



Fibers Analysis Test No. 20-5439

Summary Report

Each sample set consisted of two known fabric samples and one set of questioned fibers. Participants were requested to compare the items and report their findings. Data were returned from 104 participants and are compiled into the following tables:

	<u>Page</u>
<u>Manufacturer's Information</u>	<u>2</u>
<u>Summary Comments</u>	<u>3</u>
<u>Table 1: Association Results</u>	<u>4</u>
<u>Table 2: Fiber Type Determination</u>	<u>6</u>
<u>Table 3: Examination Methods</u>	<u>12</u>
<u>Table 4: Conclusions</u>	<u>17</u>
<u>Table 5: Additional Comments</u>	<u>34</u>
<u>Appendix: Data Sheet</u>	

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

Each sample pack consisted of two sections of known fabric (Items 1 and 2) and one set of questioned fibers (Item 3). Items 1 and 3 were from the same red fabric labeled as 100% Polyester. Item 2 was from a different brand of red fabric labeled as 100% Polyester. 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.

ITEMS 1 AND 3 (ASSOCIATION): For the known fabric (Item 1) and the questioned fibers (Item 3), a 1-yard section of fabric was first cut into 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 3 questioned fibers. For each item in this set, warp and weft fibers were teased from the edges of one fabric swatch, then packaged into a glassine bag and Item 3 pre-labeled envelopes.

ITEM 2 (ELIMINATION): For the known fabric (Item 2), a 1/2-yard section of fabric was cut into swatches. A predetermined number of full swatches were then packaged into glassine bags and pre-labeled Item 2 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 association results and identified the fibers in Items 1, 2, and 3 as Manufactured, Polyester. The following procedures were used to examine the items: 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" x 2" swatch of known fabric for Items 1 and 2, and a collection of questioned fibers for Item 3. They were requested to examine the submitted items and determine if the set of questioned fibers could have originated from either of the known swatches. Items 1 and 3 originated from the same red fabric labeled as 100% Polyester, whereas Item 2 originated from a different red fabric labeled as 100% polyester. (Refer to the Manufacturer's Information for preparation details.)

Regarding the fiber association results shown in Table 1, 102 of 104 participants (98.1%) reported that the questioned fibers found on the suspect (Item 3) could have originated from the victim's sweater (Item 1) and two participants reported that the questioned fibers could not have originated from the victim's sweater. There were 100 participants (96.2%) that reported that the questioned fibers could not have originated from the victim's coat (Item 2). Of the remaining participants, two participants reported that the questioned fibers could have originated from the victim's coat and two participants reported results as inconclusive.

Regarding the fiber type determination results shown in Table 2, 101 of 104 participants (97.1%) reported the expected fiber type for Items 1 and 3. These participants reported that the items consisted of Polyester. Of the remaining participants, they all identified the fiber type as manufactured but did not further classify the fiber. For Item 2, 89 of the 104 participants (85.6%) reported the expected fiber type for Item 2. These participants reported that the item consisted of Polyester. Of the remaining participants, 14 identified the fiber type as manufactured but did not further classify the fiber and one participant reported "N/A" as the fiber type.

Across the 104 responding participants, 634 methods of analysis were reported in total. Stereo Microscopy and IR/FTIR were the most commonly reported examination methods used. Each were reported 100 and 94 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 the questioned fibers found on the suspect (Item 3) have originated from either the victim's sweater (Item 1) and/or the victim's coat (Item 2)?

TABLE 1

WebCode	Item 1	Item 2	WebCode	Item 1	Item 2
2CLBT2	Yes	No	EZ8KRL	Yes	No
2H9HDA	Yes	No	FHJ2LL	Yes	No
2VUXG9	Yes	No	FW3NNR	Yes	No
3639KY	Yes	No	FXDDMF	Yes	No
3P8TDR	Yes	No	FY84Q9	Yes	No
3W4MCB	Yes	No	G2QHU9	Yes	No
447QQV	Yes	Inconclusive	GB2KFA	Yes	No
4FCABN	Yes	No	GJDUPN	Yes	No
4UCBQB	Yes	No	GJUTZZ	Yes	No
63NP97	Yes	No	GPFKUU	Yes	No
6BGZKM	Yes	No	H7HZRK	Yes	No
6BYRU8	Yes	No	HHTFQD	Yes	No
6P2FNM	Yes	No	JAXWPA	Yes	No
6WE9YH	Yes	No	JPDTDJ	Yes	No
6XXBQR	Yes	No	JQ8GR8	Yes	Inconclusive
7AYBUF	Yes	No	K39B4N	Yes	No
7KZ74R	Yes	No	KBNHV7	Yes	No
7TUBXT	Yes	No	KXMGQG	Yes	No
87UEU7	Yes	No	L6WBCX	Yes	No
87YJYN	Yes	No	L82PAA	Yes	No
8LPJT9	Yes	No	LFHG9E	Yes	No
9NTECB	Yes	No	LRQETV	Yes	No
9UHLLQ	Yes	No	LTM8WN	Yes	No
9UKLUK	Yes	No	MA26ER	No	Yes
AK42VZ	Yes	No	MAL8ET	Yes	No
AKM4JM	Yes	No	MFDEW2	Yes	No
APYGBF	Yes	No	MTKH4G	Yes	No
ARPHG4	Yes	No	MWFQBR	Yes	No
BJ972G	Yes	No	MXBREF	Yes	No
BRMBRF	Yes	No	NHE2PW	Yes	No
C32QV8	Yes	No	NPW8NN	Yes	No
C4GQGG	Yes	No	NTBGJM	No	Yes
C6QDV4	Yes	No	P62Y4Y	Yes	No
CVZEYA	Yes	No	P9JJNT	Yes	No
DQ3PZW	Yes	No	PLUN42	Yes	No
ECY7XG	Yes	No	PX8TAX	Yes	No
EYBZ6L	Yes	No	QQKHD9	Yes	No

TABLE 1- ASSOCIATION RESULTS

WebCode	Item 1	Item 2	WebCode	Item 1	Item 2
R36WXF	Yes	No			
R768TF	Yes	No			
RG9DP4	Yes	No			
RL3KJQ	Yes	No			
TJRRT4	Yes	No			
TWUQPU	Yes	No			
UCNDX8	Yes	No			
UF6ELL	Yes	No			
UHVYQB	Yes	No			
UJQM6Z	Yes	No			
UV8GF7	Yes	No			
UWBLZM	Yes	No			
VB6QHJ	Yes	No			
VF2L8	Yes	No			
W47N9X	Yes	No			
W4TP6V	Yes	No			
WAPE8X	Yes	No			
X6BVQG	Yes	No			
X9UK2Z	Yes	No			
XB4V8W	Yes	No			
XJC74A	Yes	No			
XMYGK3	Yes	No			
XVQPRR	Yes	No			
XYRZ2T	Yes	No			
Y688UH	Yes	No			
Y7KUCW	Yes	No			
YKM9Q9	Yes	No			
YWFDPD	Yes	No			
ZBDNVW	Yes	No			
ZT9GGU	Yes	No			

Response Summary			Participants: 104
<p>Could the questioned fibers found on the suspect (Item 3) have originated from either the victim's sweater (Item 1) and/or the victim's coat (Item 2)?</p>			
	<u>Item 1</u>	<u>Item 2</u>	
Yes:	102 (98.1%)	2 (1.9%)	
No:	2 (1.9%)	100 (96.2%)	
Inc:	0 (0.0%)	2 (1.9%)	

