



## **Fibers Analysis Test No. 22-5439**

### **Summary Report**

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Each sample set consisted of one known piece of fabric and two sets of questioned fibers. Participants were requested to compare the items and report their findings. Data were returned from 102 participants and are compiled into the following tables:

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This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

# Manufacturer's Information

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Each sample pack consisted of one section of known fabric (Item 1) and two sets of questioned fibers (Items 2 and 3). Items 1 and 2 were from the same blue fabric labeled as 100% Polyester. Item 3 was from a different blue fabric labeled as 100% Nylon. All fabric was purchased from a local fabric store. Participants were requested to examine the fibers, identify the fiber type, and determine if the questioned fibers could have originated from the known fabric.

## SAMPLE PREPARATION:

The fabric was laid out and rolled with a lint roller to remove any extraneous debris. All items were prepared at different times to prevent any possibility of cross-contamination.

ITEMS 1 AND 2 (ASSOCIATION): For the known fabric (Item 1) and the questioned fibers (Item 2), a 1-yard section of fabric was first cut into 2" x 2" square swatches. A predetermined number of full swatches were then packaged into glassine bags and pre-labeled Item 1 envelopes; the remaining swatches were used to prepare the Item 2 questioned fibers. For each item in this set, warp and weft fibers were teased from the edges of the fabric swatches, then packaged into glassine bags and pre-labeled Item 2 envelopes.

ITEM 3 (ELIMINATION): For the questioned fibers (Item 3), a 1/2-yard section of fabric was first cut into 2" x 2" square swatches. Warp and weft fibers were teased from the edges of the fabric swatches. The fibers were then packaged into glassine bags and pre-labeled Item 3 envelopes.

SAMPLE SET ASSEMBLY: For each sample set, an Item 1, 2, and 3 were placed in a pre-labeled sample pack envelope. The sample pack was sealed with invisible tape. This process was repeated until all of the sample sets were prepared. Once predistribution results were obtained, all sample sets were further sealed with a piece of evidence tape and initialed "CTS".

## VERIFICATION:

All Predistribution laboratories reported the expected identification results and determined the fiber type of Items 1 and 2 to be Manufactured Polyester and one lab also determined the Item 3 fibers as Manufactured Nylon. The following procedures used to examine the items were: Stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, macroscopic exam, IR/FTIR, microspectrophotometry, melting-point, and cross-section.

# Summary Comments

This test was designed to allow participants to assess their proficiency in the examination, identification, and comparison of fibers. Participants were provided with a 2 inch x 2 inch swatch of known fabric for Item 1 and a collection of questioned fibers for Items 2 and 3. They were requested to examine the submitted items and determine if either set of questioned fibers could have originated from the known fabric swatch. Items 1 and 2 originated from the same blue fabric labeled as 100% Polyester and Item 3 originated from a different blue fabric labeled as 100% Nylon. (Refer to the Manufacturer's Information for preparation details.)

## Table 1: Association Results:

Items 1 and 2 (Association): Of the 102 responding participants, 100 (98%) participants reported that the questioned fibers found on the suspect's black pants (Item 2) could have originated from the known section of the victim's robe (Item 1). One participant reported results as inconclusive, and one participant stated their laboratory does not report fiber comparisons.

Item 3 (Elimination): Of the 102 responding participants, 100 (98%) participants reported that the questioned fibers found inside the suspect's shoe could not have originated from the known section of fabric from the victim's robe (Item 1). One participant reported results as inconclusive, and one participant stated their laboratory does not report fiber comparisons.

## Table 2: Fiber Type Determination:

In regards to Fiber type, 98 of the 102 participants (97%) reported the expected fiber type of Items 1 and 2 which consisted of Polyester. Furthermore, 84 of the 102 participants (83%) reported that the fiber type for Item 3 consisted of Nylon. Several participants only identified Item 3 as "Manufactured" with a few mentioning that analysis is discontinued after the item is determined to not be associated with the known sample.

## Table 3: Examination Methods:

Of the 102 responding participants, 624 methods of analysis were reported in total. IR/FTIR and Stereomicroscopy were the most commonly reported examination methods used. Each were reported 96 and 95 times, respectively. Another frequently reported method is Polarized Light Microscopy, reported 92 times. There was no correlation between the examination methods used by participants and the reporting of inconsistent results for fiber type determination.

# Association Results

Could either of the questioned fibers found on the suspect's black pants (Item 2) or inside of the suspect's shoe (Item 3) have originated from the victim's robe (Item 1)?

**TABLE 1**

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
2AANYH	Yes	No	7R2TW2	Yes	No
2AV3R2	Yes	No	8AFU49	Yes	No
2LMRKF	Yes	No	93N28Y	Yes	No
36GUVF	Yes	No	9QY662	Yes	No
38ZYAE	Yes	No	A8Z7HY	Yes	No
3GPM83	Yes	No	ABXTA3	Yes	No
3XD3BZ	Yes	No	AG8VEJ	Yes	No
46BYPN	Yes	No	AJVHQ7	Yes	No
4CCDBP	Yes	No	BBUPX3	Yes	No
4CEY77	Yes	No	BDKR4Q	Yes	No
4CWUQR	Yes	No	BPE623	Yes	No
4KLFWQ	Yes	No	BTF9TP	Yes	No
4QEHZQ	Yes	No	C7EFKY	Yes	No
4XD39D	Yes	No	CGDBHU	Yes	No
63K8Y4	Yes	No	CGYN78	Yes	No
6C8B3W	Yes	No	CJPQCV	Yes	No
6PDZJ7	Yes	No	D8MWAH	Yes	No
6Y886Z	Yes	No	DCMXJR	Yes	No
6Z2VK8	Yes	No	DFJMY Y	Yes	No
77XBLY	Yes	No	DGBPLE	Yes	No
7AWLGY	Yes	No			

TABLE 1- Association Results

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
ER8CQG	Yes	No	N72MUE	Yes	No
F7QC6N	Yes	No	N9LWKQ	Yes	No
F8K2LW	Yes	No	NADY87	Yes	No
FEHQ6L	Yes	No	NWRK9D	Yes	No
GXPFT4	Yes	No	PFLB9D	Yes	No
H97L8H	Yes	No	PX4C3F	Yes	No
HFJH4C	Yes	No	Q2GG74	Yes	No
HRZZ4W	Yes	No	Q46BPP		
HVFRVP	Yes	No	Q4JJV6	Yes	No
HX47JY	Yes	No	QBKPUF	Yes	No
K9YUQL	Yes	No	QRBUZN	Yes	No
KC2UQJ	Yes	No	QZK2XC	Yes	No
KT6CTB	Yes	No	R6DPP4	Yes	No
KVPEJG	Yes	No	R7LXYN	Yes	No
L2RULA	Inconclusive	Inconclusive	RXFT9T	Yes	No
LD3HGT	Yes	No	T4FRWM	Yes	No
LJATR8	Yes	No	T6QGFZ	Yes	No
LJTRTE	Yes	No	TCQTHN	Yes	No
LMNDW	Yes	No	TDLCKP	Yes	No
LPJ8FX	Yes	No	TQD2GB	Yes	No
MNGUAG	Yes	No	TTDDU2	Yes	No
N68YFP	Yes	No	TXAX3R	Yes	No

TABLE 1- Association Results

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
TYJ66K	Yes	No			
U6N2PK	Yes	No			
U7XFPY	Yes	No			
V224BE	Yes	No			
V9HMQ8	Yes	No			
VJKZR8	Yes	No			
VXM77C	Yes	No			
W49LAA	Yes	No			
W878W7	Yes	No			
WQUN3K	Yes	No			
WVUZYK	Yes	No			
X7P7RJ	Yes	No			
XA7URM	Yes	No			
YHGEQC	Yes	No			
Z8EFH3	Yes	No			
ZHBLC3	Yes	No			
ZMQWMJ	Yes	No			

Association Response Summary			Participants: 102	
<p>Could either of the questioned fibers found on the suspect's black pants (Item 2) or inside of the suspect's shoe (Item 3) have originated from the victim's robe (Item 1)?</p>				
	<u>Item 2</u>	<u>Item 3</u>		
Yes:	100 (98.0%)	0 (0.0%)		
No:	0 (0.0%)	100 (98.0%)		
Inc:	1 (1.0%)	1 (1.0%)		
<p>The sum of the responses here may be less than the total number of participants responding due to missed or omitted responses.</p>				

# Fiber Type Determination

What is the fiber type and generic name of the fiber(s) in each item?

**TABLE 2**

WebCode	Item 1	Item 2	Item 3
2AANYH	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
2AV3R2	Manufactured - Polyester	Manufactured - Polyester	Manufactured
2LMRKF	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
36GUVF	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further categorized
38ZYAE	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
3GPM83	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
3XD3BZ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
46BYPN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further categorized
4CCDBP	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
4CEY77	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
4CWUQR	Manufactured fibres	Manufactured fibres	Manufactured fibres
4KLFWQ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
4QEHzQ	Manufactured - Polyester	Manufactured - Polyester	Manufactured - not further categorized
4XD39D	Polyester (PET)	Polyester (PET)	Nylon (PA-6)
63K8Y4	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
6C8B3W	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
6PDZJ7	Manufacture, Polyester	Manufacture, Polyester	Manufacture, Nylon
6Y886Z	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
6Z2VK8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
77XBLY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
7AWLGY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
7R2TW2	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
8AFU49	Manufactured Polyester	Manufactured Polyester	Manufactured Nylon
93N28Y	Manufactured, Polyester	Manufactured, Polyester	N/A
9QY662	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
A8Z7HY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
ABXTA3	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon

**TABLE 2- Fiber Type Determination**

WebCode	Item 1	Item 2	Item 3
AG8VEJ	Manufactured, Polyester	Manufactured, Polyester	Manufactured (not further characterized)
AJVHQ7	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
BBUPX3	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
BDKR4Q	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
BPE623	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
BTF9TP	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
C7EFKY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
CGDBHU	Manufactured, Polyester	Manufactured, Polyester	
CGYN78	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
CJPQCV	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
D8MWAH	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
DCMXJR	Manufactured; Polyester	Manufactured; Polyester	Manufactured; Nylon
DFJMYJ	Manufactured Polyester	Manufactured Polyester	Manufactured Nylon
DGBPLE	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further characterized
ER8CQG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further categorized
F7QC6N	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
F8K2LW	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Nylon
FEHQ6L	Manufactured, Metallic	Manufactured, Metallic	Manufactured, Nylon
GXPFT4	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
H97L8H	Polyester	Polyester	Nylon
HFJH4C	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
HRZZ4W	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
HVFRVP	Manufactured, Polyester	Manufactured, Polyester	Manufacture, Nylon
HX47JY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
K9YUQL	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
KC2UQJ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
KT6CTB	Manufactured; Polyester	Manufactured; Polyester	Manufactured
KVPEJG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
L2RULA			



**TABLE 2- Fiber Type Determination**

<b>WebCode</b>	<b>Item 1</b>	<b>Item 2</b>	<b>Item 3</b>
LD3HGT	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
LJATR8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further characterized
LJTRTE	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
LNMNWD	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
LPJ8FX	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
MNGUAG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
N68YFP	Manufactured/synthetic (Polyester)	Manufactured/synthetic (Polyester)	Manufactured/synthetic (Nylon)
N72MUE	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
N9LWKQ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
NADY87	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Not further identified
NWRK9D	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
PFLB9D	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
PX4C3F	Manufactured - Polyester, Manufactured - Polyester	Manufactured - Polyester, Manufactured - Polyester	Manufactured - Nylon
Q2GG74	Manufactured; Polyester	Manufactured; Polyester	Manufactured; not further characterized
Q46BPP	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
Q4JJV6	Manufactured fibers, Polyester	Manufactured fibers, Polyester	Manufactured fibers, Nylon
QBKPUF	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
QRBUZN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
QZK2XC	Manufactured (c) Polyester	Manufactured (c) Polyester	Manufactured (i) Nylon
R6DPP4	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon 6
R7LXYN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
RXFT9T	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
T4FRWM	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
T6QGfZ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not further characterized
TCQTHN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
TDLCKP	Manufactured- Polyester	Manufactured- Polyester	Manufactured- Nylon
TQD2GB	Manufactured, Polyester	Manufactured, Polyester	Manufactured, polyamide
TDDU2	Manufactured Polyester	Manufactured Polyester	Manufactured Nylon

**TABLE 2- Fiber Type Determination**

WebCode	Item 1	Item 2	Item 3
TXAX3R	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
TYJ66K	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
U6N2PK	Manufactured- Polyester	Manufactured- Polyester	Manufactured- Nylon
U7XFPY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
V224BE	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
V9HMQ8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
VJKZR8	unidentified	unidentified	unidentified
VXM77C	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
W49LAA	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
W878W7	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
WQUN3K	Polyester	Polyester	Nylon
WVUZYK	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
X7P7RJ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
XA7URM	Polyester	Polyester	Nylon
YHGEQC	Manufactured, Polyester	Manufactured, Polyester	Manufactured, not tested
Z8EFH3	Manufactured - Polyester	manufactured - Polyester	Manufactured - Nylon
ZHBLC3	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Nylon
ZMQWMJ	(Manufactured, Polyester)	(Manufactured, Polyester)	(Manufactured, Nylon)

Fiber Type Determination Response Summary			Participants: 102
Item 1	Item 2	Item 3	
Polyester: <b>98</b> (96.08%)	Polyester: <b>98</b> (96.08%)	Nylon: <b>84</b> (82.35%)	
*Other: <b>3</b> (2.94%)	*Other: <b>3</b> (2.94%)	*Other: <b>16</b> (15.69%)	
*This category represents the total number of participants that reported a response other than the consensus response.			

