LABORATORY PROFICIENCY TESTING PROGRAM

PROFICIENCY TESTING

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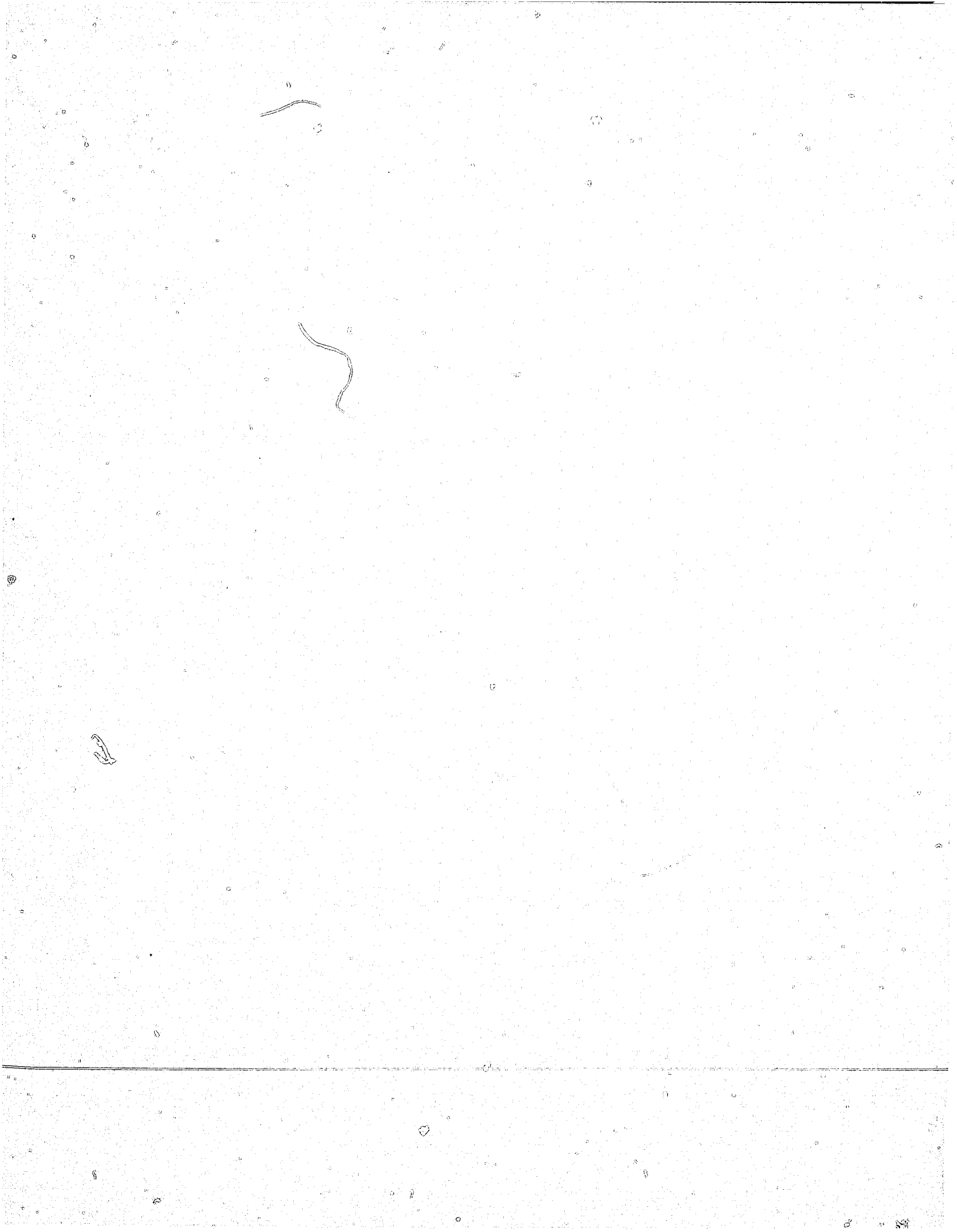
11400 ROCKVILLE PIKE • ROCKVILLE, MARYLAND 20852 • (301) 770-2723



LABORATORY PROFICIENCY TESTING PROGRAM

REPORT NO. 14

ARSON EXAMINATION

PROJECT STAFF

J. L. Peterson

E. Fabricant

Statistical presentations prepared by:

COLLABORATIVE TESTING SERVICES, INC.
Vienna, Virginia

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FOREWORD

The analysis summarized in this report is the fourteenth of a series that will be made in conjunction with this proficiency testing research project.

In the course of this testing program participating laboratories will have analyzed and identified different samples of physical evidence similar in nature to the types of evidence normally submitted to them for analysis.

The results for Test Number Fourteen are reflected in the charts and graphs which follow.

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.

August 1976

BACKGROUND

This laboratory proficiency testing research project, one phase which is summarized in this report, was initiated in the fall of 1974.

This 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. Information is being collected for research and statistical purposes only. Such information will not be revealed or used for any other purpose. Information furnished by any person or agency identifiable to any specific person or laboratory will not be revealed or used for any purposes, other than the research and statistical purposes for which it was obtained.

Participation in the program is voluntary. Accordingly, invitations have been extended to 238 laboratories to share in the research. It is recognized that all laboratories do not perform analyses of all possible types of physical evidence. Thus, in the data summaries included in this report, space opposite some Code Numbers (representing specific laboratories) may be blank, or marked "No Data Returned".

Additional evaluations of individual tests will be published in a separate report.

The Project is under the direct control of the Project Advisory Committee whose members' names are listed on the Title Page. Each is a nationally known criminalistic laboratory authority.

Supporting the Project Advisory Committee in their efforts is the Forensic Sciences Foundation with additional support from the Collaborative Testing Service, Inc., Vienna, Virginia in the area of statistical presentation.

SUMMARY

In this test, 235 laboratories were sent three samples which were referred to as Items A, B and C. Participants were asked to develop information about these samples as if they were evidence in an attempted arson case. The Data Sheet is attached at Annex A.

Of the 235 laboratories, 43 indicated that they do not perform arson examinations, 114 responded with data, 77 did not respond, and one indicated that they do arson examinations but were unable to complete the test. This represents a participation rate of 59%.