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
2CLBT2	Polyester	Polyester	Polyester
2H9HDA	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
2VUXG9	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Polyester
3639KY	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
3P8TDR	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
3W4MCB	Polyester	Polyester	Polyester
447QQV	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
4FCABN	Polyester	Polyester	Polyester
4UCBQB	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
63NP97	Manufactured, Polyester	Manufactured, not confirmed	Manufactured, Polyester
6BGZKM	red Manufactured Polyester	red Manufactured Polyester	red Manufactured Polyester
6BYRU8	Polyester	Polyester	Polyester
6P2FNM	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
6WE9YH	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
6XXBQR	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
7AYBUF	Polyester	Polyester (micro ID only)	Polyester
7KZ74R	Manufactured, Polyester	Manufactured, Synthetic (see section 5)	Manufactured, Polyester
7TUBXT	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester

TABLE 2- FIBER TYPE DETERMINATION

WebCode	Item 1	Item 2	Item 3
87UEU7	Manufactured, Polyester	Manufactured, Not determined	Manufactured, Polyester
87YJYN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
8LPJT9	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
9NTECB	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
9UHLLQ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
9UKLUK	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
AK42VZ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
AKM4JM	Manufactured, Polyester (PET)	Manufactured, Polyester (PET)	Manufactured, Polyester (PET)
APYGBF	Manufactured; Polyester	Manufactured; Polyester, Polyester	Manufactured; Polyester
ARPHG4	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Polyester
BJ972G	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
BRMBRF	Manufactured, Polyester PET	Manufactured, Polyester PET	Manufactured, Polyester PET
C32QV8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
C4GQGG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
C6QDV4	Manufactured, Polyester	Manufactured	Manufactured, Polyester
CVZEYA	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
DQ3PZW	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
ECY7XG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
EYBZ6L	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester

TABLE 2- FIBER TYPE DETERMINATION

WebCode	Item 1	Item 2	Item 3
EZ8KRL	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
FHJ2LL	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
FW3NNR	Manufactured fibers, Polyester	Manufactured fibers, Polyester	Manufactured fibers, Polyester
FXDDMF	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
FY84Q9	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
G2QHU9	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
GB2KFA	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
GJDUPN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
GJUTZZ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
GPFKUU	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Polyester
H7HZRK	Polyester	Polyester	Polyester
HHTFQD	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
JAXWPA	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
JPDTDJ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
JQ8GR8	Manufactured Polyester	Manufactured Polyester	Manufactured Polyester
K39B4N	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
KBNHV7	Polyester	Polyester	Polyester
KXMGQG	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Polyester
L6WBCX	Polyester	Polyester	Polyester

TABLE 2- FIBER TYPE DETERMINATION

WebCode	Item 1	Item 2	Item 3
L82PAA	Manufactured	Manufactured	Manufactured
LFHG9E	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
LRQETV	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
LTM8WN	Manufactured	Manufactured	Manufactured
MA26ER	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
MAL8ET	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
MFDEW2	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
MTKH4G	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
MWFQBR	Manufactured, Polyester	Manufactured, Not further categorized	Manufactured, Polyester
MXBREF	Manufactured, Polyester (one type)	Manufactured, Polyester (two type)	Manufactured, Polyester (one type)
NHE2PW	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
NPW8NN	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
NTBGJM	Manufactured Polyester	Manufactured Polyester	Manufactured Polyester
P62Y4Y	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
P9JJNT	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
PLUN42	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
PX8TAX	Manufactured, Polyester	Manufactured, Polyester, Polyester	Manufactured, Polyester
QQKHD9	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
R36WXF	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester

TABLE 2- FIBER TYPE DETERMINATION

WebCode	Item 1	Item 2	Item 3
R768TF	Manufactured	Manufactured	Manufactured
RG9DP4	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
RL3KJQ	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
TJRR4	Polyester	NA	Polyester
TWUQPU	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
UCNDX8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
UF6ELL	Manufactured, Polyester	Manufactured, not determined	manufactured, Polyester
UHVYQB	Manufactured: Polyester	Manufactured: Polyester	Manufactured: Polyester
UJQM6Z	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
UV8GF7	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
UWBLZM	Manufactured, Polyester	Manufactured, no further characterization	Manufactured, Polyester
VB6QHJ	Manufactured; Polyester	Manufactured; not further characterized	Manufactured; Polyester
VF2L8	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
W47N9X	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
W4TP6V	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
WAPE8X	Manufactured, Polyester	Manufactured, Polyester and Manufactured, Polyester	Manufactured, Polyester
X6BVQG	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
X9UK2Z	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
XB4V8W	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester

TABLE 2- FIBER TYPE DETERMINATION

WebCode	Item 1	Item 2	Item 3
XJC74A	Manufactured Polyester	Manufactured	Manufactured Polyester
XMYGK3	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
XVQPRR	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
XYRZ2T	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
Y688UH	Manufactured, Polyester	Manufactured, not further characterized	Manufactured, Polyester
Y7KUCW	Manufactured Polyester	Manufactured Polyester	Manufactured Polyester
YKM9Q9	Manufactured, Polyester	Manufactured, Not Further Characterized	Manufactured, Polyester
YWFDPD	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester
ZBDNWW	Manufactured - Polyester	Manufactured - Polyester	Manufactured - Polyester
ZT9GGU	Manufactured, Polyester	Manufactured, Polyester	Manufactured, Polyester

Response Summary			Participants: 104
<u>Item 1</u>	<u>Item 2</u>	<u>Item 3</u>	
Polyester 101 (97.1%)	Polyester: 89 (85.6%)	Polyester: 101 (97.1%)	
Other: 3 (2.9%)	Other: 15 (14.4%)	Other: 3 (14.4%)	

Examination Methods

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
2CLBT2	✓	✓	✓	✓	✓	✓		✓			
2H9HDA	✓	✓	✓	✓		✓	✓				
2VUXG9					✓						SEM/EDS
3639KY	✓	✓	✓	✓	✓	✓	✓		✓		
3P8TDR	✓	✓	✓	✓	✓	✓	✓	✓			
3W4MCB	✓	✓	✓	✓	✓	✓	✓	✓			
447QQV	✓		✓		✓	✓		✓			
4FCABN	✓	✓	✓			✓					
4UCBQB	✓	✓	✓	✓		✓	✓				
63NP97	✓	✓	✓	✓	✓	✓	✓				
6BGZKM	✓	✓	✓	✓	✓	✓	✓	✓			
6BYRU8	✓	✓	✓		✓	✓	✓				
6P2FNM	✓	✓	✓	✓	✓	✓	✓				Raman spectroscopy
6WE9YH	✓	✓	✓	✓	✓	✓	✓	✓			
6XXBQR	✓	✓		✓	✓	✓	✓				
7AYBUF	✓	✓	✓	✓		✓	✓	✓			
7KZ74R	✓	✓	✓	✓	✓	✓	✓	✓			UVMSP
7TUBXT	✓		✓	✓	✓						PyGC/MS,SEM/EDS
87UEU7	✓	✓	✓	✓	✓	✓	✓				
87YJYN	✓	✓	✓		✓	✓					Optical cross-section, dye extraction & TLC
8LPJT9	✓	✓	✓	✓	✓	✓	✓				longitudinal cross- section
9NTECB	✓	✓	✓		✓	✓	✓				Alternate Light Source
9UHLLQ	✓		✓				✓				Microscopic Measurement