# Examination Methods

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
2AANYH	✓		✓		✓	✓	✓				
2AV3R2	✓	✓	✓		✓	✓	✓	✓			
2LMRKF	✓	✓	✓		✓			✓		✓	
36GUVF	✓	✓	✓	✓		✓	✓	✓			
38ZYAE	✓	✓	✓	✓	✓	✓	✓				
3GPM83	✓	✓	✓	✓	✓	✓	✓	✓			
3XD3BZ	✓	✓	✓	✓	✓	✓	✓				TLC
46BYPN	✓	✓	✓	✓	✓	✓	✓	✓			
4CCDBP	✓				✓	✓	✓				
4CEY77	✓	✓	✓	✓		✓					
4CWUQR	✓										
4KLFWQ						✓					SEM/EDS
4QEHZQ	✓	✓	✓	✓	✓	✓	✓				
4XD39D	✓	✓	✓	✓	✓	✓	✓				
63K8Y4	✓		✓			✓	✓				
6C8B3W	✓		✓		✓	✓		✓			TLC
6PDZJ7	✓		✓		✓	✓		✓			
6Y886Z	✓	✓	✓	✓	✓	✓	✓	✓			Thin Layer Chromatography
6Z2VK8	✓	✓		✓		✓	✓				Raman Spectroscopy, Microchemical Test
77XBLY	✓	✓	✓	✓	✓	✓	✓	✓			
7AWLGY	✓	✓	✓		✓	✓					
7R2TW2	✓	✓	✓	✓	✓	✓	✓	✓			
8AFU49	✓	✓	✓			✓					

**TABLE 3- Examination Methods**

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
93N28Y	✓	✓	✓	✓	✓	✓	✓	✓			
9QY662	✓	✓	✓	✓	✓	✓		✓			
A8Z7HY	✓	✓	✓	✓	✓	✓	✓	✓	✓		
ABXTA3	✓		✓		✓	✓				✓	
AG8VEJ	✓	✓	✓	✓	✓	✓	✓				
AJVHQ7	✓		✓			✓					
BBUPX3	✓	✓	✓	✓		✓	✓		✓		
BDKR4Q	✓	✓	✓	✓	✓	✓	✓		✓		
BPE623	✓	✓	✓		✓	✓	✓				Raman
BTF9TP	✓	✓	✓	✓	✓	✓	✓				Refractive Index
C7EFKY	✓	✓	✓		✓	✓					
CGDBHU		✓	✓	✓	✓	✓	✓				
CGYN78	✓	✓	✓	✓	✓	✓	✓		✓		
CJPQCV	✓	✓	✓	✓	✓	✓	✓		✓		
D8MWAH			✓	✓		✓		✓			GC/MS-PYROLYSIS
DCMXJR	✓	✓	✓	✓	✓	✓	✓				
DFJMY	✓	✓	✓	✓	✓	✓	✓		✓		
DGBPLE	✓	✓	✓	✓	✓	✓	✓				
ER8CQG	✓	✓	✓	✓	✓	✓	✓				
F7QC6N	✓	✓	✓	✓	✓	✓	✓		✓		
F8K2LW	✓	✓	✓		✓	✓	✓		✓		Alternate Light Source, Thin Layer chromatography
FEHQ6L	✓		✓	✓	✓	✓	✓		✓		measurements, refractive index
GXPFT4	✓	✓	✓	✓		✓					Raman

TABLE 3- Examination Methods

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
H97L8H	✓	✓	✓	✓			✓				
HFJH4C	✓	✓	✓	✓		✓	✓				
HRZZ4W	✓		✓	✓		✓					
HVFRVP	✓	✓	✓			✓					
HX47JY	✓		✓	✓	✓	✓	✓		✓		
K9YUQL	✓	✓	✓	✓	✓	✓	✓		✓		
KC2UQJ	✓		✓	✓	✓	✓	✓		✓		
KT6CTB	✓	✓	✓	✓	✓	✓	✓				
KVPEJG	✓	✓	✓	✓	✓	✓	✓		✓		
L2RULA	✓				✓		✓				
LD3HGT	✓	✓	✓	✓	✓	✓	✓				
LJATR8	✓	✓	✓	✓	✓	✓	✓				
LJTRTE	✓	✓	✓		✓	✓					
LNMNDW	✓	✓	✓	✓	✓		✓		✓		
LPJ8FX	✓		✓		✓	✓	✓				
MNGUAG	✓	✓	✓	✓	✓	✓	✓				
N68YFP	✓	✓	✓			✓	✓				
N72MUE	✓	✓	✓	✓	✓	✓	✓				
N9LWKQ	✓		✓	✓		✓	✓		✓		
NADY87	✓	✓	✓	✓	✓	✓	✓		✓		
NWRK9D	✓	✓	✓	✓	✓	✓	✓				Raman
PFLB9D	✓	✓	✓	✓		✓	✓				TLC
PX4C3F	✓	✓	✓	✓	✓	✓	✓		✓		
Q2GG74	✓	✓	✓	✓	✓	✓	✓				

**TABLE 3- Examination Methods**

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
Q46BPP	✓		✓		✓	✓					
Q4JJV6	✓	✓	✓	✓	✓	✓	✓				
QBKPUF	✓	✓	✓	✓	✓	✓	✓	✓	✓		
QRBUZN	✓	✓	✓	✓	✓	✓	✓				
QZK2XC		✓		✓	✓	✓	✓				
R6DPP4	✓		✓			✓					GCMS pyrolysis, Video spectral comparator (VSC)
R7LXYN	✓		✓		✓	✓	✓				
RXFT9T	✓		✓		✓	✓	✓				
T4FRWM	✓		✓		✓	✓	✓				
T6QGFZ	✓	✓	✓	✓	✓	✓	✓				
TCQTHN	✓		✓		✓	✓	✓				
TDLCKP			✓		✓	✓					
TQD2GB	✓	✓	✓	✓	✓	✓	✓				
TTDDU2		✓		✓	✓	✓	✓				TLC
TXAX3R	✓	✓	✓	✓	✓	✓	✓				
TYJ66K	✓	✓	✓	✓	✓	✓	✓				
U6N2PK	✓		✓	✓	✓	✓		✓			Optical microscope
U7XFPY	✓	✓			✓	✓					
V224BE	✓	✓	✓		✓	✓					Alternate light source
V9HMQ8	✓	✓	✓	✓	✓	✓	✓				
VJKZR8	✓		✓		✓			✓			
VXM77C	✓	✓	✓	✓	✓	✓	✓				
W49LAA	✓	✓	✓	✓		✓	✓			✓	
W878W7	✓	✓	✓	✓	✓	✓	✓				

**TABLE 3- Examination Methods**

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
WQUN3K	✓	✓		✓		✓					
WVUZYK		✓	✓	✓	✓	✓	✓				UVMSP, 1st Derivative
X7P7RJ	✓	✓	✓	✓	✓	✓					
XA7URM	✓	✓	✓		✓	✓					
YHGEQC	✓	✓				✓	✓				
Z8EFH3	✓	✓	✓	✓	✓	✓	✓	✓	✓		
ZHBLC3	✓	✓	✓	✓	✓	✓	✓	✓			
ZMQWMJ	✓	✓	✓	✓	✓	✓	✓				

**Response Summary**

	Participants	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point
	102	95	76	92	69	80	96	74	5	34	3
Percent		93%	75%	90%	68%	78%	94%	73%	5%	33%	3%

# Conclusions

TABLE 4

WebCode	Conclusions
2AANYH	Item 2 could have originated from the same source as Item 1 since the physical and chemical properties of Item 2 are very likely similar to Item 1. However, Item 3 could have not originated from the same source as Item 1, because the chemical property is different from Item 1.
2AV3R2	The examined portions of the blue fibers from the Questioned Fiber(s): Questioned fibers found on the suspect's black pants (Item 1-2) were found to be consistent in color, microscopic appearance, optical properties and instrumental properties with the examined portions of the blue piece of woven fabric from the Known Fiber(s), Known section of the victim's robe (Item 1-1). Accordingly, the examined portions of the blue fibers from Item 1-2 could have originated from the examined portions of the blue piece of woven fabric from Item 1-1 or from another source with the same characteristics. The examined portion of the blue fibers from the Questioned Fiber(s) – Questioned fibers found inside the suspect's shoe (Item 1-3) was found to be different in microscopic appearance from the examined portions of the blue piece of woven fabric from the Known Fiber(s), Known section of the victim's robe (Item 1-1). Accordingly, the blue fibers from Item 1-3 could not have originated from the blue piece of woven fabric from Item 1-1.
2LMRKF	1). The sample received as the "Known section of the victim's robe" (Item 1) is made by blue polyester fibers. 2). The sample received as the "Questioned fibers found on the suspect's black pants" (Item 2) is made by blue polyester fibers. 3). The sample received as the "Questioned fibers found inside the suspect's shoe" (Item 3) is made by blue nylon fibers. 4). According with the physical properties evaluated, the questioned fibers received as item 2 are indistinguishable from the sample received as item 1.
36GUVF	Blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the blue polyester fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1 or another source comprised of fibers with the same microscopic characteristics and optical properties. The fibers recovered from Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined visually and using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform infrared spectroscopy.
38ZYAE	In my opinion, Item 1 is a piece of dark blue satin weave fabric, composed of blue, delustred (semi dull) polyester fibres. The warp and weft fibres are distinguishable from each other in terms of the diameter and appearance of the fibres and also in the intensity of the dye. Item 2 (from the trousers of the suspect) consists of a number of fibres of two distinguishable types, which are indistinguishable from the respective warp and weft fibres from the piece of fabric in Item 1 in terms of colour, appearance and chemical composition and so could, in my opinion, have originated from the same source as Item 1. The fibres recovered from the shoe, Item 3, are blue nylon fibres which are distinguishable from the constituent fibres in Item 1 and the recovered fibres in Item 2 and so the fibres in Item 3 could not have originated from the same source as Item 1. In my opinion, the findings provide very strong support for the view that the recovered fibres in Item 2 have originated from the damaged robe in question.
3GPM83	The known section of the victim's robe (Item 1) was examined, and known standards were collected. Item 2, the questioned fibers from the suspect's black pants, was examined and revealed to contain five (5) blue yarns and blue polyester fibers. Item 3, the questioned fibers from inside the suspect's shoe, was examined and revealed to contain one (1) light blue to colorless yarn and light blue to colorless nylon fibers. The five (5) blue yarns from Item 2 were macroscopically and microscopically examined and compared with the yarns comprising the victim's robe (Item 1). These examinations and comparisons revealed that the blue yarns from Item 2 are consistent in color, construction, and appearance with the blue yarns comprising the known section of the victim's robe (Item 1). Comparative examinations between at least one hundred and fifty-five (155) blue polyester fibers from the suspect's pants (Item 2) and the blue polyester fibers comprising the victim's robe (Item 1) revealed that the blue polyester fibers from the Item 2, black pants, are consistent in color, appearance, fiber type, and microscopic characteristics with the blue polyester fibers comprising the known section of the victim's