The information in Table 1 shows that Items A and C were of common origin with Item B. Table 2 contains the responses of the referee laboratories. Table 3 summarizes the responses given for Question 1a. Table 4 summarizes the responses given for Questions 3a and 3b. The frequency of reported methods given in response to Question 2 is given in Table 5. Table 6 is a summary of the methods used and the results of the methods used for each laboratory in lab code order.

No analysis of the responses to Question 1b was made. This question was judged to be inappropriate to this type of testing, therefore answers submitted have been disregarded.

ANNEX A
FIGURE 1.

LAB CODE B_____

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

DATE RECEIVED IN LAB_____

DATE PROCESSED IN LAB_____

DATA SHEET
PROFICIENCY TESTING PROGRAM

TEST #14
ARSON EXAMINATION

Item B represents a piece of evidence found at the scene of an attempted arson. Items A & C were found in the back seat of a fleeing motor vehicle minutes after a silent alarm was activated at police headquarters.

1. a. Could Items A or C have common origin with Item B?

	A	C
Yes	☐	☐
No	☐	☐
Inconclusive	☐	☐

b. Does the evidence denote a conspiracy?

Yes	☐
No	☐
Inconclusive	☐

2. What information (qualitative, quantitative and criminalistic) did you develop to arrive at your conclusion in Question 1? List the order of tests performed. Asterisk (*) the point at which a conclusion or conclusions were reached.

Sequence of Testing	Information Developed
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____

3. a. Was an accelerant found? Yes ☐ No ☐

b. If "Yes", was it identified? Yes ☐ No ☐

Identified as:_____

4. Please specify the information developed with each of the methods and instruments used.

   Please provide specific and complete responses. Attach additional sheets if necessary.

   Method:

   Method:

   Method:

   Method:

5. Additional Comments:

DATA SHEETS MUST BE RECEIVED AT THE FOUNDATION OFFICE BY APRIL 23, 1976

Table 1

Supplier's Characterization of Samples

Item A - approximately 8 ml of leaded gasoline, specifically Chevron Supreme High Test (94.5 octane)

Item B - portion of 8 inch square of white 100% cotton cloth from J. C. Penney's with 2 ml of Item A absorbed in the cloth

Item C - other portion of the cloth from B with no gasoline

Note: Items B and C were cut with scissors from one piece of cloth. Also, the gasoline absorbed in Item B and the gasoline in Item A are identical.

Table 2

Responses of the Referee Laboratories

Referee Laboratory 1

Question	Response
1a) A - Inconclusive C - Yes	
1b) Yes	
2b) and 4)	1. Noted odor and physical appearance of liquid sample "A": The liquid was transparent and pale pink in color and had a gasoline-like odor. 2. Tested flammability of liquid from Sample "A". Liquid was readily flammable. 3. Gas chromatograph conditions used were as follows: Gas chromatograph-Fisher-Victoreen 4400 with digital log electrometer Column 10 ft. x 1/2" 3% OV 101 on 100/120 supelcoport Temperature programmed: isothermal at 50°C for 2 minutes 10 degrees per minute to 180 degrees and held at 180 degrees for 10 minutes The gas chromatogram of the liquid showed it to be a mixture of volatile components with a boiling-point range similar to that of gasoline. *4. Ran infrared spectra of liquid from "A". Infrared spectra exhibited characteristic hydrocarbon absorptions. At this point, concluded that liquid in sample "A" was a hydrocarbon-type accelerant with a boiling-point range similar to that of gasoline. 5. Sample "B", a sealed metal can, was heated at approximately 70°C. Injected 10cc. of heated vapor into gas chromatograph. Resultant chromatogram showed a series of volatile components with a boiling-point range similar to that of gasoline. 6. Ran vapor phase infrared spectra on 40cc. of heated vapor from can, sample "B". The vapor phase spectra exhibited characteristic hydrocarbon absorptions.

* indicates the point at which a conclusion or conclusions were reached.

Table 2 (continued)

Referee Laboratory 1

*7. Examined contents of can, sample "B", found to contain a piece of white cloth with strong gasoline-like odor. It was concluded that the vapors in can "B" contained a hydrocarbon-type accelerant with a boiling-point range similar to that of gasoline.

8. Examination of the contents of the manila envelope, Item "C", showed it to contain a piece of white cloth.

*9. The cloth from "B" and the cloth from "C" were physically compared. Based on similar class and individual characteristics, this examiner concluded that the two pieces of cloth were at one time part of the same entity.

10. As a standard sample for comparison to the gas chromatogram obtained from the vapors in Item "B", a portion of the piece of cloth in Item "C" was soaked with liquid from "A". This piece of saturated cloth was placed in a sealed metal can and heated. A gas chromatogram was run on 10 cc. of heated vapors from this can. The gas chromatogram showed a series of volatile components with a boiling-point range similar to that of gasoline.

11. A vapor phase infrared spectra was run on 40 cc. of heated vapor from the sample prepared in Step 10. The spectra obtained exhibited characteristic hydrocarbon absorptions.

12. Several samples were prepared consisting of a portion of the cloth from Item "C" saturated with different brands of gasoline in our reference collection. All samples were placed in sealed metal cans and heated, and gas chromatograms run on 10 cc. of heated vapors from each sample.

13. The gas chromatogram obtained from heated vapors of the cloth from Item "C" soaked with the liquid from Iteam "A", was compared to that obtained from the heated vapors present in Item "B". The two chromatograms were very similar in terms of distribution, positions, and intensities of peaks.

Table 2 (continued)

Referee Laboratory 1

Examination of the chromatograms of heated gasoline vapors of different brands of gasoline showed them all to be very similar with respect to distribution, positions, and intensities of peaks. These chromatograms were also similar to the chromatogram of the vapors from sample "B", and the chromatogram of the heated vapors of the cloth from "C" soaked with the liquid from "A".

3a) Yes 3b) Yes, gasoline

This examiner feels, on the basis of the results obtained, there are insufficient individualizing characteristics in vapor phase gas chromatograms of different brands of gasoline to permit a conclusion as to possible common origin between the vapor phase gas chromatograms of two samples exhibiting the characteristics of gasoline vapors. Also, the vapor phase infrared spectra of different brands of gasoline do not exhibit significant differences.