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
9UKLUK	✓	✓	✓		✓	✓					Raman spectroscopy and Pyrolysis/GC/MS
AK42VZ	✓					✓		✓			SEM/EDS, Py-GC/MS, Raman Spectrophotometer, Alternative Light Source(ALS)
AKM4JM	✓		✓	✓	✓	✓	✓	✓			Raman-Spectroscopy
APYGBF	✓	✓	✓	✓		✓	✓				
ARPHG4	✓	✓	✓	✓		✓	✓				
BJ972G	✓		✓	✓	✓		✓				
BRMBRF	✓		✓		✓	✓		✓	✓		
C32QV8	✓		✓	✓	✓	✓	✓	✓			
C4GQGG	✓					✓					
C6QDV4	✓	✓	✓	✓	✓	✓	✓				
CVZEYA	✓	✓	✓	✓	✓	✓	✓				
DQ3PZW	✓				✓	✓	✓				
ECY7XG	✓	✓	✓	✓	✓	✓	✓				
EYBZ6L	✓	✓	✓	✓	✓	✓	✓			✓	
EZ8KRL	✓	✓		✓	✓	✓	✓				
FHJ2LL	✓		✓			✓	✓				
FW3NNR	✓	✓	✓	✓	✓	✓	✓	✓			RAMAN
FXDDMF	✓	✓	✓	✓	✓	✓	✓				
FY84Q9	✓	✓	✓	✓	✓	✓	✓	✓			
G2QHU9	✓	✓	✓		✓	✓		✓			
GB2KFA	✓	✓	✓		✓	✓	✓				Fluorescence (UV light box)
GJDUPN	✓	✓	✓	✓	✓		✓				Raman
GJUTZZ	✓	✓	✓		✓	✓	✓				

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
GPFKUU	✓		✓	✓	✓			✓			pyrolysis GC-MS
H7HZRK	✓		✓		✓						
HHTFQD	✓	✓	✓	✓		✓	✓				
JAXWPA	✓	✓	✓	✓	✓	✓	✓	✓			
JPDTDJ	✓	✓	✓	✓	✓	✓	✓				
JQ8GR8	✓		✓		✓						
K39B4N	✓	✓	✓	✓	✓	✓			✓		SEM/EDX
KBNHV7	✓	✓	✓		✓	✓					
KXMGQG	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
L6WBCX	✓	✓	✓		✓	✓	✓				
L82PAA	✓	✓	✓	✓				✓			
LFHG9E	✓				✓	✓		✓			Dye composition
LRQETV	✓	✓	✓	✓	✓	✓	✓	✓			
LTM8WN		✓				✓					
MA26ER	✓	✓	✓			✓					Scanning Electron Microscope (SEM-EDS)
MAL8ET	✓	✓	✓	✓	✓	✓	✓				
MFDEW2	✓	✓	✓		✓						
MTKH4G	✓	✓	✓	✓	✓	✓	✓				
MWFQBR	✓	✓	✓	✓		✓	✓				Optical Cross Section
MXBREF	✓	✓	✓		✓	✓		✓			
NHE2PW	✓	✓	✓	✓		✓	✓	✓			Thin-layer Chromatography
NPW8NN	✓	✓	✓	✓	✓	✓	✓				thin layer chromatography
NTBGJM	✓	✓		✓	✓	✓	✓				
P62Y4Y	✓	✓	✓		✓	✓	✓				

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
P9JJNT	✓	✓	✓	✓	✓	✓	✓				
PLUN42	✓	✓	✓			✓					
PX8TAX	✓	✓	✓	✓	✓	✓	✓				
QQKHD9	✓	✓	✓	✓	✓	✓	✓	✓			Berek
R36WXF	✓		✓			✓					
R768TF	✓	✓									
RG9DP4	✓	✓	✓		✓			✓		✓	
RL3KJQ	✓	✓	✓		✓	✓					UV light sources
TJRRT4	✓	✓	✓	✓	✓	✓	✓				
TWUQPU	✓	✓	✓	✓	✓	✓					
UCNDX8	✓	✓	✓	✓	✓	✓	✓	✓	✓		Berek Compensator examination
UF6ELL	✓	✓	✓	✓	✓	✓	✓				
UHVYQB	✓	✓	✓			✓	✓				
UJQM6Z	✓	✓	✓	✓	✓	✓	✓				
UV8GF7		✓	✓		✓	✓		✓			
UWBZM	✓	✓	✓	✓	✓	✓	✓				
VB6QHJ	✓	✓	✓	✓		✓	✓	✓			
VVF2L8	✓		✓	✓	✓	✓	✓				
W47N9X	✓	✓	✓			✓					ALS/fluorescence - stereomicroscope
W4TP6V	✓	✓	✓	✓		✓					
WAPF8X	✓	✓	✓	✓	✓	✓		✓			
X6BVQG	✓	✓	✓	✓	✓	✓	✓			✓	
X9UK2Z	✓	✓	✓		✓	✓					
XB4V8W	✓		✓	✓	✓	✓	✓	✓			

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other	
XJC74A	✓	✓	✓	✓	✓	✓	✓					
XMYGK3	✓	✓	✓	✓		✓	✓	✓				
XVQPRR	✓	✓	✓	✓	✓	✓	✓	✓				
XYRZ2T	✓	✓	✓	✓	✓	✓	✓	✓				
Y688UH	✓	✓	✓	✓	✓	✓	✓	✓				
Y7KUCW		✓	✓	✓	✓	✓	✓					
YKM9Q9	✓	✓	✓	✓	✓	✓	✓	✓				
YWFDPD	✓	✓	✓	✓		✓	✓				Thin Layer Chromatography	
ZBDNWW	✓	✓	✓	✓	✓	✓	✓	✓				
ZT9GGU	✓	✓	✓		✓	✓	✓	✓			alternate light source	
Response Summary												
	Participants	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	
	104	100	85	92	68	78	94	71	4	36	6	
	Percent	96%	82%	88%	65%	75%	90%	68%	4%	35%	6%	

Conclusions

TABLE 4

WebCode	Conclusions
2CLBT2	<p>Item 1 contained a manila envelope that contained a coin envelope labeled TEST NO. 20-5439: FIBERS ANALYSIS. This contained three smaller coin envelopes labeled Item 1 (CTS 1), Item 2 (CTS 2), and Item 3 (CTS 3). CTS 1 contained a red-colored swatch of woven fabric, as did CTS 2. The warp and weft yarns from these fabrics were examined separately. CTS 3 contained 2 red-colored yarns. The fibers reportedly collected from the suspect (CTS 3) were identified as polyester fibers with polygonal cross-sections. The fibers collected from the suspect were visually and chemically similar to the fibers from the victim's sweater (CTS 1) and could have originated from this item. The warp fibers in CTS 2 were identified as polyester and were similar in color to those in CTS 3, however, the fluorescent properties exhibited by these warp fibers were different from those exhibited by the fibers in CTS 3. Additionally, the weft fibers from CTS 2 did not contain delusterant; all fibers from CTS 3 did contain delusterant. Consequently, the fibers from the suspect could not have originated from the victim's coat.</p>
2H9HDA	<p>High probability for the contact between victim's sweater (Item 1) and the suspect's clothing (Item 3). There is no probability that the fibres from the suspect's clothing (Item 3) could have originated from the victim's coat (Item 2).</p>
2VUXG9	<p>Combining results from FTIR and SEM techniques we conclude that Item 3 (fibres found on the suspect) cannot be excluded from having originated from Item 1 (victim's sweater) as the chemical composition of both fibre samples is very similar, and the average diameter of fibres from item 3 are within the range of that of fibres from item 1. Item 3 (fibres found on the suspect) can be excluded from having originated from Item 2 (victim's coat) as, although the chemical composition appears to be very similar, the average diameter of the fibres from item 3 is greater than that of the fibres from item 2 (victim's coat).</p>
3639KY	<p>Item 1 is composed of red polyester fibers. Item 2 is composed of red polyester fibers. Item 3 is composed of red polyester fibers. The threads recovered on the suspect (item 3) could have originated from the victim's sweater (item 1), or another source comprised of fibers that exhibit the same physical, chemical, microscopic, and optical properties. Red polyester fibers from item 3 exhibit the same physical, chemical, microscopic, and optical properties as fibers comprising item 1. The victim's coat (item 2) is excluded as being the source of the threads recovered on the suspect (item 3). Red polyester fibers from item 3 exhibit different physical and optical properties than red polyester fibers comprising item 2.</p>
3P8TDR	<p>Fibers from two questioned red threads (Item 3, type A and type B), fibers from known red fabric from a sweater (Item 1), and fibers from known red fabric from a coat (Item 2) were examined and compared using stereomicroscopy, polarized light microscopy, fluorescence, infrared spectroscopy, and microspectrophotometry. All tested fibers were identified as polyester fibers. Item 3 type A questioned fibers were similar in all tests performed to the known fibers of one weave direction of the sweater. Item 3 type A fibers originated either from the sweater represented by Item 1 or from another source with indistinguishable properties (Level 3 - Association). Item 3 type B questioned fibers were similar in all tests performed to the known fibers of the other weave direction of the sweater. Item 3 type B fibers originated either from the sweater represented by Item 1 or from another source with indistinguishable properties (Level 3 - Association). Because similar fabrics have been manufactured that would be indistinguishable from the submitted evidence, an individual source cannot be determined. Multiple associations of questioned and known fibers may increase the significance of the fiber evidence. Item 3 type A and type B questioned fibers differed in fluorescence and some microscopical characteristics from the known fibers of both weave directions of the coat. The questioned fibers did not originate from the coat as represented by Item 2 (Elimination).</p>
3W4MCB	<p>1. Comparative examinations of Exhibit 1 (known fibers from the victim's sweater) with Exhibit 3 (questioned fibers found on the suspect) disclosed them to be consistent in their microscopic</p>