TABLE 4

WebCode	Conclusions
	<p>robe, Item 1. Further instrumental examination and comparison of color of thirty (30) of the blue polyester fibers from Item 2 revealed that they are consistent with the blue polyester fibers comprising the known section of the victim's robe, Item 1. Therefore, at least thirty (30) of the blue polyester fibers from the black pants (Item 2) could have originated from that source. The one (1) light blue to colorless yarn from Item 3 was macroscopically and microscopically examined and compared with the yarns comprising the victim's robe (Item 1). These examinations and comparisons revealed that the light blue to colorless yarn from Item 3 is different in color, diameter, and number of fibers from the blue yarns comprising the known section of the victim's robe (Item 1). Therefore, the light blue to colorless yarn from Item 3 could not have originated from that source. Identification examinations of at least one hundred (100) light blue to colorless fibers from inside the suspect's shoe (Item 3) revealed that they are consistent with Nylon.</p>
3XD3BZ	<p>Item 1: This item was used for comparison purposes. Item 2: The questioned fibers are similar in visual color to the known fibers from the victim's robe (Item 1). A portion of these fibers were selected for further analysis and are similar in optical properties, including fluorescence, color, dye composition, and fiber type to the fibers from the victim's robe. It is my opinion that the questioned fibers could have come from the victim's robe or any other garment with similar fiber characteristics (Category 2B). No analysis was performed on the remaining fibers. Item 3: The questioned fibers are different in visual color from the known fibers from the victim's robe (Item 1). It is my opinion that the questioned fibers did not originate from the victim's robe (Category 5). No further analysis was performed.</p>
46BYPN	<p>Blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the blue polyester fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. No other apparent transfer of textile fibers was detected between Items 1 through 3. The specimens were examined using the following techniques as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier-transform infrared spectroscopy.</p>
4CCDBP	<p>The examination and comparison of the questioned fibers found on the suspect's black pants (Item 2) and a known section of the victim's robe (Item 1) were found to be consistent in microscopic structures, diameter, colour (MSP) and chemical composition (Both Item 1 and 2 were identified as Polyester). The examination and comparison of the questioned fibers found inside the suspect's shoe (Item 3) and a known section of the victim's robe (Item 1) were found to be consistent in microscopic structures only. However, they differ significantly in terms of diameter, colour (MSP) and chemical composition (Item 3 was identified as Nylon). Based on the above findings, in my professional opinion: a). The questioned fibers found on the suspect's black pants (Item 2) could have originated from the victim's robe (Item 1). b). The questioned fibers found inside the suspect's shoe (Item 3) could not have originated from the victim's robe (Item 1).</p>
4CEY77	<p>The fibers in item 1 and item 2 were similar in all analytical tests performed. Item 1 could not be ruled out as a possible source of the fibers in item 2. The fibers in item 3 are not similar to the fibers in item 1. Item 1 is not a source of the fibers in item 3.</p>
4CWUQR	<p>Items 1, 2, and 3 submitted in relation to this case have now been examined and I can report the following: Comparisons of the constituent fibres from item 1 with fibres from items 2 and 3 show that: Fibres from item 2 (suspects black pants) are indistinguishable from the constituent fibres of item 1. Fibres from item 3 (suspect shoes) are different from the constituent fibres of item 1 and therefore can be eliminated as originating from item 1. Items 1 and 2 will be sent to a Forensic Provider to carry out more discriminatory testing in order to establish whether or not item 1 could be the source of item 2.</p>
4KLFWQ	<p>Based on their shape, average diameter, elemental composition, and chemical composition the fibres from item 2 (suspect's black pants) cannot be excluded from having originated from item 1 (victim's robe). Conversely, the fibres from item 3 (suspect's shoe) can be excluded as having originated from item 1, based on all four criteria.</p>
4QEHZQ	<p>Blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the blue polyester fibers comprising Item 1. Accordingly, the blue polyester fibers from Item</p>

TABLE 4

WebCode	Conclusions
4XD39D	<p>2 are consistent with originating from the source of Item 1, or another item comprised of fibers exhibiting the same microscopic characteristics and optical properties. Blue manufactured fibers recovered from Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the source of Item 1.</p> <p>The findings provide very strong support for the view that the fibres recovered from the suspect's trousers (Item 2), originated from the deceased's damaged robe (Item 1), rather than from another similar item(s) made from identical fibres. The fibres recovered from the inside of the suspect's shoe (Item 3) could not have originated from the damaged robe (Item 1).</p>
63K8Y4	<p>Item 1 consists of a blue woven fabric swatch composed of polyester fibers. Item 2 consists of several blue apparent threads also composed of polyester fibers. Item 3 consists of a few blue apparent threads composed of blue/faint purple nylon fibers. The fibers from Items 1 (Known from victim robe) and 2 (Questioned from suspect pants) are similar in macroscopic appearance, microscopic characteristics (PLM), color (MSP), and chemical composition (FTIR). The victim's robe or another item composed of the same fabric could be the source of the fibers found on the suspect's pants. The fibers from Items 1 and 3 (Questioned from suspect shoe) are dissimilar in macroscopic appearance, microscopic characteristics (PLM), color (MSP), and chemical composition (FTIR). The victim's robe is not the source of the questioned fibers removed from the suspect shoe.</p>
6C8B3W	<p>The section of victims robe consisted of woven blue polyester fibres. The fibres found on the black pants were found to be composed of blue polyester fibres. These were found to be indistinguishable to those from the victims robe in relation to microscopic appearance, cross sectional appearance, colour (visual), optical properties and dye composition. Therefore the fibres found on the black pants and those from the victims robe may share a common origin. The fibres found inside the suspect's shoe were found to be composed of nylon and could not have originated from the victims robe.</p>
6PDZJ7	<p>On examination, I found: i). The blue fibers item 2 to be similar to the fibers in the blue fabric item 1. ii). The blue fibers item 3 to be dissimilar to the fibers in the blue fabric item 1. Therefore, I am of the opinion that: i). The blue fibers item 2 and the blue fabric item 1 could have come from the same origin. li). The blue fibers item 3 and the blue fabric item 1 did not come from the same origin.</p>
6Y886Z	<p>Item 1: The fabric from the victim's robe is composed of blue polyester fibers and was used for comparison purposes. Item 2: The questioned fibers from the suspect's pants are composed of blue polyester fibers. A portion of the questioned fibers were selected for further analysis. The questioned polyester fibers were determined to be similar in size, shape, color, optical properties, fiber type, and dye composition to the known polyester fibers from the victim's robe (01-01). It is our opinion that the questioned fibers from the suspect's pants could have originated from the victim's robe or any other source with similar fibers. (Category 2B) No analysis was performed on the remaining fibers. Item 3: The questioned fibers from inside the suspect's shoe are composed of blue nylon fibers. The questioned fibers were determined to be dissimilar in visual color to the blue fibers from the victim's robe (01-01). It is our opinion that the questioned fibers from the suspect's shoe did not originate from the victim's robe. (Category 5) No further analysis was performed.</p>
6Z2VK8	<p>The questioned fibers found on the suspect's black pants (Item 2) could have originated from the victim's robe (Item 1). The questioned fibers found on the suspect's shoe (Item 3) could not have originated from the victim's robe (Item 1).</p>
77XBLY	<p>The items were examined to assist with whether the fibres found on the suspects black pants (Item 2) or the inside of the suspects shoe (Item 3) originated from the victims robe (Item 1) or from a different source. The results provide very strong support for the view that the fibres found on the suspects black pants (Item 2) originated from the victims robe (Item 1) rather than from a different source. I have chosen the above phrase from the following scale: weak support, moderate support, moderately strong support, strong support, very strong support, extremely strong support. Note: No inference on the activity that led to the presence of fibres on the clothing can be made. They also show that the fibres from the inside of the suspects shoe (Item 3) originated from a source other than the victims robe (Item 1).</p>

TABLE 4

WebCode	Conclusions
7AWLGY	Items 1, 2, and 3 were examined visually, microscopically, and by Fourier Transform infrared spectroscopy (FTIR). The questioned fibers from item 2 (suspect's pants) were compared to the known fibers from item 1 (victim's robe) and were found to be consistent with respect to color, morphology, optical properties, and fiber type. Based on these findings, it is the opinion of this analyst that the questioned fibers examined from item 2 could have originated from item 1 or any other source exhibiting the same analyzed characteristics. The questioned fibers from item 3 (inside suspect's shoe) were compared to the known fibers from item 1 (victim's robe) and were found to be different with respect to morphology and fiber type. Based on these findings, it is the opinion of this analyst that the questioned fibers from item 3 and the known fibers from item 1 did not originate from the same source.
7R2TW2	The selected fibers from items 1 and 2 are blue polyester fibers. The selected fibers from item 3 are blue to white nylon fibers. Two fibers from item 1 were compared to three fibers from item 2 and four fibers from item 3. The blue polyester fibers from item 2 are similar in microscopic characteristics to the blue polyester fibers from item 1. Additionally, they have similar cross sections and MSP and FTIR spectra. Therefore, the item 2 fibers could have originated from item 1 or any other textiles containing fibers with the same class characteristics. The item 3 blue to white nylon fibers are dissimilar in microscopic characteristics and are a different fiber type than the blue polyester fibers of item 1. Therefore, item 3 could not have originated from item 1.
8AFU49	It was determined utilizing stereomicroscopic, comparison microscopic, and Fourier Transform Infrared Spectroscopy techniques of analysis that the questioned blue polyester fibers from item 2 the known blue polyester fibers comprising item 1 exhibit consistent chemical and optical properties. Therefore, item 1 can not be eliminated as being the source of the questioned fibers from item 2. It was determined utilizing stereomicroscopic, comparison microscopic, and Fourier Transform Infrared Spectroscopy techniques of analysis that the questioned blue fibers from item 3 are comprised of nylon. Based on the questioned fibers being comprised of nylon and known fibers from item 1 being comprised of polyester, item 1 can be eliminated as being the source of the questioned fibers.
93N28Y	The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, fluorescence, FTIR and MSP. Examination of Item 1 revealed the presence of a swatch of blue woven fabric constructed of blue yarns designated as Direction 1 and Direction 2, which were each composed of blue polyester fibers. Examination of Item 2 revealed the presence of six individual blue yarns. One yarn, composed of blue polyester fibers, was consistent in color, construction and composition with the Direction 1 yarns composed of blue polyester fibers from the fabric in Item 1. Therefore, this yarn could have originated from the same source as the fabric in Item 1. Another yarn, also composed of blue polyester fibers, was consistent in color, construction and composition with the Direction 2 yarns composed of blue polyester fibers from the fabric in Item 1. Therefore, this yarn could have originated from the same source as the fabric in Item 1. No further analysis was performed on the remaining yarns in this item. Examination of Item 3 revealed the presence of a loose bundle of blue fibers. These fibers are not microscopically consistent with any of the blue fibers from the fabric in Item 1. Therefore, these fibers in Item 3 could not have originated from the same source as the fabric in Item 1. According to the Technical Procedure for the Examination of Fibers at this lab, if at any point during the course of examination items are found to be inconsistent with one another, analysis may be halted and a lab report issued stating a negative finding. Therefore, no further analysis to identify the generic fiber class of the fibers in Item 3 was performed.
9QY662	Item 1: Blue polyester fiber standard was analyzed for comparison to Item 2 and Item 3. Item 2: Multiple blue polyester fibers were found. In the sample analyzed, the unknown blue polyester fibers found on the suspect's black pants (Item 2) either originated from the blue polyester fiber standard from victim's robe (Item 1) or another source of polyester fibers possessing the same distinct physical, chemical, and optical characteristics. Item 3: Multiple blue nylon fibers were found. In the sample analyzed, the unknown blue nylon fibers from suspect's shoe and the blue polyester fiber standard from victim's robe (Item 1) are not the same in physical, chemical, and optical characteristics. The unknown fibers from suspect's shoe could not have originated from the standard.
A8Z7HY	Items 1, 2, and 3 were examined visually and using stereomicroscopy. Fibers composing Item 1 and fibers from Items 2 and 3 were examined using comparison microscopy, polarized light microscopy