*On the basis of the aforementioned reasoning, it is this examiner's opinion that the comparative results are inconclusive with respect to a possible common origin between samples A and B.

Table 2 (continued)

Referee Laboratory 2

Question	Response
1a)	A - Yes C - Yes
1b)	No
2) 1.	Ignition - A is flammable, volatile
2.	GC - B a volatile petroleum distillate
3.	*GC - A a petroleum distillate of the gasoline type
4.	*GC - the extraction of B, a petroleum distillate of the gasoline type
5.	*Physical and microscopic examinations of C and B - B and C have common origin
3a)	Yes
3b)	Yes, gasoline
4) GC vapor	- PE 900, 20' SE-30 column, isothermal at 50°C 1000 microliter sample. Detected presence of volatile petroleum distillate.
GC liquid	- PE 900, 20' SE-30 column, 0.5 microliter sample, isothermal at 40°C for 2 minutes, program 40-175°C at 4°/min. Identified liquid and extract as petroleum distillate of the gasoline type.
Physical and microscopic examination.	Items C and B (cloth) are visually and microscopically similar; color, texture, material, weave pattern. Physical match of cut edges. Demonstrates common origin.
5)	Minor differences were observed in ratios of higher boiling components in A and B, however, these do not exclude the possibility of common origin since gasoline of the same brand and grade from a single source may vary with time.

Table 2 (continued)

Referee Laboratory 3

Question		Response
1a)	A - Yes C - Yes	
1b)	No	
2)		1. Headspace sampling of B - volatile hydrocarbon mixture present. 2. Distribution - small amount of volatile liquid, immiscible in water. 3. GC - Hydrocarbon mixture, identified as Liquid Sample A. 4. Cloth from B found to be contiguous cut section of cloth in C.
3a)	Yes	
3b)	Yes, gasoline	
4)	Gas Chromatography of headspace vapors from Item B: Volatile hydrocarbon mixture present, similar in volatility range to gasoline.	
	Distillation	Direct steam distillation of B recovered a small quantity of colorless liquid not miscible in water.
	Refractive Index	of residue 1.47, consistent with partially evaporated gasoline; R. I. of Item A 1.42 before evaporation.
	Gas Chromatography of liquid distillate - Characterized as partially evaporated gasoline, and consistent with originating from same gasoline as in Item A. Method: Visual comparison of cloth in Item B with cloth in Item C revealed matching cut edges - B and C once contiguous section of same piece of cloth.	
5)	Question 1B -	A conspiracy must be decided by the courts not the criminalist. Since both A and C were recovered from the same location, there is no two-party involvement suggested, in any event.

Table 3

Summary of Responses to Question 1a

Question 1a: Could Items A or C have common origin with Item B?

Response	Number of Labs	% of Responding Labs
Yes for A and Yes for C	80	70.2
Inconclusive for A and Yes for C	12	10.5
No for A and Yes for C	9	7.9
Yes for A and Inconclusive for C	4	3.5
Yes for A and No Response for C	4	3.5
Yes for A and No for C	2	1.8
No for A and No for C	2	1.8
No for A and Inconclusive for C	1	.9
Total	114	100%

Item	Number of Labs Responding Yes	Number of Labs Responding No	Number of Labs Responding Inconclusive	Number of Labs Giving No Response
A having common origin with B	90 (78.9%)	12 (10.5%)	12 (10.5%)	0
C having common origin with B	101 (88.6%)	4 (3.5%)	5 (4.4%)	4 (3.5%)

Table 4a

Summary of Responses to Question 3a

Question 3a: Was an accelerant found?

All 114 responding laboratories reported "Yes."

Table 4b

Summary of Responses to Question 3b

Question 3b: If "Yes", was it (the accelerant) identified?

Identified as: _____

Response	Number of Labs	%
Yes	106	93.0%
No	8	7.0%

Labs Responding "Yes" to Question 3b, but reporting other accelerants than gasoline:

Lab Code	Response
212	A gasoline, B not gasoline
316	Petroleum Distillate consistent with aviation gasoline
390	A gasoline, B in kerosene - naphtha range
470	A gasoline, no accelerant in B

Table 5

Frequency of the Methods Reported in Response to Question 2

Question 2: What information did you develop to arrive at your conclusion in Question 1?

Method	Number of Labs Reporting Use of this Method	Percentage of Responding Labs Using this Method
Gas Chromatography	110	96.5%
Fabric & Cut Examinations	105	92.1%
Odor	45	39.5%
Infrared	28	24.6%
Flammability Tests	18	15.8%
Fluorescent Tests	9	7.9%
Thin layer Chromatography	6	5.3%
Hydrocarbon Detector	4	3.5%
Dye Staining	4	3.5%
Energy Dispersive X-ray	3	2.6%
Flash Point Tests	3	2.6%
Atomic Absorption	2	1.7%
Color Tests	2	1.7%
Refractive Index	1	.9%
Solubility	1	.9%
Nuclear Magnetic Resonance	1	.9%
S. P. F.	1	.9%

Table 6

Summary of Laboratory Responses

(* indicates the point at which a conclusion or conclusions were reached)

Lab Code	Question	Response
202	1b)	Inconclusive - responsibility of the court system
YY	2)	1. GC - low temperature and screening on Items A and B
		2. Microscopic Exam - physical match between B and C (at one time they were the same piece of cloth)
	3a)	Yes
	3b)	Gasoline
205	1b)	Inconclusive
YI	2)	1. GC chromatogram of Item A headspace at room temperature
		2. GC chromatogram of Item B headspace at room temperature
		3. GC chromatogram of Item B headspace after heating
		4. GC chromatogram of Item C headspace after heating
	3a)	Yes 3b) Yes, gasoline
207	1b)	No response - irrelevant to analysis
IY	2)	1. Macroscopic and olfactory - A & B have odor similar to gasoline, Similarity of cloth in B & C
		2.* Gas Liquid Chromatography A & B similar to gasoline
		3. Flame
		4. Fluorescence - A, B & C contained fluorescent components
		5. Microscopic Exam
	3a)	Yes 3b) Yes, gasoline
209	1b)	Inconclusive
YY	2)	1. Head space GC of A and B - presence of gasoline in both containers
		2. Smelling of A & B B and C match
		3. Polarized Microscopic Exam of B & C - B and C cotton and physical characteristics are similar
		4. Thread count of B & C - B consistent with C
	3a)	Yes 3b) Yes, gasoline