TABLE 4

WebCode	Conclusions
	<p>characteristics, optical properties, and chemical properties. As a result of these findings, Exhibit 3 could have originated from Exhibit 1, or another source with the same characteristics. 2. Comparative examinations of Exhibit 2 (known fibers from victim's coat) with Exhibit 3 disclosed them to be inconsistent in their microscopic characteristics. As a result of these findings, Exhibit 3 could not have originated from Exhibit 2. 3. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. 4. 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. The presence of transfers by multiple different fiber types strengthens the result relative to transfers by a single fiber type.</p>
447QQV	<p>The questioned fibers found on the suspect (Item 3) could have originated from the victim's sweater (Item 1). Both items consist of polyester fibers with indistinguishable chemical and physical properties. The victim's coat (Item 2) is composed of two different types of polyester fibers. One of the fiber types of Item 2 is indistinguishable from the fibers in Item 3 (or Item 1). The second type of polyester fiber in Item 2 was not observed in Item 3. Based on the absence of both fiber types in Item 3, the association between the questioned fibers found on the suspect (Item 3) and the victim's coat (Item 2) is inconclusive.</p>
4FCABN	<p>It was determined utilizing stereomicroscopic, polarized light microscopic, comparison microscopic and Fourier Transform Infrared Spectroscopy that the questioned red polyester fibers from item 3 and the known red polyester fibers comprising item 1 exhibited consistent chemical and optical properties. Based on those characteristics, item 1 cannot be eliminated as being the source of the questioned fibers from item 3. It was determined utilizing stereomicroscopic, polarized light microscopic, comparison microscopic and Fourier Transform Infrared Spectroscopy that the questioned red polyester fibers from item 3 and the known red polyester fibers comprising item 2 exhibited dissimilar chemical and optical properties. Based on those characteristics, item 2 can be eliminated as being the source of the questioned fibers from item 3.</p>
4UCBQB	<p>1. Exhibits 1 (known section of fabric from victim's sweater), 2 (known section of fabric from victim's coat), and 3 (questioned fibers found on the suspect) are all composed of polyester fibers. 2. Comparative examination of the polyester fibers from Exhibit 1 with the polyester fibers from Exhibit 3 disclosed them to be consistent in their microscopic characteristics, optical properties, and chemical properties. As a result of these findings, Exhibit 3 (questioned fibers found on the suspect) could have originated from Exhibit 1 (known section of fabric from victim's sweater) or another source of fibers with the same characteristics. 3. Comparative examination of the polyester fibers from Exhibit 2 with the polyester fibers from Exhibit 3 disclosed them to be inconsistent in their microscopic characteristics. As a result of these findings, Exhibit 3 (questioned fibers found on the suspect) could not have originated from Exhibit 2 (known section of fabric from victim's coat). 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.</p>
63NP97	<p>The color, chemical, and microscopic characteristics of the red fibers of Item #3 were consistent with the color, chemical, and microscopic characteristics of the known red fabric of Item #1. This is a Type III Association. Differences were found in the microscopic characteristics of the red fibers of Item #3 and the submitted known red fabric from Item #2. This is an Elimination.</p>
6BGZKM	<p>The two threads (questioned fibers) found on the suspect (item 3) are not differentiated from known section of the victim's sweater (item 1). Fibers from item 3 can come from the victim's sweater (item 1) or from another textile material with the same characteristics. The two threads (questioned fibers) found on the suspect (item 3) are different from fibers of the victim's coat (item 2) : they don't come from the victim's coat (item 2).</p>
6BYRU8	<p>The fabric from the sweater (Item 1) was found to be composed of red polyester fibers. The red polyester fibers from the sweater (Item 1) were found to be similar in color, physical characteristics, microscopic</p>

TABLE 4

WebCode	Conclusions
	<p>characteristics and chemistry in comparison to the questioned red polyester fibers recovered from the suspect (Item 3.) The red polyester fibers recovered from the suspect (Item 3) could have originated from the red fabric from the sweater (Item 1), or from any other source of red polyester fibers with similar color, physical characteristics, microscopic characteristics and chemistry. The fabric from the coat (Item 2) was found to be composed of red polyester fibers. The red polyester fibers from the coat (Item 2) are different in color, physical characteristics, and microscopic characteristics in comparison to the red polyester fibers recovered from the suspect (Item 3). The red polyester fibers from Item 3 could not have originated from the red fabric from the coat (Item 2.) Samples collected and analyzed during the examination and analysis of the items in this case (ex. slides) have been returned to and retained with the original item. Items 1, 2, and 3 were examined visually and using stereomicroscopy, polarized light microscopy, comparison polarized light microscopy, Fourier transformed infrared spectroscopy and microspectrophotometry.</p>
6P2FNM	<p>1. The questioned fibers found on the suspect (Item 3.) could have originated from the victim's sweater (Item 1.). 2. The questioned fibers found on the suspect (Item 3.) couldn't have originated from the victim's coat (Item 2.).</p>
6WE9YH	<p>Item 1 is composed of red polyester fibers. One red fiber from item 1 (Fiber 1A) was compared to two fibers from item 3 (Fibers 3A and 3B). Fibers 3A and 3B, have similar microscopic, optical, cross-sectional characteristics, and a similar infrared spectral pattern to Fiber 1A; therefore, the fibers found on the suspect could have come from the victim's sweater or any other textile with the same class characteristics. Item 2 is composed of red polyester fibers. Two red fibers from item 2 (Fibers 2A and 2B) were compared to Fibers 3A and 3B. Fibers 2A and 2B have dissimilar microscopic characteristics to Fibers 3A and 3B; therefore, the fibers found on the suspect could not have come from the victim's coat.</p>
6XXBQR	<p>Fibres from Items 1, 2. and 3 were each red polyester fibres. In my opinion, to the extent of the analyses conducted, there is a level 3 association between Item 1 and Item 3. Item 2 is excluded as being a source for Item 3. Levels of association range from 1 (highest) to 5 (lowest), Inconclusive, and Eliminated.</p>
7AYBUF	<p>The questioned fibers found on the suspect (Exhibit 3) consist of two red yarns, each composed of multiple fibers. These yarns were found to correspond in color and type (polyester), microscopic characteristics, cross-section (polygonal), fluorescence, chemical composition (FTIR), and visible spectra (MSP) to the known fibers/yarns from the victim's sweater (Exhibit 1). Additionally, the yarns from Exhibit 3 have "crimping" that is consistent with the Exhibit 1 fabric construction (satin weave). Accordingly, the fibers from Exhibit 3 could have originated from the victim's sweater or from another source having fibers with the same characteristics. It should be noted that the analytical techniques used allow for a high degree of discrimination between different fibers, however, other textiles containing fibers made to the same specifications and woven in a similar manner would be indistinguishable from these fibers. The fibers in Exhibit 3 were also compared to the known fabric from the victim's coat (Exhibit 2) and found to be different in microscopic characteristics and visible spectra (MSP). Accordingly the questioned fibers found on the suspect did not originate from the victim's coat.</p>
7KZ74R	<p>The fibres making up the threads (Item 3) which were found on the Suspect's clothing were indistinguishable from the constituent red polyester fibres of the threads making up the Victim's sweater (Item 1) and therefore they could have originated from this item. In my opinion this finding provides X support for the assertion that the threads (Item 3) originated from a damaged area of the Victim's sweater (Item 1) (*). [See additional comments].</p>
7TUBXT	<p>According to above mentioned analyses, item 1 was found to have similar Fluorescence with item 3, but item 2 has different Fluorescence from item 3, Therefore, item 3 may have originated from item 1.</p>
87UEU7	<p>Red polyester fibers recovered from Item 3 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from</p>