TABLE 4

WebCode	Conclusions
	<p>(PLM), Fourier Transform Infrared Spectrophotometry (FTIR), and microchemical tests. Fibers composing Item 1 and fibers from Item 2 were further examined using fluorescence microscopy and Microspectrophotometry (MSP). The Item 2 dark blue polyester fibers were consistent in physical, chemical, and optical properties with the dark blue polyester fibers composing Item 1. Based on the fibers examined, it was concluded that these Item 2 dark blue polyester fibers originated from either the robe represented by the Item 1 piece of fabric or another source composed of fibers with the same physical, chemical and optical properties (Level III – Association with Discriminating Characteristics). This type of conclusion was reached because other textiles containing fibers produced with the same properties (type, color, microscopic characteristics, etc.) would also be indistinguishable from these fibers. It should be noted that the techniques used in this comparative analysis can typically distinguish different fibers. The Item 3 fibers could not be associated with the fibers composing Item 1 due to differences in color (Exclusion/Elimination). TERMINOLOGY KEY FOR COMPARATIVE EXAMINATIONS: Level I: Physical/Fracture Match: Physical Fit is reached when the items that have been broken, torn, or separated exhibit physical features that correspond/re-align in a manner that is not expected to be replicated. Level II - Association with Highly Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Additionally, the items share unusual characteristics that would rarely be expected to occur in the relevant population. This is the highest degree of association that can be determined in the absence of a Physical Fit. Level III: Association with Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Other items have been manufactured or could occur in nature that would also be indistinguishable from the submitted items and could be encountered in the relevant population. The analytical techniques used in the analysis of these items can provide high levels of discrimination among natural and manufactured materials. This is considered a high degree of association. Level IV: Association with Limitations: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. As compared to the categories above, this type of association has decreased evidential value. For example, the items are more commonly encountered in the relevant population, minor variations were observed, or a complete analysis was not performed due to limited characteristics or sample size. Minor variations, for certain types of examinations, could be due to factors such as contamination of the sample(s) or having a sample of insufficient size to adequately assess heterogeneity of the entity from which it was derived. Inconclusive: No conclusion could be reached regarding an association or an elimination between the items. Exclusion with Limitations: The item exhibits differences from the comparison sample that support that it did not originate from the source, as represented by the comparison sample. An Exclusion/Elimination conclusion was not reached due to limiting factors, such as possible natural or manufactured source variations. Exclusion/Elimination: The items exhibit differences that demonstrate the items did not originate from the same source.</p>
ABXTA3	Item 2 is consistent with Item 1. Item 3 is not consistent with Item 1.
AG8VEJ	<p>The results of the trace evidence examinations (fiber) are included in this report. Microscopic examination of fibers is accomplished by using one or more analytical techniques including stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy. The microscopy characteristics and optical properties determined by these techniques are used for the examination and comparison of fibers. Blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. Fibers found on Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The items were examined using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy.</p>

TABLE 4

WebCode	Conclusions
AJVHQ7	The fibers from item 1 and item 2 are manufactured polyester, and those are showed similar fiber color and polarized light pattern. Item 3 is manufactured nylon, and its color and polarized light pattern are different from those of item 1 and item 2.
BBUPX3	The requested analysis was to determine if the questioned fibers found on the suspect's pants (Item 1-2) and inside the suspect's shoe (Item 1-3) could have come from the victim's robe as represented by Item 1-1 (known). Items 1-1, 1-2, and 1-3 were examined visually, microscopically (stereo, polarized light and fluorescence), and by infrared spectroscopy and microspectrophotometry. Item 1-3 (questioned) differed from Item 1-1 in fluorescence microscopy, physical characteristics (diameter, color, and shape) and chemical composition (fiber type) and did not originate from that source (Elimination). Item 1-2 (questioned) corresponded in all tests performed to Item 1-1 and could have originated from that source. However, because other items have been manufactured that would also be indistinguishable from the submitted evidence, an individual source cannot be determined (Level 3 - Association).
BDKR4Q	Exhibit 1 (known section of the victim's robe) disclosed the presence of one piece of blue woven fabric. Analysis of the fibers that make up the fabric disclosed them to be polyester. Exhibit 2 (questioned fibers found on the suspect's black pants) disclosed the presence of blue fibers. Analysis of these fibers disclosed them to be polyester. Exhibit 3 (questioned fibers found inside the suspect's shoe) disclosed the presence of blue fibers. Analysis of these fibers disclosed them to be nylon. Comparative examinations of the questioned fibers in Exhibit 2 with the known fibers from a section of the victim's robe in Exhibit 1 disclosed them to be indistinguishable in all assessed microscopic characteristics and optical properties with no exclusionary difference. Further analysis disclosed several of these fibers to be chemically indistinguishable by microspectrophotometry (MSP) and Fourier-transform infrared spectroscopy (FTIR). Therefore, the fibers in Exhibit 2 could have originated from that section of the robe in Exhibit 1 or from another source with the same characteristics (Type III Inclusion). This type of conclusion was reached because other textiles containing fibers made to the same specifications (type, color, microscopic characteristics, etc.) would also be indistinguishable from these fibers. Comparative examinations of the questioned fibers in Exhibit 3 with the known fibers from a section of the victim's robe in Exhibit 1 disclosed them to be different in microscopic characteristics and fiber type. Therefore, the fibers in Exhibit 3 could not have originated from that section of the robe in Exhibit 1 (Exclusion).
BPE623	The fibers of Item 1 and Item 2, have the same characteristics. Thus the fibres found on the suspect's black pants (Item 2) come from the victim's robe (Item 1) or from another textile item of indistinguishable fibers. The fibers found on the suspect's shoe (Item 3) were inconsistent with item-1 and could not have the same source.
BTF9TP	The known section of the victim's robe (Item 1) is composed of blue polyester fibers. The questioned fibers found on the suspect's black pants (Item 2) are blue polyester fibers. The questioned fibers found inside the suspect's shoe (Item 3) are blue nylon fibers. The blue polyester fibers found on the suspect's black pants are similar in physical appearance, color, diameter, chemistry, refractive index and cross-sectional shape in comparison to the known section of the victim's robe (Item 1). The blue polyester fibers found on the suspect's black pants (Item 2) could have come from the victim's robe (Item 1) or any other blue polyester fiber source with similar characteristics. The blue nylon fibers from Item 3 are different in microscopic characteristics and chemistry in comparison to the known section of the victim's robe (Item 1). The blue nylon fibers found inside the suspect's shoe (Item 3) could not have originated from the section of the victim's robe (Item 1).
C7EFKY	The known fibers collected from the victim's robe (Item #1) are similar in optical and chemical properties to the blue colored fibers recovered from the suspect's pants (Item #2). The fibers from the victim's robe (Item #1) or another material with similar fiber characteristics could have been the source of the fibers found on the suspect's pants (Item #2). Note, additional techniques used to resolve minor color/dye differences were not available at the time of this report that could either support or refute a common source determination. The known fibers collected from the victim's robe (Item #1) were excluded as a possible source to the blue colored fibers recovered from the suspect's shoe (Item #3). Differences in optical and chemical properties were observed.
CGDBHU	[No Conclusions Reported.]

TABLE 4

WebCode	Conclusions
CGYN78	The blue polyester fibers submitted in Item# 1-2 are similar to the blue polyester fibers which compose Item# 1-1, therefore the fibers from Item# 1-2 could have originated from the same source as the fibers from Item# 1-1. The blue/violet nylon fibers submitted in Item# 1-3 are dissimilar to the blue polyester fibers which compose Item# 1-1, therefore the fibers from Item# 1-3 may not have originated from the same source as the fibers from Item# 1-2.
CJPQCV	The above items were submitted for examination and comparison to determine if the questioned fibers (Items 2 and 3) could have come from the victim's robe as represented by the swatch of a woven, fabric material (Item 1). Item 2 consisted of blue synthetic fibers that were reportedly collected from the suspect's pants, and Item 3 consisted of blue-to-clear synthetic fibers that were reportedly collected from the suspect's shoe. The tested fibers from Items 2 and 3 were similar in all tests performed (polarized light microscopy, fluorescence microscopy, microspectrophotometry, and cross section). In addition, infrared spectroscopy showed both questioned and known fibers to be similar in chemical composition (polyester). The victim's robe, Item 1, is a possible source of the questioned fibers collected from the suspect's pants, Item 2 (Level 3 Association: see association scale below) [Attachment not provided by participant]. Because other items have been manufactured that would also be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned fibers collected from the suspect's shoe (Item 3) differed in microscopical properties from the known fibers in the fabric sample from the victim's robe (Item 1). The victim's robe as represented by Item 1 is eliminated as a possible source of the questioned fibers in Item 3 (Elimination). If additional known clothing articles are collected that may have come into contact with the victim's robe, please contact the undersigned as additional comparisons could be conducted.
D8MWAH	The questioned fibers found on the suspect's black pants (Item 2) has been originated from the victim's robe (Item 1), because of their similarities in physical properties and chemical compositions. The questioned fibers found inside the suspect's shoe (Item 3) has not been originated from the victim's robe (Item 1), because of their differences in physical properties and chemical compositions.
DCMXJR	1). Comparative examinations of Exhibit 001 (Fibers that compose the known section of the victim's robe) with Exhibit 002 (Questioned fibers found on the suspect's pants) disclosed them to be consistent in their physical characteristics and chemical characteristics. As a result of these findings, Exhibit 002 could have originated from Exhibit 001 or another source with the same characteristics. 2). Comparative examinations of Exhibit 001 (Fibers that compose the known section of the victim's robe) with Exhibit 003 (Questioned fibers found on the suspect's shoe) disclosed them to be inconsistent in their physical characteristics. As a result of these findings, Exhibit 003 could not have originated from Exhibit 001. 3). A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. Due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a suitable fiber selected at random to be consistent with a particular source. 4). Examination of Exhibits 001 and 002 disclosed the presence of polyester fibers. Examination of Exhibit 003 disclosed the presence of nylon fibers.
DFJMY	Questioned fibers found on the suspect's black pants (item 2) are not differentiated from known section of the victim's robe (item 1). Fibers from item 2 can come from the victim's robe (item 1) or from another textile material with the same characteristics. The questioned fibers found inside the suspect's shoe (item 3) are different from fibers of the victim's robe (item 1); they don't come from the victim's robe (item 1).
DGBPLE	Two populations of blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1 or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. Light blue manufactured fibers recovered from Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined using the following techniques as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier-transform infrared spectroscopy.
ER8CQG	The blue polyester fibers from Item 2 have the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the same

TABLE 4

WebCode	Conclusions
	<p>source as Item 1 or another source comprised of fibers with the same microscopic characteristics and optical properties. The Item 3 fibers are microscopically dissimilar to the fibers comprising Item 1. Accordingly, the Item 3 fibers are not consistent with originating from the same source as the Item 1 known sample. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, and instrumentally using microspectrophotometry and infrared spectroscopy, where appropriate.</p>
F7QC6N	<p>Known section of the victim's robe (Item 1): This item was used for comparison purposes. Please note this item is comprised of polyester fibers. Questioned fibers from the suspect's pants (Item 2): This item was determined to be polyester fibers which are similar in physical properties, optical properties, and polymer composition to the fibers from the known section of the victim's robe (Item 1). It is our opinion that these fibers could have come from the victim's robe or any other textile with similar characteristics. Questioned fibers from the suspect's shoes (Item 3): This item was determined to be nylon fibers which are dissimilar in visual color to the fibers from the known section of the victim's robe (Item 1). It is our opinion that these fibers did not come from the victim's robe.</p>
F8K2LW	<p>The physical, chemical, and optical properties of the blue polyester fibers collected from the suspect's black pants (Item #2) compare to the known blue polyester fibers collected from victim's robe (Item #1). It should be noted that individual textile fibers do not possess enough distinct microscopic characteristics to be positively identified as originating from a particular product to the exclusion of all other products. The blue-purple nylon fibers collected from the suspect's shoe (Item #3) do not compare to the known blue polyester fibers from the victim's robe (Item #1).</p>
FEHQ6L	<p>Conclusions: The known fibers in Item 1 and the questioned fibers from Item 2 exhibited no significant differences in optical characteristics, physical and chemical composition, therefore the fibers in Item 2 could have originated from the same source as the fibers in Item 1 or another similar source of blue fibers with the same physical, optical and chemical properties. The synthetic fibers in Items 1 and 2 were identified as metallic. The questioned fibers in Item 3 exhibited significant differences in optical characteristics, chemical and physical composition from Items 1 and 2. Therefore, Item 3 did not originate from the same source as Item 1. The synthetic fibers in Item 3 were identified as nylon.</p>
GXPFT4	<p>Item 1 and Item 2 were each identified as manufactured, delustered polyester fibers and were similar to each other. Item 2 may have originated from Item 1. Item 3 was identified as manufactured Nylon fibers. Item 3 was dissimilar to Item 1 and Item 3 could not have originated from Item 1.</p>
H97L8H	<p>1). Examination of Exhibit 1 (item 1) disclosed the presence of blue polyester fibers. 2). Examination of Exhibit 2 (item 2) disclosed the presence of blue polyester fibers. 3). Examination of Exhibit 3 (item 3) disclosed the presence of blue nylon fibers. 4). Comparative examinations of Exhibit 1 with Exhibit 2 disclosed them to be consistent in their physical characteristics and chemical characteristics. As a result of these findings, the fibers from Exhibit 2 could have originated from Exhibit 1, or another source with the same characteristics. A). A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. B). Due to the variability in manufacturing dyeing, and consumer use, one would not expect to encounter a suitable fiber selected at random to be consistent with a particular source. 5). Comparative examinations of Exhibit 1 with Exhibit 3 disclosed them to be inconsistent in their physical characteristics and chemical characteristics. As a result of these findings, the fibers from Exhibit 3 could not have originated from Exhibit 1.</p>
HFJH4C	<p>There is a high probability that questioned fibres found on the suspect's black pants (Item 2) could have originated from the victim's robe (Item 1). Questioned fibres found inside the suspect's shoe (Item 3) could not have originated from the victim's robe (Item 1).</p>
HRZZ4W	<p>Based on the results obtained with the use of applied methods it could be stated that questioned fibers found on the suspect's black pants (Item 2) could have originated from the victim's robe (Item 1), while questioned fibers found inside the suspect's shoes (Item 3) could not have originated from the victim's robe (Item 1).</p>
HVFRVP	<p>Blue polyester fibers were recovered from Item 2 which exhibit the same microscopic characteristics as the known blue polyester fibers in Item 1. Therefore, the blue polyester fibers in Item 2 could have originated from the same source as the known polyester fibers in Item 1. Blue nylon fibers were</p>

