X" marked cartridge case) and Item #4 (unmarked jacketed projectile) were prepared by firing 200 rounds of .380 auto Winchester (w-w), 95 grain, full metal case ammunition of two lots in a P. Beretta 9 mm Corto (.380 Auto) Model 1934, Brevettato auto loading pistol, Ser. No. #686256 (Bardone V.T. 1938-XVI), being in good condition and with a fair barrel.

Although the cartridges and projectiles were prepared together, the assumption should not have been made in advance that they came from the same weapons.

At a later date, a complete report will be sent to you including the results of three referee laboratories and the results of all laboratories (by code numbers).

LAB CODE A-_____

FIGURE 5

☐ CHECK HERE (AND RETURN) IF YOU DO NOT PERFORM BLOOD ANALYSIS

DATE RECEIVED IN LAB_____

DATE PROCESSED IN LAB_____

DATA SHEET

PROFICIENCY TESTING PROGRAM

TEST #3

HUMAN BLOOD ANALYSIS

The sample is a human blood stain, therefore we ask that you supply only the methodology you would use in answering questions 1 and 2. It is not necessary to perform the actual tests. This applies to questions 1 and 2 only.

1. Indicate the methods you would normally use to ascertain that the sample is blood.

   Method(s):

2. Indicate the methods you would normally use to ascertain that the blood is from human species.

   Method(s):

Examine according to your normal laboratory procedures and complete portion(s) which comply with your laboratory policy.

3. a. What is the ABO factor? _____

   b. Indicate method(s) used:

4. If your laboratory has the capabilities to perform any other grouping or subgrouping procedures (such as MN, Rh, or isoenzymes, etc.) run any or all of them and report your findings here. (For each grouping or subgrouping identified, please indicate the methods used. Attach additional sheets if necessary.)

   Group:

   Method(s):

   Group:

   Method(s):

FIGURE 6

QUICK REPORT

Proficiency Testing Program

Test #3

Human Blood Analysis

Thank you for returning your data sheets and test results. The human blood stain sample was characterized by the manufacturer as follows:

ABO factor: group B

Rh: Positive, Cc D Ee

MN: type MN

EAP: type A

AK: type 1

PGM: type 2-1

At a later date a complete report will be sent to you including the results of three referee laboratories and the results of all laboratories (by code numbers).

LAB CODE A- _____

FIGURE 7

☐ CHECK HERE (AND RETURN) IF YOU DO NOT PERFORM GLASS EXAMINATION

DATE RECEIVED IN LAB_____

DATE PROCESSED IN LAB_____

DATA SHEET

PROFICIENCY TESTING PROGRAM

TEST #4
GLASS EXAMINATION

Item A represents a glass sample taken from the scene of a burglary. Item B represents a glass sample taken from the trousers of a suspect.

1. Item A could have common origin with Item B.

☐ YES

☐ NO

☐ Inconclusive

2. What information (quantitative and qualitative) did you develop to arrive at your conclusion in No. 1?

Item A

Item B

3. Method(s) and instrument(s) used:

DATA SHEETS MUST BE RECEIVED AT THE FOUNDATION OFFICE BY MAY 30, 1975.

FIGURE 8

QUICK REPORT

PROFICIENCY TESTING PROGRAM

TEST #4

GLASS ANALYSIS

Thank you for returning your data sheets and test results. The glass samples were characterized by the manufacturer as follows:

COLOR

Both are clear glass and cannot be distinguished on this basis.

FLUORESCENCE

Type B glass has some tin dissolved into one of its surfaces and exposure to ultraviolet light will cause the glass to fluoresce. Type A glass does not contain tin.

COMPOSITION

The composition of the glasses are as follows:

	Type A	Type B
SiO_2	73.37%	73.20%
Na_2O	13.16	13.64
K_2O	0.24	0.03
CaO	8.26	8.87
MgO	3.61	3.95
Al_2O_3	1.22	0.15
SO_3	0.18	0.25
Fe_2O_3	0.112	0.082
Total	100.15	100.16

DENSITY

Typical nominal values for densities are as follows:

Type A	Type B
2.4860 g/cc	2.4945 g/cc
2.4862	2.4947
2.4821	2.4949
2.4876	2.4949
2.4859	2.4944
2.4852	2.4952

REFRACTIVE INDEX

Typical refractive indices are as follows:

N_D (Sodium Line) Refractive Index Type A	N_D (Sodium Line) Refractive Index Type B
1.5167	1.5186
1.5167	1.5185
1.5158	1.5186
1.5167	1.5185
1.5168	1.5186
1.5166	1.5186

At a later date a complete report will be sent to you including the results of three referee laboratories and the results of all laboratories (by code numbers).

LAB CODE A-_____

FIGURE 9

☐ CHECK HERE (AND RETURN) IF YOU DO NOT PERFORM AUTO PAINT EXAMINATION

DATE RECEIVED IN LAB_____

DATE PROCESSED IN LAB_____

DATA SHEET

PROFICIENCY TESTING PROGRAM

TEST #5
AUTO PAINT EXAMINATION

Item A represents a paint specimen recovered from the clothing of a dead victim found at roadside--an apparent hit-and-run victim. (Disregard metal base plate.)

Items B and C were taken from two separate suspect vehicles. (Disregard metal base plate.)

1. Item A could have common origin with:

☐ B

☐ C

☐ Both

☐ Neither

2. What information (quantitative and qualitative) did you develop to arrive at your conclusion in No. 1?

Item A

Item B

Item C

3. Method(s) and instrument(s) used:

DATA SHEETS MUST BE RECEIVED AT THE FOUNDATION OFFICE BY JUNE 20, 1975.

FIGURE 10

QUICK REPORT

PROFICIENCY TESTING PROGRAM

TEST #5
AUTO PAINT EXAMINATION

Thank you for returning your data sheets and test results. The auto paint samples can be characterized according to the sample manufacturer as follows:

Samples A, B, and C are the same color - American Motors Sienna Orange (G6). All three samples have a triple layer sequence of orange topcoat, medium gray primer and dark gray primer. Samples A and C are the same and were prepared using topcoat and primer from U.S. paint suppliers. Sample B was prepared using a topcoat and primer supplied by a Canadian supplier and is representative of material used at the American Motors Canadian plant. There is a difference (formulation) in composition between the topcoats of Sample B versus A and C, therefore Item A could have common origin only with C.

At a later date a complete report will be sent to you including the results of three referee laboratories and the results of all laboratories (by code numbers).

END