TABLE 4

WebCode	Conclusions
	<p>the same source as Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. These fibers are microscopically dissimilar to fibers comprising Item 2. Accordingly, these fibers are not consistent with originating from the same source as Item 2. No other fibers were recovered from Item 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>
87YJYN	<p>Comparison of Items 3 & 1: The samples are consistent with each other in color (visual and microscopic), size, cross-sectional shape, optical properties, and chemical composition. In addition, the fibers are consistent with each other in dye characteristics. No discriminating differences were observed between these questioned fibers and fibers composing the known sample. Therefore, these questioned fibers from the suspect originated from the victim's sweater, as represented by Item 1, or from another source exhibiting all of the same analyzed characteristics. Comparison of Items 3 & 2: The samples are different than each other in color (microscopic), size, and/or cross-sectional shape. Therefore, these questioned fibers from the suspect did not originate from the victim's coat, as represented by Item 2.</p>
8LPJT9	<p>Item 3, the questioned fibers collected from the suspect, was examined and revealed to contain two (2) red yarns. The yarns were macroscopically and microscopically examined and compared with the yarns comprising Item 1, the known section of the victim's sweater, and Item 2, the known section of the victim's coat. These comparisons revealed that the two (2) red yarns are consistent in color, construction and appearance with the red yarns comprising Item 1, the known section of the victim's sweater. At least one hundred and thirteen (113) fibers from the two (2) red yarns were further examined and compared with the fibers comprising Item 1, the known section of the victim's sweater, and Item 2, the known section of the victim's coat. These examinations revealed that the one hundred and thirteen (113) red fibers are consistent in color, appearance, fiber type and microscopic characteristics with the red polyester fibers comprising Item 1. Further instrumental examinations and comparisons of thirty (30) of the red polyester fibers revealed that they are also consistent with the fibers comprising the known section of the victim's sweater. Therefore, at least thirty (30) of the red polyester fibers collected from the yarns in Item 3 could have originated from that source. These comparisons also revealed that the two (2) red yarns collected from Item 3, are different in construction and microscopic characteristics from the yarns/fibers comprising Item 2, the known section of the victim's coat. Therefore the two (2) red yarns could not have originated from that source. Because textile materials are mass produced, it is not possible to state that a fiber originated from a particular source to the exclusion of all other textile materials composed of fibers which exhibit the same physical, optical, and/or chemical properties.</p>
9NTECB	<p>Items 1 and 2 consist of red woven fabric swatches composed of polyester fibers. Item 3 consists of two red threads each composed of polyester fibers. The fibers from Item 1 (Known from Victim's Sweater) and Item 3 (Questioned from Suspect) were found to be similar in macroscopic appearance, microscopic characteristics (Polarized Light Microscope), color (MicroSpectroPhotometer), and chemical composition (Fourier Transform InfraRed Spectrometer). The victim's sweater or another item composed of the same fabric could be the source of the threads found on the suspect. The fibers from Item 2 (Known from Victim's Coat) and Item 3 (Q - Suspect) were found to be dissimilar in macroscopic appearance, microscopic characteristics (PLM), color (MSP), and/or chemical composition (FTIR). The sampled portion of the victim's coat is not the source of the fibers found on the suspect.</p>
9UHLLQ	<p>Items 1-3 all match in fiber type. However Item 1 Direction 2 and Item 3 fiber 1 are much closer in crimp frequency. Item 2 is not close to Item 3 in crimp frequency. As a result, the questioned fibers found on the suspect (item 3) could have originated from item 1 (known section of the victim's sweater). The questioned fibers found on the suspect (item 3) could not have originated from item 2 (known section of the victim's coat).</p>
9UKLUK	<p>The fibers of Item-1 and Item-3, have the same characteristics. Thus the fibres found on the suspect (item-3) come from the victim's sweater (item1) or from another textile item of indistinguishable fibers. The fibers found on the suspect (Item-3) were inconsistent with item-2 and could not have the same source.</p>

TABLE 4

WebCode	Conclusions
AK42VZ	According to the results of microscopic examination, Cross-Section, FT-IR, Py-GC/MS, SEM/EDS, Raman Spectrophotometer and Alternative Light Source(ALS), the composition of item 3 is similar to item 1, which is different from item 2.
AKM4JM	We found several differences between the fibres of Item 2 and Item 3, so we can exclude that the fibres found on the suspect (Item 3) could have originated from the victim's coat (Item 2). With all comparisons we made, we didn't find differences between the fibres of Item 1 and Item 3, so we can't differentiate between the fibres of Item 1 and Item 3. Therefore, it's possible that the fibres found on the suspect (Item 3) could have originated from the victim's sweater (Item 1).
APYGBF	The fibers in item 1 can not be eliminated as a source of the fibers in item 3. The fibers in item 2 are not similar to the fibers in item 3. Item 2 is eliminated as a source of the fibers in item 3.
ARPHG4	1. Comparative examinations of Exhibit 001 (Fibers that compose the known section of the victim's sweater) with Exhibit 003 (Questioned fibers found on the suspect) disclosed the fibers to be consistent in their microscopic characteristics, optical properties, and chemical properties. As a result of these findings, Exhibit 003 could have originated from Exhibit 001 or another source with the same characteristics. 2. Comparative examinations of Exhibit 002 (Fibers that compose the known section of the victim's coat) with Exhibit 003 (Questioned fibers found on the suspect) disclosed them to be inconsistent in their microscopic characteristics. As a result of these findings, Exhibit 003 could not have originated from Exhibit 002. 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. The presence of transfers by multiple different fiber types strengthens the result relative to transfers by a single fiber type. 4. Examination of Exhibits 001, 002, and 003 disclosed the presence of polyester fibers.
BJ972G	Questioned fibers found on the suspect (Item 3) could have come from victim's sweater (Item 1). Questioned fibers found on the suspect (Item 3) couldn't have come from the victim's coat (Item 2).
BRMBRF	Item 3 is consistent with Item 1. Item 3 is not consistent with Item 2.
C32QV8	Conclusions: Exhibit 1: Known section of the victim's sweater. Exhibit 2: Known section of the victim's coat. Exhibit 3: Bundle of fibers found on the suspect. There were no significant differences found in the microscopic, color, and chemical analysis of Exhibit 1 when compared with Exhibit 3. The questioned red fibers found on the suspect could have originated from the known section of the victim's sweater or another fabric material with the same microscopic, color and chemical composition. There were significant differences found in the microscopic characteristics and minor differences found in the color characteristics of Exhibit 2 when it was compared with Exhibit 3; therefore, the questioned bundle of red fibers found on the suspect can be excluded as originating from the known section of the victim's coat.
C4GQGG	On examination, I found: i.The red fibers Item 3 to be similar to the fibers in the red fabric Item 1. ii.The red fibers Item 3 to be dissimilar to the fibers in the red fabric Item 2. Therefore, I am of the opinion that: i.The red fibers Item 3 and the red fabric Item 1 could have come from the same origin. ii.The red fibers Item 3 and the red fabric Item 2 did not come from the same origin.
C6QDV4	The pink and light pink polyester fibers from Item 3 exhibit the same microscopic characteristics and optical properties as the pink and light pink polyester fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the Item 1 sweater or another source comprised of fibers with the same microscopic characteristics and optical properties. The pink and light pink polyester fibers from Item 3 are microscopically dissimilar to the fibers comprising Item 2. Accordingly, based on the Item 2 known sample, the Item 3 fibers are not consistent with originating from the Item 2 coat. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy,