TABLE 4

WebCode	Conclusions
	identified in Item 3 which are not consistent with the known blue polyester fibers in Item 1 based on fiber type. It is pointed out that textile fibers do not possess enough individual microscopic characteristics to be positively as originating from a particular garment to the exclusion of all other similar garments.
HX47JY	The fibres found inside the suspect's shoe (Item 3) are distinguishable (FT-IR spectra, MSP spectra) from the known fibres of the victim's robe (Item 1). Item 1: Fibres from the warp yarn have the same FT-IR spectra, but neither the same intensities in the MSP spectra nor the same wave structure compared to the fibres from the weft yarn. The fibres found on the suspect's black pants (Item 2) are indistinguishable from the known fibres of the victim's robe (Item 1). Item 2 and Item 1 are not distinguishable with all used methods and also not distinguishable in the wave structures of the fibres created by weaving. In Item 2 there are a lot of long fibres like the warp yarn of Item 1, and also a lot of long fibres like the weft yarn of Item 1. Thus, the suspect's black pants had contact with the defect victim's robe or with another defect textile like the victim's robe.
K9YUQL	Item #1 contains a piece of woven fabric composed of polyester fibers. Item #2 contains multiple yarns of polyester fibers. Item #3 contains several yarns of nylon fibers. The polyester fibers of Item #2 are similar in all examined characteristics, relative to Permout™, to the polyester fibers used to construct the fabric of Item #1 and thus could have originated from the fabric of Item #1 or another fabric constructed of the same polyester fibers. The nylon fibers of Item #3 are dissimilar to the polyester fibers from the robe as represented by Item #1 and thus could not have originated from Item #1.
KC2UQJ	The piece of blue cloth in Item 1 from victim's robe consisted of 2 sets of fibres, both were made up of polyester but differed in colour shade and diameter. Blue fibres agreeing in fibre type, diameters, colours and microscopic appearance under various lighting conditions with the 2 sets of fibres in Item 1 respectively were found in Item 2 from suspect's black pants. Therefore, the questioned fibres in Item 2 could have originated from the same source as Item 1. On the other hand, fibres agreeing only in colour but differed in fibre type with either of the 2 sets of fibres in Item 1 were found in Item 3 from suspect's shoe, the latter being composed of nylon. Therefore, the questioned fibres in Item 3 did not originate from the same source as Item 1. The findings indicate that it is likely that a contact having occurred between victim's robe and suspect's black pants, resulting in transfer of fibres from the former to the latter.
KT6CTB	The blue polyester fibers in Item 2 exhibit the same microscopic characteristics and optical properties as the blue polyester fibers comprising the warp and weft of Item 1; accordingly, the blue polyester fibers in Item 2 are consistent with originating from Item 1 or from another source comprised of fibers which exhibit the same microscopic characteristics and optical properties. The manufactured fibers in Item 3 are microscopically dissimilar to the blue polyester fibers comprising Item 1; accordingly, the fibers in Item 3 are not consistent with originating from Item 1. The items were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy and instrumentally using microspectrophotometry and infrared spectroscopy.
KVPEJG	The Exhibit 1 known fabric was comprised of blue polyester fibers. The questioned fibers in Exhibit 2 were identified as blue polyester fibers and were determined to be consistent in physical characteristics, optical properties and chemical composition to the fibers comprising the Exhibit 1 fabric. The fibers in Exhibit 2 could have originated from Exhibit 1 or any other material consisting of polyester fibers with the same physical characteristics, optical properties and chemical composition (Type III Inclusion). This type of conclusion was reached because other textiles containing fibers made to the same specifications would also be indistinguishable from these fibers. The questioned fibers in Exhibit 3 were identified as blue nylon fibers, and therefore could not have originated from the Exhibit 1 fabric (Exclusion).
L2RULA	Results are inconclusive.
LD3HGT	Control blue fabric (Item 1) was found to consist of polyester fibres. Item 2 was found to consist of polyester fibres. Item 3 was found to consist of nylon fibres. Based on yarn characteristics and the microscopic characteristics, fluorescence, instrumental colour analysis and chemical composition of the fibres, at least two blue yarns marked "Item 2" could have originated from the yarns constituting the control blue fabric marked "Item 1", or from other sources containing yarns with similar characteristics. Based on yarn characteristics, microscopic characteristics, fluorescence and chemical composition of



TABLE 4

WebCode	Conclusions
	the fibres, the blue yarns marked "Item 3" did not originate from the yarns constituting the control blue fabric marked "Item 1".
LJATR8	Results of Examination: Blue polyester fibers recovered from Item 2 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the same source as Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The fibers recovered from Item 3 are microscopically dissimilar to fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the same source as Item 1. No other fibers were recovered from Items 2 and 3. The specimens were examined using the following techniques as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform-infrared spectroscopy; where appropriate.
LJTRTE	The fibers of item 2, present physical characteristics similar of color, shape, design and microscopic behavior in the polarized light microscope and chemical behavior in the Fourier Transform Infrared Spectrophotometer, to the fibers of ITEM 1, therefore, it is concluded that the fibers from ITEM 2, could have come from the victim's robe worn. The fibers of ITEM 3, present different physical characteristics of color, shape, design and microscopic behavior in the polarized light microscope and chemical behavior in the Fourier Transform Infrared Spectrophotometer than the fibers of ITEM 1. Therefore, it is concluded that the fibers from ITEM 3, they are not from the victim's robe worn.
LNMNDW	The blue polyester fibers from the suspect's black pants, (item 2), display consistent color, physical characteristics and optical characteristics as compared to the fibers from the known section of the suspect's robe, (item 1). Level III Association. The blue nylon fibers from inside the suspect's shoe, (item 3), display differences in physical characteristics as compared to the blue polyester fibers from the known section of the victim's robe, (item 1). Elimination.
LPJ8FX	Item 1 consist of Polyester fibers. Item 2 is same as Item 1 in composition and MSP. Item 3 consist of Nylon fibers.
MNGUAG	1). Exhibit 1 (known section of victim's robe) consists of a section of fabric composed of polyester fibers. 2). Comparative examination of the polyester fibers from Exhibit 1 with the polyester fibers from Exhibit 2 (questioned fibers found on the suspect's black pants) disclosed them to be consistent in their physical characteristics and chemical characteristics. As a result of these findings, Exhibit 2 could have originated from the fabric in Exhibit 1 or another source of fibers with the same characteristics. 3). Comparative examination of the polyester fibers from Exhibit 1 with the nylon fibers from Exhibit 3 (questioned fibers found inside the suspect's shoe) disclosed them to be inconsistent in their physical characteristics and chemical characteristics. As a result of these findings, Exhibit 3 could not have originated from the fabric in Exhibit 1. 4). It should be noted that a fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. Due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a suitable fiber selected at random to be consistent with a particular source.
N68YFP	The fibers of Item 1.2, reportedly collected from the suspect's pants, are similar to the Item 1.1 fibers collected from the known section of the victim's robe. The Item 1.1 and Item 1.2 fibers are similar in color, microscopical characteristics and chemical composition. The fiber samples Item 1.2 could have originated from the same source as the Item 1.1 fibers. This should be considered a Type III Association on the Association Scale presented at the end of this report. The fibers from Item 1.3, reportedly collected from the suspect's shoe, are different in microscopical and chemical characteristics from the Item 1.1 fibers collected from the known section of the victim's robe. This should be considered an Elimination on the Association Scale presented at the end of this report. Fiber exams were performed using Fourier transform infrared spectroscopy (FTIR), polarized light microscopy, and microspectrophotometry. Association Scale: Type I Association: A physical match; items fit back to one another demonstrating that the items are from the same source. Type II Association: An association in which items are consistent in all measured physical properties and/or chemical composition and share atypical characteristics (e.g., factory repaint layers) that would not be expected to be readily available in the relevant population. Type III Association: An association in which items are consistent in all measured physical properties and/or chemical composition and, therefore, could have originated from

TABLE 4

WebCode	Conclusions
	<p>the same source, but not exclusively, because other manufactured items in this class would be indistinguishable from the submitted evidence. Type IV Association: An association in which items are consistent in all measured physical properties and/or chemical composition and, therefore, could have originated from the same source. As compared to a Type III association, items categorized as a Type IV share characteristics that are more common amongst these kinds of manufactured products. Alternatively, an association between items would be categorized as a Type IV if a limited analysis was performed due to characteristics or size of the specimen(s). Type V Association: An association in which items are consistent in some, but not all, measured physical properties and/or chemical composition. Some minor variation(s) exist between the known and questioned items and could be due to factors such as sample heterogeneity, weathering, contamination of the sample(s), or having a sample of insufficient size to adequately assess homogeneity of the entity from which it was derived. Inconclusive: No conclusion could be reached regarding an association/elimination between the items. Elimination: The items were dissimilar in physical properties and/or chemical composition, indicating that they did not originate from the same source.</p>
N72MUE	<p>On the basis of the samples received and the examinations and analysis conducted, I have formed the following opinions: I am unable to exclude the hypothesis that the fibres comprising the known section of fabric in item 1 could share a common origin with the questioned fibres in item 2. I am also unable to exclude the possibility that another piece of fabric, similar to that in item 1, could also be a source of the questioned fibres in item 2. I am able to exclude the hypothesis that the fibres comprising the known section of fabric in item 1 could share a common origin with the questioned fibres in item 3.</p>
N9LWKQ	<p>The questioned fibres found on the suspect's black pants (item 2) match in all criteria the fibres of the victim's robe (item 1). Therefore it is likely that the questioned fibres found on the suspect's black pants come from a textile similar to the robe worn by the victim. There is no evidence that the questioned fibres found inside the suspect's shoe (item 3) come from the victim's robe.</p>
NADY87	<p>Blue polyester fibers recovered from Item 2 (Your Item 2) have the same microscopic characteristics and optical properties as the blue polyester fibers that comprise the warp and weft of the Item 1 fabric sample (Your Item 1). Accordingly, the blue polyester fibers are consistent with originating from the robe Item 1 was sampled from or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The blue and white fibers recovered from Item 3 (Your Item 3) are microscopically dissimilar from the fibers comprising Item 1 (Your Item 1). Accordingly, the fibers from Item 3 are not consistent with having originated from the same source as Item 1. The specimens were examined visually using stereomicroscopy, comparison microscopy, fluorescence microscopy, and polarized light microscopy, and instrumentally using microspectrophotometry, and infrared spectroscopy, where appropriate.</p>
NWRK9D	<p>The complainant's robe, as represented by item QA-01, could not be eliminated as a possible source of the blue polyester yarns found on the suspect's black pants (item QA-02). As such, the blue polyester yarns found on the suspect's black pants (item QA-02) either came from the complainant's robe (item QA-01) or from another source that is indistinguishable with respect to the properties listed in the results. The complainant's robe, as represented by item QA-01, was eliminated as a possible source of the questioned fibres found inside the suspect's shoe (item QA-03).</p>
PFLB9D	<p>METHODS: Items 1, 2, and 3 were examined by stereomicroscopy, polarized light microscopy, and infra-red spectroscopy. Items 1 and 2 were additionally examined by microspectrophotometry, comparison light microscopy, fluorescence microscopy, and thin layer chromatography. RESULTS AND CONCLUSIONS: Item 1 contained two (2) yarns that were distinguishable by their construction. Item 2 contained two (2) yarns that were distinguishable by their construction. One (1) of the yarns of royal blue polyester fibers in Item 2 was indistinguishable from one (1) of the yarns of royal blue polyester fibers in Item 1 in color, polymer type, microscopic characteristics, and construction (Type 3 Association). The other yarn of royal blue polyester fibers in Item 2 was indistinguishable from the second yarn of royal blue polyester fibers in Item 1 in color, polymer type, microscopic characteristics, and construction (Type 3 Association). This means that the questioned yarns found on the suspect's black pants could have come from the victim's robe. Item 3 contained light blue nylon fibers which were different from the royal blue polyester fibers in Item 1 (Elimination). This means that the questioned</p>