Note: The two-letter code beneath the Lab Code represents the Lab's response to Question 1a:
YY indicates Yes for A and Yes for C
YI indicates Yes for A and Inconclusive for C
IY indicates Inconclusive for A and Yes for C
NN indicates No for A and No for C
YNR indicates Yes for A and No Response for C
YN indicates Yes for A and No for C
NY indicates No for A and Yes for C

Table 6, continued

Lab Code	Question	Response
210	1b)	Inconclusive
YY	2)	1. Visual and nasal - Petroleum hydrocarbons and similar cloth
		2.* Gas chromatography - Gasoline in both A and B
		3.* Fabric comparison - B and C had been joined at one time
	3a)	Yes 3b) yes, gasoline
211	1b)	Yes
YY	2)	1. Odor - characteristic of a petroleum distillate like gasoline
		2. Flame test - volatile
		3. Gas chromatography - similar to gasoline
	3a)	Yes 3b) Yes, gasoline - like compound
212	1b)	No
NN	2)	1. Odor - A gasoline, B hydrocarbon odor, C negative
		2.* Gas chromatography - A gasoline, B hydrocarbons (but not gasoline) C no hydrocarbons
	3a)	Yes
	3b)	Yes, A characteristic of gasoline, B flammable hydrocarbons but not gasoline
214	1b)	No
YNR	2)	1. Odor of A and B - resembles gasoline
		2. J & W Aromatic Hydrocarbons Detector - 1.0 Explosibility on B
		3.* GC - Items A & B both consistent with gasoline
		4.* Item B and Item C have physical match - visual comparison
		5 * Energy dispersive x-ray analysis - Items A and B both unleaded
	3a)	Yes 3b) Gasoline (unleaded)
215	1b)	No - conspiracy requires agreement between 3 or more persons
YY		in this state
	2)	1. GC analysis of A
		2. GC analysis of known unleaded gasoline standard
		3* GC analysis of B
		4. Infrared spectrum of A and B
		5* Cloth examination of B and C - physical match
	3a)	Yes 3b) Yes, gasoline
216	1b)	No Response - connection between auto and attempted arson
YY	2)	1. Gas chromatograph - A similar to B (gasoline in type)
		2.* Cloth examination - physical match of B and C
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
218 YY	1b)	No - evidence does not show agreement between two or more persons
	2)	1. Organoleptic Test - A has odor of gasoline 2. A immiscible and lighter than water 3. Flash point - A at or below room temperature (22°C) 4.* GC - A identified as gasoline, B contains gasoline vapors same as A 5.* Cloth Examination - B and C were originally one piece
	3a)	Yes 3b) Yes, gasoline
225 YY	1b)	Yes
	2)	1. GC Analysis - A and B identical 2. Mechanical fit - Both pieces were originally one piece of material
	3a)	Yes 3b) No, Petroleum Distillate
229 IY	1b)	Yes
	2)	1.* Qualitative - vapor of cloth (B) similar to vapor of liquid (A) 2. Cloth comparison - match of B and C 3. Thread comparison - threads from B and C similar 4. IR spectra - B and C similar
	3a)	Yes 3b) Yes, gasoline
233 YY	1b)	Inconclusive
	2)	1.* Macroscopic Exam - B and C originally one piece 2. Microscopic Exam - fibers of B and C same 3.* Gas Chromatography - B and C same, Item C gasoline
	3a)	Yes 3b) Yes, gasoline
237 YY	1b)	Inconclusive - legal determination
	2)	1.* Distillation 2. GC analysis of distillate 3. GC analysis of vapors from B 4.* GC analysis of vapors from A ond C 5.* Microscopic comparison - B and C
	3a)	Yes 3b) Yes, gasoline
239 YY	1b)	Yes
	2)	1. GC analysis of A 2. GC analysis of B 3. Microscopic analysis of C and B - fracture match between B & C
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
249	1b)	Inconclusive
YI	2)	1. GC headspace analysis of B - volatile hydrocarbon present
		2. GC liquid analysis of A - gasoline
		3. Steam Distillation of B
		4. Capillary columns analysis of A and B
	3a)	Yes 3b) Yes, gasoline
250	1b)	Yes
YY	2)	1. Distill B
		2.* GC - gasoline in both A and B
		3.* Tear pattern - B and C match
	3a)	Yes 3b) Yes, gasoline
252	1b)	Yes
IY	2)	1. Odor - odor of gasoline in A and B
		2. GC & IR - no difference in A and B
		3. Atomic Absorption - lead present in A and B - none in C
		4. Microscopic - physical match of B and C
	3a)	Yes 3b) Yes, gasoline
256	1b)	Inconclusive
YY	2)	1. Odor - A and B both gasolinic hydrocarbons
		2. GC of headspace - A and B both gasolinic hydrocarbons
		3.* GC of extracts - A and B are quantitatively the same for aromatic fraction
		4.* Macroscopic/Microscopic exam - B and C have physical match along cut edge
		5. Column and thin layer chromatography - A and B consistent w.r.t. dyes
	3a)	Yes 3b) Yes, gasoline
257	1b)	Yes
IY	2)	1. Odor
		2. Liquid and controls - A
		3. Vapor GC - A & B controls - gasoline present
		4.* Cloth comparison - B and C similar
		5. Cloth cut match and microscopic Exam - B and C same
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
260	1b)	Yes - depending on definition of conspiracy
YY	2)	1. Odor - A & B contain volatile hydrocarbons with odor of gasoline
		2. GC (head space) - more volatile fractions of A & B match
		3.* GC (solvent extract) - less volatile fractions of A & B match
		4.* Visual and microscopic - cloth in B and C are of common origin
	3a)	Yes 3b) yes, gasoline
261	1b)	Inconclusive
YY	2)	1. IR spectrophotometer - A and B are hydrocarbons
		2. G.C. - A and B similar to gasoline and to each other
		3.*X-ray Fluorescence - A and B contain lead and bromine
		4. Microscopic Exam - B and C similar - cut marks show common origin
	3a)	Yes 3b) Yes, leaded gasoline