TABLE 4

WebCode	Conclusions
	and fluorescence microscopy and instrumentally using microspectrophotometry and infrared spectroscopy, where appropriate.
CVZEYA	The red polyester fibers found on suspect (item 3) are consistent with the red polyester fibers of victim's sweater (item 1). Item 3 could be originated from item 1. The red polyester fibers found on suspect (item 3) are not consistent with the red polyester fibers of victim's coat (item 2). Item 3 could not be originated from item 2.
DQ3PZW	The questioned fibers from the suspect's clothing (Item 3) were microscopically examined and compared to Item 1 (the known section of the victim's sweater) and Item 2 (the known section of the victim's coat), respectively. The findings were as follows: (i) The comparative examinations on the questioned fibers (Item 3) with known section of Item 1 revealed that the questioned fibers from the suspect's clothing (Item 3) were found to be consistent with Item 1 known sample in microscopic structures, diameter, colour (MSP), generic fiber type (Polyester) and chemical composition (FTIR). Based on the above findings, in my professional opinion, the Item 3 questioned fibers could have originated from the victim's sweater (Item 1). (ii) The comparative examinations on the questioned fibres (Items 3) with known section of Item 2 revealed that the questioned fibres from the suspect's clothing (Item 3) were found to be different with Item 2 known sample in microscopic structures, diameter and colour (MSP), despite having similarities in generic fibre type (Polyester) and chemical composition (FTIR). Based on the above findings, in my professional opinion, the Items 3 questioned fibers could not have originated from the victim's coat (Item 2).
ECY7XG	Based on yarn construction, and microscopic characteristics, fluorescence, instrumental colour analysis and chemical composition of the fibres constituting the yarns, the yarns in Item 3 could have originated from Item 1 or other sources containing yarns with similar characteristics. Based on yarn construction, and microscopic characteristics and/or fluorescence of the fibres constituting the yarns, the yarns in Item 3 were found to be different from the yarns sampled from Item 2. Based on microscopic characteristics and chemical composition, Item 1, Item 2 and Item 3 were found to consist of polyester fibres.
EYBZ6L	Polyester fibers from the victim's sweater (item 1) exhibit the same physical, chemical, microscopic and optical properties as the polyester fibers found on the suspect (item 3); therefore, the fibers found on the suspect originated from the sweater or another textile source comprised of fibers that exhibit the same physical, chemical, microscopic and optical properties. Polyester fibers from the victim's coat (item 2) and polyester fibers found on the suspect (item 3) are dissimilar in physical, optical and microscopic properties; therefore these items do not share the same source.
EZ8KRL	The three fibers have the same chemical composition, they are polyester fibers, but item 2 is different from item 1 and 3 in terms of their physical characteristics and color. Item 1 and 3 are the same. Item 2 is different
FHJ2LL	Item 3 could have originated from Item 1 because both items are consistent in all measured and observed physical properties, chemical composition and microscopic characteristics. Item 3 could not have originated from Item 2 because both items are consistent in their color and chemical composition but different from microscopic characteristics.
FW3NNR	The questioned fibers found on the suspect (Item 3) were consistent (indistinguishable) with the Known section of the victim's sweater (Item 1) in macroscopic, microscopic, color (MSP), infrared (FTIR) and Raman characteristics. Therefore the questioned fibers found on the suspect (Item 3) could have come from the victim's sweater (Item 1) or another source of fibers with similar macroscopic, microscopic, color (MSP), spectral (FTIR and Raman) characteristics. The questioned fibers found on the suspect (Item 3) are dissimilar to the Known section of the victim's coat (Item 2) (distinguishable). Therefore the questioned fibers found on the suspect (Item 3) did not originate from the victim's coat (Item 2).
FXDDMF	Based on microscopic characteristics and chemical composition, "Item 1" to "Item 3" were found to consist of polyester fibres. Based on yarn construction and microscopic characteristics, fluorescence,

TABLE 4

WebCode	Conclusions
	instrumental colour analysis and chemical composition of the fibres, "Item 3" 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 sampled from "Item 2".
FY84Q9	The red polyester fibers recovered from the suspect (Item 3) are similar in size, shape, color, fiber type, and optical characteristics to the known red polyester fibers from the victim's sweater (Item 1). It is my opinion that these fibers could have originated from the victim's sweater or any other source with similar fibers. The red polyester fibers from the suspect (Item 3) are dissimilar in color and/or optical characteristics to the known red polyester fibers from the victim's coat (Item 2). It is my opinion that these fibers did not originate from the victim's coat.
G2QHU9	Item 1: Red polyester fiber standards were analyzed for comparison to Item 3. Item 2: Red polyester fiber standards were analyzed for comparison to Item 3. Item 3: In the sample analyzed, red polyester fibers were found. The unknown fibers (Item 3 "found on the suspect") either originated from the fiber standard (Item 1 from "the victim's sweater") or another source of fibers possessing the same distinct physical, chemical, and optical characteristics. The unknown fibers (Item 3 "found on the suspect") and the fiber standard (Item 2 from "t[h]e victim's coat") are not the same in physical characteristics. The unknown fibers (Item 3 "found on the suspect") could not have originated from the standard (Item 2 "from t[h]e victim's coat").
GB2KFA	The questioned red polyester fibers in item 3 were visually, microscopically and instrumentally consistent with the known red polyester fibers in item 1. This indicates that the red polyester fibers in item 3 could have originated from the red sweater fabric in item 1. The questioned red polyester fibers in item 3 were visually, microscopically and instrumentally (microspectrophotometry) different from the known red polyester fibers in item 2. This indicates that the red polyester fibers in item 3 do not share a common origin with the red coat fabric in item 2.
GJDUPN	RESULTS: The sweater and coat (items 1 and 2, respectively) were used for comparison purposes. Item 3 consisted of two yarns. The yarns were indistinguishable in yarn construction and the red polyester fibres were indistinguishable in microscopic appearance and composition from the yarns and fibres comprising the complainant's sweater (item 1). From the yarns, ten fibres were selected for Microspectrophotometry and were found to be indistinguishable in colour from the fibres comprising the complainant's sweater (item 1). From the yarns, eight fibres were selected for Raman analysis and were found to be indistinguishable in measurable dye component composition from the fibres comprising the complainant's sweater (item 1). CONCLUSIONS: The complainant's sweater (item 1) could not be eliminated as a possible source of the yarns collected from the suspect (item 3). As such, the yarns collected from the suspect (item 3) either came from the sweater (item 1) or from another source of yarns that are indistinguishable with respect to the properties listed in the results. The complainant's coat (item 2) was eliminated as a possible source of the yarns collected from the suspect (item 3). Therefore, the yarns collected from the suspect (item 3) did not come from the coat (item 2).
GJUTZZ	Exhibits 1-3 each consist of two populations of polyester fibers. The samples from Exhibit 3 are similar in all examined respects to the samples from Exhibit 1. Therefore, the fibers from the suspect's clothing could have originated from the victim's sweater or another garment of similar composition. The samples from Exhibit 3 are dissimilar to the sample from Exhibit 2 based on color and fiber morphology. Therefore, the fibers from the suspect's clothing could not have originated from the victim's coat as manufactured.
GPFKUU	The questioned fiber (item 3) have been originated from the victim's sweater (item 1), because of their similarity in physical properties and chemical composition. The questioned fiber (item 3) have not been originated from the victim's coat (item 2), because of their differences in physical properties and chemical composition.