TABLE 4

WebCode	Conclusions
	<p>fibers found inside the suspect's shoes did not come from the victim's robe. TRACE INTERPRETATION SCALE: Type 1 Association: Physical Match: The compared items exhibit physical features that demonstrate they were once part of the same object. Type 2 Association: Association with Distinctive characteristics: Items are consistent in all measured and observed physical properties, chemical composition and/or microscopic characteristics, and therefore could have originated from the same source. The items further share distinctive characteristics that would not be typically encountered in the relevant population. Type 3 Association: Association with Conventional characteristics: Items are consistent in all measured and observed physical properties, chemical composition and/or microscopic characteristics, and therefore could have originated from the same source. Because other items have been manufactured or are naturally occurring that would also be indistinguishable from the submitted evidence, an individual source cannot be determined. Type 4 Association: Association with limited characteristics and/or examination (1). Items are consistent in all measured and observed physical properties, chemical composition and/or microscopic characteristics, and therefore could have originated from the same source. This type of evidence may be commonly encountered in the environment or may have limited comparative value. Or (2). The comparison between items may be categorized as a Type 4 Association if the association is limited by the inability to perform a complete analysis or if minor variations are observed in the examination results. Inconclusive: No conclusion could be reached regarding an association or an elimination between the items. Elimination: Items exhibit differences in one or more of the following: physical properties, chemical composition, or microscopic characteristics and therefore did not originate from the same source. Non-Association: The items were different in physical properties, chemical composition, and/or microscopic characteristics, indicating that the items did not originate from the same source. However, these differences were insufficient for a definitive elimination.</p>
PX4C3F	<p>Examination of Item 2 revealed the presence of six (6) dark blue yarns. Macroscopic and microscopic examinations and comparisons of these six (6) dark blue yarns revealed that they are consistent in color, construction and appearance with the dark blue yarns comprising the section of dark blue fabric from the suspect's robe, Item 1. Examination of the fibers comprising the dark blue yarns in Item 2 revealed the presence of two populations of medium blue polyester fibers; type 'A' and type 'B', which can be differentiated by delustrant and color of fluorescence. Macroscopic and microscopic examinations and comparisons of at least sixty (60) type 'A' medium blue polyester fibers in Item 2 and the medium blue polyester fibers comprising the section of dark blue fabric from the suspect's robe revealed that they are consistent in color, appearance, fiber type and microscopic characteristics. Further instrumental examinations and comparisons of color of twenty-one (21) type 'A' medium blue polyester fibers in Item 2 revealed that they are consistent with the medium blue polyester fibers comprising the section of dark blue fabric from the victim's robe (Item 1), and therefore could have originated from that source. Macroscopic and microscopic examinations and comparisons of at least sixty (60) type 'B' medium blue polyester fibers in Item 2 and the medium blue polyester fibers comprising the section of dark blue fabric from the suspect's robe (Item 1) revealed that they are consistent in color, appearance, fiber type and microscopic characteristics. Further instrumental examinations and comparisons of color of nineteen (19) type 'B' medium blue polyester fibers in Item 2 revealed that they are consistent with the medium blue polyester fibers comprising the section of dark blue fabric from the victim's robe (Item 1), and therefore could have originated from that source. Examination of Item 3 revealed the presence of numerous medium blue fibers. Macroscopic and microscopic examinations and comparisons of at least one hundred (100) medium blue fibers in Item 3 and the medium blue polyester fibers comprising the section of dark blue fabric from the suspect's robe revealed that they are different in color distribution. Further microscopic and instrumental examinations revealed that the medium blue fibers in Item 3 are nylon fibers and therefore different in fiber type from the medium blue polyester fibers comprising the section of dark blue fabric from the suspect's robe; these fibers could not have originated from that source.</p>
Q2GG74	<p>Blue polyester fibers found in Item 2 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1 or another source comprised of fibers with the same microscopic characteristics and optical properties. Fibers found in Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined visually using</p>

TABLE 4

WebCode	Conclusions
Q46BPP	<p>stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform infrared-spectroscopy, where appropriate.</p> <p>Item 1, known section of the victim's robe, contains manufactured fibers identified as polyester. Item 2, questioned fibers found on the suspect's black pants, contains manufactured fibers identified as polyester. Item 3, questioned fibers found inside the suspect's shoe, contains manufactured fibers identified as nylon.</p>
Q4JJV6	<p>The questioned fibers found on the suspect's black pants (Item2) were consistent (indistinguishable) with the fibers of Known section of the victim's robe (Item1) in macroscopic, microscopic, color (MSP) and infrared (FTIR) characteristics. Therefore the questioned fibers found on the suspect's black pants (Item2) could have come from the Known section of the victim's robe (Item1) or another source of fibers with similar macroscopic, microscopic, color (MSP), spectral (FTIR) characteristics. The questioned fibers found inside the suspect's shoe (Item3) are dissimilar to the fibers of Known section of the victim's robe (Item1) (distinguishable). Therefore the questioned fibers found inside the suspect's shoe (Item3) could not have come from the Known section of the victim's robe (Item1).</p>
QBKPUF	<p>Items 1, 2, and 3 were examined visually and using stereomicroscopy. Fibers from Items 2 and 3 and fibers composing Item 1 were examined using comparison microscopy, polarized light microscopy (PLM), Fourier Transform Infrared Spectrophotometry (FTIR), and microchemical tests. Fibers from Item 2 and fibers composing Item 1 were further examined using fluorescence microscopy and Microspectrophotometry (MSP). The Item 2 blue polyester fibers were consistent in physical, chemical and optical properties with the blue polyester fibers composing the Item 1 robe. Based on the fibers examined, it was concluded that these Item 2 blue polyester fibers originated from either the Item 1 robe or another source composed of fibers with the same physical, chemical and optical properties (Level III: Association with Discriminating Characteristics). This type of conclusion was reached because other textiles containing fibers produced with the same properties (type, color, microscopic characteristics, etc.) would also be indistinguishable from these fibers. It should be noted that the techniques used in this comparative analysis can typically distinguish different fibers. Based on the fibers examined, the Item 3 fibers could not be associated with the fibers composing Item 1 due to differences in color and chemical composition (Exclusion/Elimination). <b>TERMINOLOGY KEY FOR COMPARATIVE EXAMINATIONS:</b> Level I: Physical/Fracture Match: Physical Fit is reached when the items that have been broken, torn, or separated exhibit physical features that correspond/re-align in a manner that is not expected to be replicated. Level II: Association with Highly Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Additionally, the items share unusual characteristics that would rarely be expected to occur in the relevant population. This is the highest degree of association that can be determined in the absence of a Physical Fit. Level III: Association with Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Other items have been manufactured or could occur in nature that would also be indistinguishable from the submitted items and could be encountered in the relevant population. The analytical techniques used in the analysis of these items can provide high levels of discrimination among natural and manufactured materials. This is considered a high degree of association. Level IV: Association with Limitations: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. As compared to the categories above, this type of association has decreased evidential value. For example, the items are more commonly encountered in the relevant population, minor variations were observed, or a complete analysis was not performed due to limited characteristics or sample size. Minor variations, for certain types of examinations, could be due to factors such as contamination of the sample(s) or having a sample of insufficient size to adequately assess heterogeneity of the entity from which it was derived. Inconclusive: No conclusion could be reached regarding an association or an elimination between the items. Exclusion with Limitations: The item exhibits differences from the comparison sample that support that it did not originate from the source, as represented by the comparison sample. An Exclusion/Elimination conclusion was not reached due to limiting factors, such</p>

TABLE 4

WebCode	Conclusions
	as possible natural or manufactured source variations. Exclusion/Elimination: The items exhibit differences that demonstrate the items did not originate from the same source.
QRBUZN	"Item 1" and "Item 2" were found to consist of polyester fibres. "Item 3" was found to consist of nylon fibres. Based on yarn construction and microscopic characteristics, fluorescence, instrumental colour analysis and chemical composition of the fibres, "Item 2" could have originated from "Item 1" or from other sources containing yarns with similar characteristics. Based on yarn construction and microscopic characteristics of the fibres, "Item 3" was found to be different from the yarns in "Item 1".
QZK2XC	Item 1 was a blue fabric constructed of polyester fibres. Item 2 was blue threads. These could not be differentiated from Item 1 with respect to the examinations, observations, and analyses conducted. In my opinion there is a level 3 association between Items 1 and 2. Manufactured fibres are not unique, and Item 3 may have originated from a source other than Item 1, with the same colour and composition. Item 3 was blue-purple threads. These were differentiated from Item 1. In my opinion Item 3 is eliminated as having originated from Item 1. Levels of association range from Level 1 (highest) to Level 5 (lowest), "inconclusive" and "elimination".
R6DPP4	Item 1 and Item 2 found to be manufactured polyester, whereas Item 3 found to be manufactured Nylon 6. Item 2 could have originated from Item 1, but Item 3 could not have originated from Item 1.
R7LXYN	Item 2 is considered to be similar to Item 1. The reason is that the physical and chemical properties are very similar. However, Item 3 has different chemical properties from Item 1.
RXFT9T	Item 1 and Item 2 are both blue polyester fibers, with FTIR and microspectrophotometry spectra, as well as characteristics displayed by stereo- and polarized light microscopy being similar to each other. Therefore, Item 2 could have originated from Item 1. Item 3, on the other hand, is a blue nylon fiber with FTIR and microspectrophotometry spectra, as well as characteristics displayed by stereo- and polarized light microscopy being different to Item 1. Thus, Item 3 could not have originated from Item 1.
T4FRWM	The fibers found on the suspect's black pants (Item 2) could have come from the victim's robe (Item 1). The fibers found inside of the suspect's shoe (Item 3) could not have come from the victim's robe (Item 1).
T6QGFZ	Blue polyester fibers recovered from the Item 2 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. Textile fibers found in the Item 3 debris are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy, where appropriate.
TCQTHN	item 1 and item 2 is identical but not item 3.
TDLCKP	A). The sample of fibres obtained from the pants of the suspect (Item 2) and the fibres from the victim's robe (Item 1) yielded microscopic and spectral properties that are consistent with that of polyester. The physical properties of the fibres from both items (colour, morphology and diameter) are similar in nature and it can therefore be determined that the fibres found on the suspect's pants could have originated from the victim's robe. B). The sample of fibres obtained from the shoe of the suspect (Item 3) yielded microscopic and spectral properties that are consistent with that of nylon. It can therefore be determined that the fibres found in the suspect's shoe did not originate from the victim's robe.
TQD2GB	The results of the examination strongly support that the questioned fibres, Item 2, originate from the victim's robe, Item 1. The questioned fibres, Item 3, do not originate from the victim's robe, Item 1.
TTDDU2	The threads of blue polyester fibres recovered from the suspect's black pants (Item 2) were found to be microscopically indistinguishable from those of the victim's robe (Item 1) in terms of high-power microscopic appearance and fluorescence. Further analytical tests showed these fibres to also be indistinguishable in terms of instrumental colour analysis, chemical composition and dye composition. Therefore, in my opinion, the threads recovered from Item 2 could have originated from Item 1. In