262	1b)	No Response - conspiracy denotes a legal situation, not a technical one
YY	2)	1. Headspace GC - A gasoline
		2.* Headspace GC - B gasoline
		3. Steam distillation of B - insufficient to recover
		4.* Physical match - B matches C
		5. GC of A - to look for mixture of petroleum products
	3a)	Yes 3b) Yes, gasoline
271	1b)	No - conspiracy requires two people
YY	2)	1.* GC analysis - A is gasoline
		2.* Steam distillation - GC analysis - B is gasoline
		3.* Fracture match - B and C from same cloth
		4. AA analysis - A and B both leaded
	3a)	Yes 3b) Yes, gasoline (leaded)
273	1b)	Inconclusive
YI	2)	1. GC for flammables
		2. Microscopic Exam
	3a)	Yes 3b) Yes, gasoline
274	1b)	Yes
IY	2)	1. Headspace GC - B is gasoline
		2.* Steam distillation - GLC of distillate - B conclusively gasoline
		3.* GC analysis - A is gasoline
		4. Visual exam - B and C
		5. Microscopic Exam - confirms physical match of B and C
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
278 YY	1b)	Inconclusive
	2)	1. Steam Distillation - Item B has petroleum distillate odor, flammable, density less than 1
		2.* GC - A and B similar
		3.* Match edges - B and C edges match
	3a)	Yes 3b) Yes, gasoline
281 YY	1b)	No Response
	2)	1. Odor - A gasoline, B gasoline
		2. Flammability - A flammable
		3. Cuts match with B and C
	3a)	Yes 3b) Yes, gasoline
282 YY	1b)	Yes
	2)	1. GC comparison of A with gasoline standard
		2. GC headspace comparision of A and B
		3.* GC headspace comparision of A and B with gasoline standard
		4.* Edge match - edges of B and C match
	3a)	Yes 3b) Yes, gasoline
284 YY	1b)	No Response - it is not the decision of the Laboratory
	2)	1. Gas Chromatography - determined accelerant to be gasoline
		2. Microscopic Exam - determination of white cotton fibers and fiber count
	3a)	Yes 3b) Yes, gasoline
285 YY	1b)	No
	2)	1. Odor - odor of gasoline in A and B
		2.* Organic profile of vapor (GC) - A and B identical and similar to gasoline
		3.* Macroscopic and microscopic - B and C have a common edge
	3a)	Yes 3b) Yes, gasoline
291 YY	1b)	Inconclusive
	2)	1. Distillation - Item B distilled, flammable fluid recovered
		2. GC analysis - A and B similar
		3. Attempted physical match of B and C - no conclusions
		4.* Microscopic Chemical Exam of fabrics - B and C similar cotton fabrics
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
292	1b)	In conclusive - insufficient knowledge of the crime scene
YY	2)	1. GC - headspace of A and B similar
		2. Distillation - Arson Apparatus
		3.* GC - chromatogram of A vs. distillate of B
		4. UV spectrum
		5. Physical match - cloth from B and C match
	3a)	Yes 3b) Yes, gasoline
295	1b)	No - beyond the scope of interest of the Laboratory
YY	2)	1. Organoleptic - no dissimilarities between A and B
		2.* GC - A and B contain gasoline
		3.* Physical match - B and C constitute parts of the same piece of fabric
	3a)	Yes 3b) Yes, gasoline
296	1b)	Job is only to characterize the material
YN	2)	1. Smell
		2. GC - identification of volatile compounds
	3a)	Yes 3b) Yes, gasoline
297	1b)	Inconclusive
NY	2)	1. Odor - A and B smell of gasoline
		2.* GC - A and B chromatograms indicate gasoline but two different kinds
		3.* Physical match - B and C were once part of a single piece of cloth
	3a)	Yes 3b) Yes, gasoline
303	1b)	Inconclusive
YY	2)	1. Odor - petroleum distillate present in A and B
		2.* GC - A and B same mixture of organics
		3. Ref. Search - possible mixture of fluid but no absolute identification of accelerant
		4. Fiber exam - B and C same
		5.* Edge exam - Edges of B and C match
	3c)	Yes 3b) No
307	1b)	Inconclusive
IY	2)	1. Odor - A and B have odor of gasoline
		2. Odor - C contains no odor of flammables
		3. Microscopic Exam - cloth in B and C are same
		4. Dye Staining - B and C are cotton
		5. Infrared - A is gasoline
		6. Red O Exam - presence of flammable hydrocarbon in B
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
309	1b)	Inconclusive - not lab's area of expertise
YY	2)	1.* GC - A and B are both gasoline
		2. Flammability - A flammable
		3. Visual - B had been cut from C
		4.* Microscopic - B had been cut from C
	3a)	Yes 3b) Yes, gasoline
310	1b)	Yes
YNR	2)	1.* GC - A and B similar, accelerants
		2.* Infrared - A and B similar, hydrocarbons
		3. Flammability - A flammable
		4. Physical Match - B and C have common origin
		5. Microscopic Exam - B and C cotton
	3a)	Yes 3b) No
313	1b)	Inconclusive - inappropriate question
YNR	2)	1. Flammability - A flammable
		2. GC - A and B are the same
		3. Fracture match - B matches C
	3a)	Yes 3b) Yes, gasoline
314	1b)	No Response
IY	2)	1. Smell - probable hydrocarbon compound in A and B
		2. IR - A compared with B inconclusive
		3. Microscopic Exam - B and C cotton cloth, consistent with each other
	3a)	Yes 3b) No
316	1b)	Yes
YY	2)	1.* GC - A and B similar to aviation gasoline
		2.* Macroscopic/Microscopic Exam - B and C have common origin
		3.* Distillation - C negative for volatile substance
	3a)	Yes 3b) Yes, petroleum distillates consistent with gasoline
317	1b)	Yes
YY	2)	1. GC headspace - A and B compared
		2. GC liquid - A and B compared
		3. Odor - A and B smells characteristic of gasoline
		4. Fiber exam - B and C similar
		5.* Edge match - B and C edges match
	3a)	Yes 3b) Gasoline