TABLE 4

WebCode	Conclusions
H7HZRK	Questioned fibers found from the suspect (item 3) could have originated from the victim's sweater (item 1).
HHTFQD	The victim's sweater (item 1) and coat (item 2) were sampled. Microscopic and spectrometric analysis of these samples indicated that the both items contain blends of different types of polyester fibres. The sampled fibres were compared with fibres found on the suspect (item 3). Fibres found on the suspect could clearly be discriminated from fibres in the victim's coat, but matched both fibre types in the victim's sweater in all investigated characteristics. The following hypotheses are considered to evaluated these results: H1: The item (coat, sweater) is the source of the fibres found on the suspect H2: An arbitrary other textile is the source of the fibres found on the suspect It is concluded that: The result strongly support the hypothesis that the victim's sweater (item 1) is the source of the fibres found on the suspect. The victim's coat (item 2) is not the source of the fibres found on the suspect.
JAXWPA	The trace fibres from the suspect's clothing (item 3) could have originated from the victim's sweater (item 1).
JPDTDJ	The results strongly support the proposition that the questioned fibers found on the suspect (Item 3) originated from the victim's sweater (Item 1). The questioned fibers found on the suspect (Item 3) could not have originated from the victim's coat (Item 2).
JQ8GR8	The fibers isolated on the suspect may share a common origin with those of the victims sweater. The fibers are a red dyed polyester comprised of multilobal fibers with a delustering agent. The fibers have similar crosssections and diameters. It is inconclusive if the fibers isolated on the suspect originated from the victims coat. While both types of fibers that make up the vicitims coat are polyester and red, the fibers from the coat contain both delustered and nondelustered fibers. the delustered polyester fibers from the coat are also multilobal. Only delustered multilobal polyester fibers were isolated on the suspect sample. no nondelustered polyester fibers were isolated from the suspect.
K39B4N	The physical appearance and chemical composition of the fibers in Item 3 are consistent with the fibers in Item 1 but inconsistent with the fibers in Item 2.
KBNHV7	Physical, microscopic and instrumental comparison of the red polyester fibers from Item 3 with the red polyester fibers in the construction of Item 1 revealed them to be consistent with respect to optical properties, color, and fiber type. Therefore, the fibers found on the suspect could have come from the victim's sweater or another source consistent with these properties. Physical, microscopic, and instrumental comparison of the red polyester fibers from Item 3 with the red polyester fibers in the construction of Item 2 revealed them to be inconsistent with respect to color and optical properties. Therefore, the fibers found on the suspect could not have come from the victim's coat.
KXMGQG	The red fibers, Item 3, recovered on the suspect could have come from the red woven fabric swatch, Item 1, sampled from the victim's sweater, or any other textile with the same physical and chemical characteristics. The red fibers, Item 3, recovered on the suspect did not come from the red woven fabric swatch, Item 2, sampled from the victim's coat.
L6WBCX	The questioned polyester fibers found on the suspect in Item 3 either originated from the known section of the victim's sweater in Item 1 or from another source with the same optical, physical and chemical properties (Level IV association). This level of association was reached due to a limited analysis and comparison; fluorescence and manual cross-sectioning was not performed. The questioned polyester fibers found on the suspect in Item 3 could not have originated from the known section of the victim's coat in Item 2 (Elimination).
L82PAA	With our methods, we could not differentiate the sample of fibres in item 3 from the sample of fibres in item 1. The examined fibres found on the suspect (item 3) could have originated from the victims Sweater (item 1). We could differentiate the sample of fibres from the fibres found on the suspect (item 3) from the fibres of item 2.

TABLE 4

WebCode	Conclusions
LFHG9E	<p>The section of the victim's sweater (item 1) consisted of red woven fabric with a non-plain weave. The warp and weft fibres from the section of the victim's sweater (item 1) were both found to consist of red, delustered polyester. The section of the victim's coat (item 2) consisted of red woven fabric with a non-plain weave. The warp fibres from the section of the victim's coat (item 2) were found to consist of red, delustered polyester. The weft fibres from the section of the victim's coat (item 2) were found to consist of red, non-delustered polyester. The fibres found on the suspect (item 3) consisted of two strands of red fibres with the appearance of having originated from a woven fabric. Fibres from both strands were found to consist of red, delustered polyester. In relation to chemical composition, longitudinal appearance, cross sectional appearance and dye composition the fibres from each of the strands found on the suspect (item 3) were found to be indistinguishable to the fibres from the section of the victim's sweater (item 1). Therefore these two fibre samples may share a common origin.</p>
LRQETV	<p>The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, fluorescence, FTIR, and MSP. Examination of Lab Item # 1 (Known section of the victim's sweater) revealed the presence of one (1) swatch of red fabric woven with yarns comprised of red polyester fibers. Examination of Lab Item # 2 (Known section of the victim's coat) revealed the presence of one (1) swatch of shiny red fabric woven with yarns comprised of red polyester fibers. Examination of Lab Item # 3 (Questioned fibers found on the suspect) revealed the presence of two (2) yarns comprised of red polyester fibers found to be consistent in microscopic properties, color, composition, and construction to the swatch of fabric woven with yarns comprised of red polyester fibers in Lab Item # 1. Therefore, the yarns comprised of red polyester fibers in Lab Item # 3 could have originated from the same source as the swatch of fabric woven with yarns comprised of red polyester fibers in Lab Item # 1. Furthermore, the two (2) yarns in Lab Item # 3 were found to be microscopically not consistent with the yarns comprised of red polyester fibers from the swatch of fabric in Lab Item # 2. Therefore, the yarns comprised of red polyester fibers in Lab Item # 3 could not have originated from the same source as the swatch of fabric woven with yarns comprised of red polyester fibers in Lab Item # 2.</p>
LTM8WN	<p>Item 3 comes from item 1 which is from the victim's sweater, but not from the victim's coat. The microscopic comparison shows that: Item 1A, 1B : are red delustrant polyester, Item 2A is red delustrant polyester, Item 2B is red non delustrant polyester, Item 3A, 3B are red delustrant polyester, Item 3 is matching item 1 in white, UV and Blue lights.</p>
MA26ER	<p>The submitted items were examined and analyzed by Stereo, PLM, Comparison, FT-IR Spectrometer and Scanning Electron Microscope (SEM-EDS). The fibers found in item 1 composed of Manufactured, Polyester. The fibers found in item 2 composed of Manufactured, Polyester. The fibers found in item 3 composed of Manufactured, Polyester. The Polyester founded in Item 3 exhibit the same microscopic appearance (color and size) and characteristic as item 2. The Polyester founded in Item 3 exhibit the difference size by microscopic appearance as item 1. Therefore, these fibers from the questioned fibers found on the suspect could have originated from the known section of the victim's coat.</p>
MAL8ET	<p>Examination of Item 3, questioned material represented as having been collected from the suspect's clothing, revealed the presence of two (2) orange-red yarns. The yarns were compared macroscopically and microscopically to the yarns comprising the piece of fabric from the victim's sweater (Item 1). These examinations revealed that the orange-red yarns from the suspect's clothing were consistent in color, appearance and construction characteristics with the yarns comprising the piece of fabric from the victim's sweater (Item 1). Macroscopic and microscopic examinations and comparisons of approximately one hundred and fifteen (115) orange-reds fibers comprising the yarns from the suspect's clothing (Item 3) revealed that they were consistent in appearance, generic fiber type and microscopic characteristics with the orange-red polyester fibers comprising the piece of fabric from the victim's sweater (Item 1) and therefore could have originated from that source. Further instrumental examination of thirty (30) of the orange-red polyester fibers from the suspect's clothing (Item 3) revealed that they were consistent with the orange-red polyester fibers comprising the piece of fabric from the victim's sweater (Item 1) and therefore could have originated from that source. The orange-red yarns from the</p>