TABLE 4

WebCode	Conclusions
	<p>interpreting the findings, I have considered the following to alternative propositions: The threads recovered from Item 2 have originated from Item 1. The threads recovered from Item 2 have not originated from Item 1 and match by chance. Fibre population studies have shown that natural fibres such as cotton are relatively common compared to synthetic fibres such as polyester. Target fibre studies have shown that the chance of finding matching fibres on a surface chosen at random is small and that the chance of a random match decreases with the number of different analytical tests undertaken. The threads of matching blue polyester fibres were found to be indistinguishable from those of the victim's robe (Item 1) using a number of analytical tests. Taking all the above into consideration, in my opinion the findings provide "very strong" support for the first proposition rather than the second. The term "very strong support" is selected from a scale of standard terms used to express the relative level of scientific support for a proposition over its alternative, as discussed above. These terms are: Limited, Moderate, Moderately Strong, Strong, Very Strong, Extremely strong. Additionally, in some instances, a proposition may be conclusively supported, if the findings are such that the alternative can be dismissed. If the findings provide no greater support for one proposition over the other, then the findings are described as inconclusive. In my opinion, the fibres found inside the suspect's shoe (Item 3) could not have originated from the victim's robe (Item 1).</p>
TXAX3R	<p>Microscopic examination &amp; instrumental analysis of Item 1 revealed blue polyester fibers. Microscopic examination &amp; instrumental analysis of Item 2 revealed blue polyester fibers. Microscopic examination &amp; instrumental analysis of Item 3 revealed light blue to light purple nylon fibers. Examination and comparison of representative fibers in Items 1 and 2 were found to be similar in all measured physical, microscopic, chemical, and color properties. They could have come from the same source or any other source with the same properties. Examination and comparison of representative fibers in Items 1 and 3 were found to be dissimilar in microscopic, chemical, and color properties. They could not have come from the same source.</p>
TYJ66K	<p>The trace fibres from the suspect's black pants (Item 2) could have originated from the victim's robe (Item 1). The trace fibres from inside the suspect's shoe (Item 3) could not have originated from the victim's robe.</p>
U6N2PK	<p>Item 1 is composed of blue fibers treated with a delustrant, presenting an irregular diameter as a result of the twist in the fibers. Regarding fiber type, they are manufactured fibers identified as Polyester by FTIR. Item 2 is composed of blue fibers treated with a delustrant, presenting an irregular diameter as a result of the twist in the fibers. Regarding fiber type, they are manufactured fibers identified as Polyester by FTIR. Item 1 and Item 2 behave similarly under fluorescence and polarized light. In addition, the fibers of both items have a similar cross-section. Item 3 is composed of blue and light grey colour fibers treated with a delustrant. Regarding fiber type, they are manufactured fibers identified as Nylon by FTIR. Item 1 and Item 3 behave differently under fluorescence and polarized light. In addition, the fibers of both items do not have a similar cross-section. Conclusion: The fibers found on suspect's black pants (Item 2) have probably originated from the victim's robe (Item 1). The fibers found inside the suspect's shoe (Item 3) have a different origin other than the victim's robe (Item 1).</p>
U7XFPY	<p>Item 1 and 2 could have been originated from the same source.</p>
V224BE	<p>Conclusions: Items 1-3 were examined visually, stereoscopically (including the use of an alternative lighting source), microscopically and instrumentally using Fourier Transform Infrared Spectrometry. Two fiber types were observed in items 1 (known section of robe) and 2 (questioned fibers from pants). One fiber type was observed in item 3 (questioned fibers from shoe). Fibers from items 1 and 2 exhibited consistent properties including color, texture, diameter and chemical composition. Items 1 and 2 were identified as polyester fibers. Items 1 and 2 may share a common source of origin (the victim's robe). Questioned fibers from item 2 could also have originated from additional sources that are indistinguishable in all assessed examinations and analyses. No statistical or numerical probabilities can be applied to the conclusions of this report. Item 3 was not consistent with item 1.</p>
V9HMQ8	<p>Based on the results of the examination performed, I am of the opinion that: 1). The questioned blue polyester fibres from Item 2, could have come from the victim's robe (Item 1). 2). The questioned blue nylon fibres from Item 3 could not have come from the victim's robe (Item 1). It should be noted that</p>

TABLE 4

WebCode	Conclusions
	whilst the fibres from Item 2 could have come from the victim's robe, it also could have come from another robe of the same type or a different textile product composed of the same fibres.
VJKZR8	Fibers from sample 2, found on the suspect's black pants could have come from the victim's robe.
VXM77C	The blue polyester fibers found on the suspect's black pants (item 2) are consistent with the blue polyester fibers of the victim's robe (item 1). Item 2 could be originated from item 1. The blue nylon fibers found found inside the suspect's shoe (item 3) are not consistent with the blue polyester fibers from victim's robe (item 1). Item 3 could not be originated from item 1.
W49LAA	Items 1 & 2 yarns are similar in all examined characteristics. Item 2 could have originated from same source as item 1, or another source of similar manufacturing. Items 1 & 3 yarns are comprised of fibers from different polymers. Item 3 could not have originated from the victim's robe as represented by the fabric swatch from item 1.
W878W7	The known section of the victim's robe (Item 1) was a piece of blue woven fabric approximately 50 x 50mm. The blue yarns (both warp and weft) were composed of delustered polyester fibres. The questioned fibres from the suspect's black pants (Item 2) were presented as five blue yarns. All of the blue yarns were comprised of delustered polyester fibres, these fibres corresponded in colour, composition, and appearance to the blue yarns/fibres from the known section of the victim's robe. The questioned fibres from the suspect's shoe (Item 3) were presented as five blue yarns. All of the blue yarns were comprised of blue delustered nylon fibres (the intensity of the colour varied along the length of the fibres), these fibres did not correspond in colour, composition and appearance to the blue yarns/fibres from the known section of the victim's robe.
WQUN3K	The result speaks with great certainty that fibers in Item 1 and 2 are same type. They may have common origin. Item 3 is different.
WVUZYK	The suspect's pants (trousers) bore four blue threads and several fibres (Item 2) that were indistinguishable from fibres and threads shed from the damaged edges of the fabric used to make the victim's robe (Item 1). In my opinion the fibres and threads on the suspect's pants could have come from the victim's robe. If the suspect had been involved in the attack on the victim, there could be an opportunity for his pants to come into contact with the victim's damaged robe and for fibres and threads to have been transferred from the robe to his pants. If the suspect had not come into recent contact with the victim's damaged robe I would not expect to find threads, indistinguishable from the constituents of the victim's robe, on the suspect's pants by coincidence. I have therefore considered the following alternative scenarios: 1) The suspect's pants (trousers) have been in recent contact with the victim's damaged robe. 2) The suspect's pants have not been in recent contact with the victim's damaged robe and any matching threads were coincidental. In my opinion, the findings provide very strong support for scenario 1 rather than scenario 2. In expressing this level of support I have used the following scale...etc.
X7P7RJ	The source of item 1 is included as a source for the unknown fibers in item 2. For another item to be considered a possible source, it would have to display the same physical, optical, and chemical properties. The source of item 1 is excluded as a possible source of the unknown fibers in item 3.
XA7URM	Item Description: Finding Conclusion: #2 Questioned fibers: Same color, crimp, microscopical characteristics, optical properties, and chemical composition as Item #1. Support for same source 1. #3 Questioned fibers: Different microscopical characteristics, optical properties, and chemical composition than Item #1. Source Exclusion 2: 1). This association is not exclusive; other manufactured items with the same characteristics may exist. 2). The evidence exhibits fundamentally different characteristics than the known and could not have come from the same source. Remarks: The evidence is being returned to your department. Digital images are being retained at [Laboratory]. Analytical Detail: These findings were determined using visual examination techniques, microscopical examination techniques (stereomicroscope, PLM, comparison microscopes) and instrumental analyses (FTIR).
YHGEQC	Item 2, questioned fibres found on suspect's black trousers, consisted of threads of blue fibres. They were examined for synthetic fibres similar to the synthetic constituent fibres of the known section of victim's robe; item 1. Twenty fibres were found to be indistinguishable by comparison microscopy and

TABLE 4

WebCode	Conclusions
Z8EFH3	<p>microspectrophotometry from the constituent fibres of the victim's robe. Two of these fibres underwent further Fourier-transform infrared spectroscopy (FTIR) testing and were found to be indistinguishable from the constituent fibres of the victim's robe using this technique. Item 3 questioned fibres found inside suspect's shoe consisted of threads of blue fibres. They were examined for synthetic fibres similar to the synthetic constituent fibres of the known section of victim's robe; item 1, none were found. A total of twenty fibres recovered from the suspect's black trousers, item 2, were found to match the synthetic constituent fibres of the victim's robe, item 1. This finding provides strong support for the proposition that the victim's robe has been in contact with the suspect's trousers. In assessing the evidential significance of the findings I have used the following scale of support: No support, weak support, support, strong support, conclusive.</p> <p>I started the examination of the submitted evidence items on February 17, 2022. The known section of victim's robe fabric, item 001-1, is composed of blue polyester fibers. I compared the two questioned fiber samples, items 001-2 and 001-3, to the known fabric using stereo microscopy, polarized light microscopy, fluorescence microscopy, comparison microscopy, thermal microscopy, infrared microspectrophotometry, and UV-Visible microspectrophotometry. I found that the questioned fibers, item 001-2, are also blue polyester fibers that are indistinguishable from the known fibers, item 001-1, from the victim's robe. The fibers, item 001-2, could have come from the victim's robe or another fabric of the same color and type fibers exhibiting the same microscopical and chemical features. I found that the questioned fibers, item 001-3, are blue nylon fibers and therefore, distinguishable from the known fibers, item 001-1, from the victim's robe. The fibers, item 001-3, did not come from the victim's robe fabric, item 001-1.</p>
ZHBLC3	<p>Blue polyester fibers recovered from the suspect's pants (Item 2) are similar in size, shape, color, optical properties, and fiber type to the blue polyester fibers from the victim's robe (Item 1). It is my opinion that these fibers could have originated from the victim's robe or any source with similar fibers (Category 2B). Blue and purple nylon fibers recovered from the suspect's shoes (Item 3) are dissimilar in fiber type to the blue polyester fibers from the victim's robe (Item 1). It is my opinion that these fibers did not originate from the victim's robe (Category 5). The known fibers from the victim's robe (Item 1) consisted of blue polyester fibers and were used for comparison purposes.</p>
ZMQWMJ	<p>The blue fibers, which make up the victim's tunic, (Item #1), match in terms of their physical characteristics, chemical composition, and color property with the blue fibers of dubious origin recovered from the suspect's black pants. (Item #2) so they would have a common origin. In the same way the undoubted fiber collected from Item #1 does not match the undoubted fiber collected inside the shoe of the suspected Item #3.</p>