Table 6, continued

Lab Code	Question	Response
320 YY	1b)	No - Question too vague to answer properly
	2)	1. GC - A and B similar to each other and STD gasoline
		2.* Infrared - A and B identical hydrocarbon compounds
		3. Physical Match - B and C have physical match along edges.
	3a)	Yes
	3b)	Yes, gasoline
322 YY	1b)	No
	2)	1. J-W-SS-P Model Hydrocarbon Indicator - Tested for vapor response
		2.* GC - determined gasoline
		3. Distilled cloth and recovered hydrocarbons
		4.* Compared standard and distilled sample - match
		5.* Compared two pieces of cloth - B and C match
	3a)	Yes
	3b)	Yes, gasoline
324 YY	1b)	Yes
	2)	1. GC - A and B similar to known gasoline sample
		2. Electron microscope - B and C cloths similar in appearance and weave patterns identical
		3. Jigsaw comparison - B and C cut in the same interlocking pattern
		4. Polarized microscope - B and C fibers comparable.
	3a)	Yes
	3b)	Yes, gasoline
325 NI	1b)	Inconclusive
	2)	1. Odor - A and B resemble gasoline
		2. J-W Hydrocarbon detector - + off scale reading of A and B
		3. GC - A different from B (no peaks on C)
		4. Distillation of B - .4 ml liquid floating on H_2O
	3a)	Yes
	3b)	No
327 YY	1b)	Yes
	2)	1. GC - A injection
		2. GC - CS_2 extract of B injected
		3.* Tear match comparison of B and C - B and C were once one piece
		4. Microscopic examination of fibers - B and C cotton fibers
		5. Macroscopic comparison of fabric
	3a)	Yes
	3b)	Yes, gasoline
330 YY	1b)	Yes
	2)	1. GC - matched A to B
		2. Microscopic exam - matched cloth in B to C
		3. Infrared - octane indicated in A
	3a)	Yes
	3b)	Yes, gasoline

Table 6, continued

Lab Code	Question	Response
331 YY	1b)	No Response
	2)	1. Odor - gasoline odor in A and B 2. Steam distillation on B 3.* GC - A and B are gasoline 4.* Physical match - B and C cloths match 5. Microscopic Exam - B and C fibres are cotton 6. Flammability tests on A and B 7. Refractive indices on A and B
	3a) Yes	3b) Yes, gasoline
339 NY	1b)	Inconclusive
	2)	1. Odor detection and visual exam 2. Steam distillation 3. Infrared Spectroscopy 4. GC 5. Flame test 6. Microscopic comparison - cut on two portions of cloth is a physical match
	3a) Yes	3b)--- , gasoline
340 IY	1b)	Yes
	2)	1.* GC - A and B both contain hydrocarbon 2.* Infrared - A and B contains hydrocarbons 3. Flammability testing - A flammable 4. Physical Exam of B and C - B and C could have come from same source 5.* Microscopic Exam
	3a) Yes	3b) Yes, hydrocarbon accelerant similar to gasoline
341 YY	1b)	Yes
	2)	1.* GC - A and B both contain a similar gasoline 2. Infrared - A and B match 3.* Physical match - B and C match
	3a) Yes	3b) Yes, gasoline
344 YY	1b)	Not for our lab to decide
	2)	1. GC - on A 2. GC - A and B 3. Puzzle match - B and C can be matched
	3a) Yes	3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
345 NY	1b)	Yes
	2)	1. GC - A is gasoline 2. GC - B is gasoline 3.* GC - comparison of A and B show they are different 4. Macroscopic Exam - jigsaw match of cut edges of B and C 5.* Microscopic Exam - B and C have same number of threads and weave 6. Extract dye from B and attempt TLC - failed
	3a)	Yes
	3b)	Yes, gasoline
347 YY	1b)	Inconclusive
	2)	1. Odor - A and B smell of gasoline 2.* GC - A and B tested 3. Microscopic Exam - cotton fibers
	3a)	Yes
	3b)	Petroleum distillate of the gasoline type
351 YY	1b)	Yes
	2)	1. Odor - A and B similar to gasoline 2.* GC - A and B similar 3. Cloth - B and C similar 4.* Fiber count - B and C consistent
	3a)	Yes
	3b)	No
353 YY	1b)	Not decision of this Laboratory
	2)	1. GC - A and B tested 2. Infrared - A and B tested 3. Tear Pattern - B and C have common tear
	3a)	Yes
	3b)	Yes, gasoline
360 YY	1b)	Yes
	2)	1. Infrared - A and B similar 2. Infrared - Cloths B and C are similar 3.* Microscopic Exam - cloth samples similar
	3a)	Yes
	3b)	Yes, gasoline
363 YY	1b)	Yes
	2)	1. GC - A and B positive for flammable fluids and are qualitatively identical 2. Microscopic Exam - B and C originally one unit
	3a)	Yes
	3b)	Yes, gasoline