# Additional Comments

TABLE 5

WebCode	Additional Comments
36GJVP	Fibers can differ as to type (e.g. rayon, cotton), color, shape, size, microscopic features (e.g. delusterant, voids) and optical properties (e.g. refractive index, sign of elongation). These are characteristics that may associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods. The characteristics and optical properties present in fiber(s) are used as comparison criteria. When the characteristics and optical properties of a recovered fiber(s) are the same as a known sample, the recovered fibers are consistent with originating from the source of the known sample, or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. However, due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a fiber selected at random to be consistent with a particular item. The inability to associate persons/items through a microscopic hair/fiber examination does not necessarily mean the persons/items of interest had no contact. A number of factors can produce this result, including: 1). Hair/fiber evidence may not have transferred. 2). Hairs/fibers that did transfer may have been lost prior to submission to the laboratory. 3). The hairs/fibers transferred or the known sample submitted may not be representative of the source. 4). The hairs/fibers may be from a different source.
3GPM83	Because textile materials are mass produced, unknown textiles can only be associated to a single source where there is a physical fit of textile products along damaged, torn, or cut edges.
77XBLY	Minor differences were noted in the warp and weft threads in Item 1 and these were also present in the threads in Item 2, which contributed to the overall support level.
93N28Y	This lab does not analyze loose questioned fibers "as a group". Suggest submitting yarns or fabric swatches only, or if only loose fibers are available, then only a few (not hundreds in a clump). Additionally, at this laboratory, fiber analyses with a negative association stop as soon as a difference is noted; the exam does not continue to identify the fiber types. The examination of this proficiency test did not follow our lab's Technical Procedures in that aspect.
AG8VEJ	Fibers can differ as to type (e.g., rayon, cotton), color, shape, size, microscopic features (e.g., delustrant, voids) and optical properties (e.g., refractive index, sign of elongation). These are characteristics that may associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods. The characteristics and optical properties of the fiber(s) are used as comparison criteria. When the characteristics and optical properties of a recovered fiber(s) are the same as a known sample, the recovered fibers are consistent with originating from the source of the known sample, or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. However, due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a fiber selected at random to be consistent with a particular item. The inability to associate persons/items through a microscopic fiber examination does not necessarily mean the persons/items of interest had no contact. A number of factors can produce this result, including: 1). fiber evidence may not have transferred. 2). fibers that did transfer may have been lost prior to submission to the laboratory. 3). The fibers transferred or the known sample submitted may not be representative of the source. 4). The fibers may be from a different source.
BTF9TP	Items were examined visually and using Fourier Transform Infrared Spectroscopy, Comparison Polarized Light Microscopy, Refractive Index and Microspectrophotometry. Samples collected and analyzed during the examination and analysis of the items in this case (ex. glass slides) have been returned to and retained with the original item.
CJPQCV	There would be an association scale inserted after the conclusions.
HRZZ4W	While performing CTS test comparative examination of fibers was stopped after fluorescence

TABLE 5

WebCode	Additional Comments
	microscopy examination. In normal situation further comparative examination would be performed with the use of MSP equipment. The reason of not performing such analysis was temporary problem with MSP lamp which was breakdown and could not be repaired before deadline of test results delivery into organiser. In normal situation MSP measurement would be performed. What is more expertise won't be release to client without such examination.
KT6CTB	The examinations performed in this proficiency test are not probative; therefore, we wouldn't have actually conducted these examinations in real life.
L2RULA	We had problems with our FTIR, that's why we were not able to determine the fiber type.
LJTRTE	The physical characteristics of color and shape are exclusive characteristics of the comparative analysis of fibers, in wich case differences are observed in these mentioned characteristics, the analysis is finished and the corresponding conclusions are drawn.
Q46BPP	This laboratory does not report fiber comparisons.
RXFT9T	10 individual microspectrophotometry spectra were taken for each item, normalized and compared to each other. While Items 1 and 2 display identical microspectrophotometry spectra patterns, the maximum absorption peaks of Item 3 are shifted towards lower wavelengths. Microscopic exams and FTIR results also confirm Item 3 to be nylon, and not polyester as Items 1 and 2 are identified.
TDLCKP	Due to the fact that instrumentation to determine colour is limited, such as a comparison microscope and MSP, it is difficult to determine minor differences in colour. An alternate light source crime lite was used with different wave lengths to determine fluorescence of the fibres. Both items 1 and 2 yielded consistent results. It was therefore determined that both Items 1 and 2 were of the same colour and therefore originated from the same source.
TQD2GB	The conclusion is made under the assumption that Item 1 is a representative sample from the victim ´s robe.
WVUZYK	As suspect is the victim's boyfriend consideration as to last time they met and whether the robe could have been damaged prior to the attack would need to be made.
ZMQWMJ	It is considered appropriate to continue with this type of exercises.

-End of Report-  
(Appendix may follow)

## Test No. 22-5439: Fibers Analysis

DATA MUST BE SUBMITTED BY **March 14, 2022, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: 8KDW4W

The Accreditation Release section can be accessed by using the "Continue to Final Submission" button above. This information can be entered at any time prior to submitting to CTS.

### Scenario:

Police are investigating the homicide of a women in her home. The victim's body was found in her bedroom where there appears to be signs of a struggle and multiple tears in her robe. The neighbor reported hearing an altercation and briefly saw a man, in black pants and a red shirt, leaving the home in a hurry. The police tracked down the victim's boyfriend the next morning, he could not corroborate an alibi, so they obtained a search warrant of his home. The police found clothes that matched the neighbor's description and recovered fibers from the suspect's pants and the inside of his shoe. Police are requesting you to examine the fibers, report their identification(s), and determine if the fibers found on the suspect's black pants and/or the inside of his shoe could have come from the robe worn by the victim.

### Items Submitted (Sample Pack FIBR):

Item 1: Known section of the victim's robe.

Item 2: Questioned fibers found on the suspect's black pants.

Item 3: Questioned fibers found inside the suspect's shoe.

**1.) Could either of the questioned fibers found on the suspect's black pants (Item 2) or inside of the suspect's shoe (Item 3) have originated from the victim's robe (Item 1)?**

	Yes	No	Inconclusive
Item 2:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 3:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### **2.) Fiber Type Determination.**

Please enter the fiber type (Manufactured, Animal, or Vegetable) and generic name in the blank provided for each Item. For Manufactured fibers please use the terminology in the appendix provided. (Example: Item 1 Vegetable, Cotton)

Item 1:

Item 2:

Item 3:

**3.) Indicate the procedure(s) used to examine the submitted items:**

Please check all that apply.

<b><u>Microscopic Exams:</u></b>	<input type="checkbox"/> Stereo	<input type="checkbox"/> Comparison
	<input type="checkbox"/> Polarized Light	<input type="checkbox"/> Fluorescence

Macroscopic Exam       IR/FTIR       Microspectrophotometry  
 Solubility Tests       Cross-Section       Melting Point

Other (specify):

**Please note:** Any additional formatting applied in the free form space below will not transfer to the Summary Report and may cause your information to be illegible. This includes additional spacing and returns that present your responses in lists and tabular formats.

**4.) What would be the wording of the Conclusions in your report?**

**5.) Additional Comments**

## Appendix: Manufactured Fibers - Names & Definitions

### Federal Trade Commission Rules and Regulations Under the Textile Fiber Products Identification Act 16 CFR Part 303

#### §303.7 Generic Names and Definitions for Manufactured Fibers

Pursuant to the provisions of Section 7(c) of the Act, the Commission hereby establishes the generic names for manufactured fibers, together with their respective definitions, set forth in this section, and the generic names for manufactured fibers, together with their respective definitions, set forth in International Organization for Standardization ISO 2076: 1999(E), "Textiles - Man-made fibres - Generic names."

**(a) Acrylic**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85% by weight of acrylonitrile units.

**(b) Modacrylic**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of less than 85% but at least 35% by weight of acrylonitrile units, except fibers qualifying under paragraph (j)(2) of this section and fibers qualifying under paragraph (q) of this section.

**(c) Polyester**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85% by weight of an ester of a substituted aromatic carboxylic acid, including but not restricted to substituted terephthalate units, and para substituted hydroxy-benzoate units. (1) Where the fiber is formed by the interaction of two or more chemically distinct polymers (of which none exceeds 85% by weight), and contains ester groups as the dominant functional unit (at least 85% by weight of the total polymer content of the fiber), and which, if stretched at least 100%, durably and rapidly reverts substantially to its unstretched length when the tension is removed, the term elasterell-p may be used as a generic description of the fiber. (2) Where the glycol used to form the ester consists of at least ninety mole percent 1,3-propanediol, the term "triexta" may be used as a generic description of the fiber.

**(d) Rayon**

A manufactured fiber composed of regenerated cellulose, as well as manufactured fibers composed of regenerated cellulose in which substituents have replaced not more than 15% of the hydrogens of the hydroxyl groups. Where the fiber is composed of cellulose precipitated from an organic solution in which no substitution of the hydroxyl groups takes place and no chemical intermediates are formed, the term lyocell may be used as a generic description of the fiber.

**(e) Acetate**

A manufactured fiber in which the fiber-forming substance is cellulose acetate. Where not less than 92% of the hydroxyl groups are acetylated, the term triacetate may be used as a generic description of the fiber.

**(f) Saran**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 80% by weight of vinylidene chloride units.

**(g) Azlon**

A manufactured fiber in which the fiber-forming substance is composed of any regenerated naturally occurring proteins.

**(h) Nylril**

A manufactured fiber containing at least 85% of a long chain polymer of vinylidene dinitrile where the vinylidene dinitrile content is no less than every other unit in the polymer chain.

**(i) Nylon**

A manufactured fiber in which the fiber-forming substance is a long chain synthetic polyamide in which less than 85% of the amide linkages are attached directly to two aromatic rings.

**(j) Rubber**

A manufactured fiber in which the fiber-forming substance is comprised of natural or synthetic rubber, including the following categories: (1) A manufactured fiber in which the fiber-forming substance is a hydrocarbon such as natural rubber, polyisoprene, polybutadiene, copolymers of dienes and hydrocarbons, or amorphous (noncrystalline) polyolefins. (2) A manufactured fiber in which the fiber-forming substance is a copolymer of acrylonitrile and a diene (such as butadiene) composed of not more than 50% but at least 10% by weight of acrylonitrile units. The term lastrile may be used as a generic description for fibers falling within this category. (3) A manufactured fiber in which the fiber-forming substance is a polychloroprene or a copolymer of chloroprene in which at least 35% by weight of the fiber-forming substance is composed of chloroprene units.

**(k) Spandex**

A manufactured fiber in which the fiber-forming substance is a long chain synthetic polymer comprised of at least 85% of a segmented polyurethane.

**(l) Vinal**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 50% by weight of vinyl alcohol units, and in which the total of the vinyl alcohol units and any one or more of the various acetal units is at least 85% by weight of the fiber.

**(m) Olefin**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85% by weight of ethylene, propylene, or other olefin units, except amorphous (noncrystalline) polyolefins qualifying under paragraph (j)(1) of this section. Where the fiber-forming substance is a cross-linked synthetic polymer, with low but significant crystallinity, composed of at least 95% by weight of ethylene and at least one other olefin unit, and the fiber is substantially elastic and heat resistant, the term lastol may be used as a generic description of the fiber.

**(n) Vinyon**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85% by weight of vinyl chloride units.

**(o) Metallic**

A manufactured fiber composed of metal, plastic-coated metal, metal-coated plastic, or a core completely covered by metal.

**(p) Glass**

A manufactured fiber in which the fiber-forming substance is glass.

**(q) Anidex**

A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 50% by weight of one or more esters of a monohydric alcohol and acrylic acid.

**(r) Novoloid**

A manufactured fiber containing at least 85% by weight of a cross-linked novolac.

**(s) Aramid**

A manufactured fiber in which the fiber-forming substance is a long-chain synthetic polyamide in which at least 85% of the amide linkages are attached directly to two aromatic rings.

**(t) Sulfar**

A manufactured fiber in which the fiber-forming substance is a long chain synthetic polysulfide in which at least 85% of the sulfide linkages are attached directly to two (2) aromatic rings.

**(u) PBI**

A manufactured fiber in which the fiber-forming substance is a long chain aromatic polymer having reoccurring imidazole groups as an integral part of the polymer chain.

**(v) Elastoeester**

A manufactured fiber in which the fiber-forming substance is a long-chain synthetic polymer composed of at least 50% by weight of aliphatic polyether and at least 35% by weight of polyester, as defined in 16 CFR 303.7(c).

**(w) Melamine**

A manufactured fiber in which the fiber-forming substance is a synthetic polymer composed of at least 50% by weight of a cross-linked melamine polymer.

**(x) Fluoropolymer**

A manufactured fiber containing at least 95% of a long-chain polymer synthesized from aliphatic fluorocarbonmonomers.

**(y) PLA**

A manufactured fiber in which the fiber-forming substance is composed of at least 85% by weight of lactic acid ester units derived from naturally occurring sugars.

## RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB, and/or A2LA. Please select one of the following statements to ensure your data is handled appropriately.

- This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section below must be completed.)
- This participant's data is **not** intended for submission to ASCLD/LAB, ANAB, and/or A2LA.

Have the laboratory's designated individual complete the following steps **only if your laboratory is accredited in this testing/calibration discipline** by one or more of the following Accreditation Bodies.

### **Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory.**

ANAB Certificate No.   
(Include ASCLD/LAB Certificate here)

A2LA Certificate No.

### **Step 2: Complete the Laboratory Identifying Information in its entirety.**

Authorized Contact Person and Title

Laboratory Name

Location (City/State)