Table 6, continued

Lab Code	Question	Response
371	1b)	Yes
YY	2)	1. Odor
		2. Distillation
		3*. GC - distillate from B and liquid from A
		4. Infrared - liquid from A and distillate from B
		5. Microscopic Exam - materials of B and C
	3a)	Yes 3b) Yes, gasoline
375	1b)	Yes
YY	2)	1. GC - B could have originated from A
		2. Fabric edge match - B and C are positive matches
		3. Microscopic exam - fibers of B and C both cotton
	3a)	Yes 3b) Yes, flammable hydrocarbons
376	1b)	No Response - the answer to this should be decided in the courts
YY	2)	1. GC - A appears to be gasoline
		2. Microscopic exam - B and C cotton weave
		3. Solubility - B and C cotton
		4. Ignition test - B flammable
		5. Physical match between B and C
	3a)	Yes 3b) Yes, gasoline
379	1b)	Depends on definition of conspiracy
YY	2)	1. Odor - test on A and B
		2.* Infrared - test on A and B
		3.* Fracture comparison - B and C compared
		4. Flammability - A flammable
	3a)	Yes 3b) Yes, gasoline
380	1b)	Inconclusive
IY	2)	1. Visual Exam - B and C have common origin
		2. Olfactory exam - A and B similar - possible presence of gasoline
		3. GC - A gasoline, A and B similar
		4. Photography of tear marks on Exhibits B and C
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
381 YY	1b)	Yes
	2)	1. Combined portions of A and C into a sealed metal container 2. GC - test on C 3. GC - test on B 4. GC - test on A and C mixture 5. Physical comparison of B with C 6. Ignition of A and B
	3a)	Yes
	3b)	Yes, gasoline
385 YY	1b)	Inconclusive - vague question
	2)	1. GC - A identified as gasoline, B same as C impregnated with A 2. Energy dispersive X-ray - Pb and Br detected on B similar to C impregnated with A 3. Microscopic Exam - B and C were at one time one piece of cloth
	3a)	Yes
	eb)	Yes, gasoline
387 YY	1b)	Legal, not scientific question
	2)	1. GC - A and B similar to gasoline 2. Physical match between B and C 3. T.L.C. - B and A on cloth C same RF and color 4. S.P.F. - A and B peaks same 5. Microscopic Exam - cloths similar
	3a)	Yes
	3b)	Yes, gasoline
388 NY	1b)	No Response
	2)	1.* GC - comparison of A and B 2.* Microscopic Exam - comparison of B and C;fibers are white cotton.
	3a)	Yes
	3b)	Yes, gasoline
390 NN	1b)	No
	2)	1. Odor - A smelled like gasoline 2. Odor - B smelled like kerosene 3. No volatile material present on C 4.* GC - compared all three samples
	3a)	Yes
	3b)	Yes, A - gasoline, B - kerosene - naptha range
391 YY	1b)	Yes
	2)	1. Odor - of A 2. GC - comparison of A and B 3.* Odor - of B 4. Physical match of cut edges of B and C
	3a)	Yes
	3b)	Yes, gasoline

Table 6, continued

Lab Code	Question	Response
394	1b)	No
NY	2)	1. GC - A and B contained gasoline
		2.* TLC - A and B different
	3a)	Yes 3b) Yes, gasoline
395	1b)	Yes
YY	2)	1. Infrared - A identified as gasoline, A and B identical
		2. GC - A verified as gasoline, B same components as A but different ratios, C contains no vapor
		3. GC - A after exposing to atmosphere same as B
		4. GC - A after saturating glass wool same as B
		5. Comparison of cloth samples - B and C similar
	3a)	Yes 3b) Yes, gasoline
397	1b)	Yes
IY	2)	1. GC - Headspace of B
		2. Distillation of contents of B
		3. GC of distillate from B
		4.* Fracture match - B and C were once joined
	3a)	Yes 3b) Yes, gasoline
398	1b)	No
YY	2)	1. Flammability - A flammable
		2. Odor - A and B similar to gasoline
		3. GC - Headspace - A and B similar
		4. GC - A and B similar
		5. Microscopic Exam - fabrics of B and C compared
	3a)	Yes 3b) Yes, gasoline
402	1b)	No
YY	2)	1.* GC - same hydrocarbons present in A and B - both compared to a gasoline standard
		2. Macro and Micro Exam - B and C were
	3a)	Yes 3b) Yes, gasoline
406	1b)	Legal determination not scientific
YY	2)	1. GC - A identified as gasoline
		2.* GC - B contained gasoline residue similar to A
		3.* Physical match - Irregular edges of B and C match
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
407	1b)	Inconclusive
YN	2)	1. Odor - A and B compared
		2. Infrared - A and B contain hydrocarbons
		3. GC - A and B contain volatile hydrocarbons
		4. Flammability - A and B flammable
		5. Microscopic Exam - B and C different
		6. UV light - B and C different
	3a)	Yes 3b) Yes, gasoline
408	1b)	Yes
YY	2)	1.* GC - A and B are the same
		2.* GC - A matches known gasoline
		3. Flammability - A flammable
		4. Cloth and weave pattern - B and C match
		5. Microscopic Exam - B and C are cotton
	3a)	Yes 3b) Yes, gasoline
417	1b)	Inconclusive
YY	2)	1. Odor - A and B smell of hydrocarbons
		2.* GC - A and B both contain gasoline
		3.* Visual inspection - B and C have common origin
	3a)	Yes 3b) Yes, gasoline
418	1b)	Inconclusive
NY	2)	1. Distillation of B
		2.* Infrared - A and B similar
		3.* Microscopic Exam - B and C fibers are white cotton
	3a)	Yes 3b) Gasoline type material
422	1b)	Yes
YY	2)	1. GC - A and B identified as gasoline
		2. Physical match - B and C match
		3. UV Fluorescence - A, B and C are negative
		4. Color test for lead - negative for A and B
		5. Physical match - B and C match
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
426 NY	1b)	Inconclusive
	2)	1. Odor - smells of gasoline 2. Flammability - combustible 3. GC - B different 4. Infrared - A and B similar 5 - Physical match - B and C match
	3a) Yes	3b) No
428 YY	1b)	Yes - inappropriate question
	2)	1. Distillation of B 2. GC - A and B identified as gasoline 3. X-ray fluorescence - A and B tested 4. Microscopic Exam - B and C physical match
	3a) Yes	3b) Yes, gasoline - leaded
429 IY	1b)	NR - matter for attorneys, not crime labs
	2)	1. Distillation of B 2. Visual and microscopic comparison of cloth - B and C were once joined 3. UV fluorescence - C fluorescence more than B 4. GC - A and B are gasoline, but not necessarily similar
	3a) Yes	3b) Yes, gasoline
430	1b)	Inconclusive
	2)	1. Distillation 2. Spark Ignition 3.* GC - Distillate vs. known gasoline 4.*Infrared - Distillate vs. known gasoline 5. Microscopic Cloth Comparison - comparison of A and C
	3a) Yes	3b) Yes, gasoline
431 YY	1b)	NR - this Lab does not make this determination
	2)	1.* GC 2.* Physical Match 3. Microscopic Exam - Fibers are cotton
	3a) Yes	3b) Yes, gasoline
432 YY	1b)	No
	2)	1. Odor - A and B smell like gasoline 2. UV - A similar to gasoline 3. GC - A and B are similar 4. Microscopic Exam - edges of B and C match 5. Thread count - B and C match
	3a) Yes	3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
433 YY	1b)	Inconclusive
	2)	1.* Odor - A and B smell like gasoline 2. Infrared - A and B similar to gasoline 3. GC - A and B identified as gasoline 4.* Physical match between B and C
	3a)	Yes 3b) Yes, gasoline
438 YY	1b)	Yes
	2)	1. GC - A and B similar to gasoline 2.* GC - (different column) - A and B identified as gasoline 3.* Macroscopic Exam - Physical match of B and C
	3a)	Yes 3b) Yes, gasoline
441 YY	1b)	NR - insufficient information
	2)	1. Odor 2. GC - A and B tested 3. Marquis color test - A and B tested 4. Physical match - B and C match
	3a)	Yes 3b) Yes, gasoline
443 YY	1b)	Inconclusive - chemist does not know what is meant here
	2)	1. Odor - A and B tested 2. Fire/Flash Point - Item A tested at freeze temperature 3. Infrared - A tested 4. GC - A tested 5. GC - B tested 6.* Microscopic/Visual - Comparison of B and C
	3a)	Yes 3b) Yes, gasoline
444 YY	1b)	Inconclusive
	2)	1. Odor - A and B tested 2. GC - A and B similar 3. Tear comparison - B and C match 4. Fiber analysis - B and C fibers both cotton
	3a)	Yes 3b) No
446 YY	1b)	Yes
	2)	1. Distillation of B 2.* Visual Cloth Comparison - B and C were once joined 3.* GC - A and B identified as gasoline 4. GC - A and B identified as gasoline
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
449	1b)	NR - improper question
YY	2)	1. GC - A and B similar
		2. Infrared - A consistent with gasoline
		3. Flash Point at room temperature - A identified as an accelerant
		4. Physical watch of B and C
	3a)	Yes 3b) Yes, gasoline
450	1b)	Inconclusive
NY	2)	1.* Microscopic Exam
		2.* GC - A and B similar to gasoline but different
		3.* Nuclear Magnetic Resonance - A and B characteristic of gasoline but different
		4.* Infrared - A and B different
		5.* X-ray fluorescence - A and B contain Pb and Br
	3a)	Yes 3b) Yes, gasoline
452	1b)	NR
YY	2)	1. GC - B contains gasoline
		2.* GC - A contains gasoline
		3.* Physical match of B and C
		4. Fiber identification - B and C were cotton
	3a)	Yes 3b) Yes, gasoline
453	1b)	NR - not up to this Laboratory
YY	2)	1.* GC - A and B contained gasoline
		2.* Visual/microscopic - edges of B and C match
	3a)	Yes 3b) Yes, gasoline
455	1b)	Yes
YY	2)	1. GC - A and B similar to gasoline
		2. Visual Cloth Exam - B and C once joined together
	3a)	Yes 3b) Yes, gasoline
458	1b)	Yes
YY	2)	1.* GC - A and B identified as gasoline with possible common origin
		2.* Physical Exam - B and C show physical match
		3. Microscopic Exam - B and C cotton
	3a)	Yes 3b) Yes, gasoline
465	1b)	Yes
YY	2)	1.* GC - A and B contain accelerants
		2.* Physical/Microscopic - cloth B and C match along cut edge
	3a)	Yes 3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
469	1b)	Inconclusive
YI	2)	1. Odor - smell of flammable liquid present
		2.* GC - A and B contain gasoline
	3a) Yes	3b) Yes, Gasoline
470	1b)	Inconclusive - question of law
IY	2)	1. Infrared - A identified as gasoline, inconclusive for B
		2. Fracture match between B and C
	3a) Yes	3b) Item A identified as gasoline, no accelerant identified from B
473	1b)	Not part of scientific finding
YY	2)	1. GC/MS - hydrocarbons
		2. X-ray, Energy Dispersive - Additives characterization
		3. Microscopic/Megascopic - Physical match between B and C
	3a) Yes	3b) Yes, gasoline (leaded)
474	1b)	NR
YY	2)	1. Macroscopic
		2.* GC - A and B contain gasoline, none on C
		3. TLC - A and B cyes similar, no dyes on C
		4. Physical comparison - B and C were once joined
	3a) Yes	3b) Yes, gasoline
476	1b)	Yes
YNR	2)	1. Microscopic - same cloths, cuts match
		2. GC - A and B contain gasoline
	3a) Yes	3b) Yes, gasoline
478	1b)	Inconclusive
YY	2)	1. Odor
		2. Flammability
		3. GC - consistent with gasoline
	3a) Yes	3b) Yes, gasoline
479	1b)	Yes
NY	2)	1. Odor - A and B hydrocarbon; C negative
		2. John William CSSP Combustible Gas Detector - A and B contain flammable volatiles
		3. GC - A and B contain mixture of flammable hydrocarbons
		4.* TLC - A and B dyes do not compare
	3a) Yes	3b) Yes, gasoline

Table 6, continued

Lab Code	Question	Response
480	1b)	Inconclusive
YY	2)	1. GC - A and B identified as gasoline
		2. Microscopic Exam - B and C both cotton
	3a)	Yes 3b) Yes, gasoline
481	1b)	NR
YY	2)	1. GC - A and B identified as gasoline
		2. Physical match of B and C - B and C from same sheet
	3a)	Yes 3b) Yes, gasoline
482	1b)	Inconclusive
YY	2)	1. GC - A typical of gasoline
		2. GC - A same as B
		3. Microscopic Exam - Fibers and fabric of B and C are similar
	3a)	Yes 3b) Yes, gasoline
493	1b)	Yes
YY	2)	1. Odor - A and B smell of hydrocarbons, C does not
		2. Oil Red "O" Spot Test - B positive, C negative
		3.* GC - A and B same
		4. Infrared - A tested
		5. Physical match - B and C
		6.* Weave match - B and C
		7. Microscopic Exam - B and C cotton
		8. Fabric I.D. by stain - B and C cotton
	3a)	Yes 3b) Yes, gasoline

Note: The two-letter code beneath the Lab Code represents the Lab's response to Question 1a:
YY indicates Yes for A and Yes for C
YI indicates Yes for A and Inconclusive for C
IY indicates Inconclusive for A and Yes for C
NN indicates No for A and No for C
YNR indicates Yes for A and No Response for C
YN indicates Yes for A and No for C
NY indicates No for A and Yes for C

END