TABLE 4

WebCode	Conclusions
	<p>suspect's clothing were also compared macroscopically and microscopically to the yarns comprising the piece of fabric from the victim's coat (Item 3). These examinations revealed that the orange-red yarns from the suspect's clothing were consistent in color appearance and some construction characteristics with the yarns comprising the piece of fabric from the victim's sweater (Item 2). Macroscopic and microscopic examinations and comparisons of approximately one hundred and fifteen (115) orange-reds fibers comprising the yarns from the suspect's clothing (Item 3) revealed that they were different from the orange-red fibers comprising the piece of fabric from the victim's coat (Item 2) and therefore could not have originated from that source.</p>
MFDEW2	<p>The questioned red polyester fibers from the suspect (Item 3) were found to be consistent with the known red polyester fibers from the victim's sweater (Item 1) with respect to color, morphology, optical properties, fiber count and fiber type. Based upon these observations, it is the opinion of this analyst that the questioned red fibers (Item 3) and the known sweater fibers (Item 1) are of the same type and could have come from the same source. This analyst recognizes that another source of fibers with properties consistent with the above fibers exists. The questioned fibers from the suspect (Item 3) were found to be inconsistent with the known red polyester fibers from the victim's coat (Item 2) with respect to morphology and fiber count.</p>
MTKH4G	<p>Based on the examinations conducted, I am of the opinion that: i) the results strongly support the proposition that the pink polyester fibres found on the suspect came from the victim's sweater as opposed to another random source. ii) the pink polyester fibres found on the suspect did not come from the victim's coat.</p>
MWFQBR	<p>Red polyester fibers recovered from Item 3 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. These fibers are microscopically dissimilar to the fibers comprising Item 2. Accordingly, these fibers are not consistent with originating from the same source as Item 2. No other fibers were recovered from Item 3. No hairs were recovered from Item 3. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, and instrumentally using microspectrophotometry, and Fourier transform infrared spectroscopy, where appropriate.</p>
MXBREF	<p>The questioned fibers found on the suspect (Item 3) are red polyester. The known section of the victim's sweater (Item 1) is constructed with a single type of red polyester. The known section of the victim's coat (Item 2) is constructed with two types of red and red-orange polyester fibers. The questioned fibers found on the suspect (Item 3) are dissimilar in color, diameter, cross-section, and/or optical properties to the known section of the victim's coat (Item 2). The known section of the victim's coat (Item 2) is eliminated as a source of the questioned fibers found on the suspect (Item 3). The questioned fibers found on the suspect (Item 3) are similar in color, diameter, cross-section, optical properties, and chemical composition to the known section of the victim's sweater (Item 1). The questioned fibers found on the suspect (Item 3) could have originated from the known section of the victim's sweater (Item 1) or another source with similar properties.</p>
NHE2PW	<p>Two (2) red polyester threads, each with a distinct crimp pattern, were found in Item 3. One (1) of the red polyester threads in Item 3 was indistinguishable from the red, polyester fill threads in the satin-woven fabric of Item 1 in color, generic fiber type, microscopic characteristics, and crimp pattern (Type 3 Association).* The other red polyester thread in Item 3 was indistinguishable from the red, polyester warp threads in the satin-woven fabric of Item 1 in color, generic fiber type, microscopic characteristics, and crimp pattern (Type 3 Association).* The two (2) red polyester threads found in Item 3 were different from the fibers in Item 2 (Elimination).** This means the red polyester threads found on the suspect could have come from the victim's sweater. ***This means the red polyester threads found on the suspect did not come from the victim's coat.</p>

TABLE 4

WebCode	Conclusions
NPW8NN	<p>Item 1 contained a woven fabric consisting of red polyester fibers with two (2) distinct crimp patterns. Item 2 contained a woven fabric consisting of red polyester fibers with two (2) distinct crimp patterns. Item 3 contained red polyester threads with two (2) distinct crimp patterns. The two (2) types of red polyester threads found in Item 3 were indistinguishable from the two (2) types of red polyester fibers in Item 1 in appearance, color, fiber type, and microscopic characteristics (Type 3 Association).[*] The two (2) types of red polyester fibers found in Item 3 were different from the two (2) types of red polyester fibers in Item 2 (Elimination).^{**} [*]This means that the two types of red fibers found on the suspect could have originated from the victim's sweater. ^{**}This means that the two types of red fibers found on the suspect did not originate from the victim's coat. 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>
NTBGJM	<p>In my opinion the findings provide very strong support for a view that the fibres in item 3 originated from the victim's coat (item 2) rather than that the fibres did not originate from the coat and match by chance. The fibres in item 3 could not have originated from the victim's jumper (item 1) .</p>
P62Y4Y	<p>Item 3 is similar in all examined characteristics to the threads of the fabric in item 1. Item 3 could have originated from the victim's sweater as represented by item 1 or another source with these same characteristics. Item 3 exhibits significant differences from the threads of the fabric in item 2. Item 3 did not originate from the victim's coat as represented by item 2.</p>
P9JJNT	<p>Item 1: The Item 1 section from the victim's sweater consists of red polyester fibers. Item 2: The Item 2 section from the victim's coat consists of red polyester fibers. Item 3: The Item 3 questioned fibers consists of two red polyester yarns. The Item 3 fibers from the yarns were compared to the Item 1 and Item 2 fibers. The Item 3 fibers are similar to the Item 1 fibers in color, chemical composition, and microscopic characteristics. This is a Type III association as described at the end of this report. The Item 3 fibers are different in color and microscopic characteristics from the Item 2 fibers. This is an elimination as described at the end of this report.</p>
PLUN42	<p>The red colored fibers recovered from the suspect (Item #3) are similar in color, diameter, crimp pattern, and optical and chemical properties to the known fibers from the victim's sweater (Item #1). The fibers from the victim's sweater (Item #1) or another material with similar fiber characteristics could have been the source of the fibers found on the suspect (Item #3). The red colored fibers recovered from the suspect (Item #3) are dissimilar in crimp pattern and some optical properties to the known fibers from the victim's coat (Item #2). The fibers from the victim's coat (Item #2) were excluded as</p>

TABLE 4

WebCode	Conclusions
	being a possible source to the fibers found on the suspect (Item #3).
PX8TAX	The above findings have been evaluated as follows: The fibres found on the suspect originated from the victims sweater and/or the coat or The fibres found on the suspect originated from an unknown source. The findings provide strong support for the view that the fibres found on the suspect originated from the victims sweater rather than from an unknown 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. The findings also show that the fibres found on the suspect did not originate from the victims coat.
QQKHD9	The red polyester fibers identified in Item# 3 are similar to the red polyester fibers identified in Item# 1, therefore, the red polyester fibers in Item# 3 could have originated from the same source as the red polyester fibers identified in Item #1. The red polyester fibers identified in Item# 3 are dissimilar to the red polyester fibers identified in Item# 2.
R36WXF	All three items contain the manufactured fiber polyester Item 1 and item 3 have similar physical properties, therefore, item 3 could have generated from item 1
R768TF	In my opinion, using low power microscopy only, comparisons show the two very similar fibres with differing crimping recovered from item three (fibres from suspect) are indistinguishable from the two constituent fibres recovered from item one (victims sweater). In that, the fibres recovered from item three and item one could have originated from the same item in order to establish whether or not the fibres are matching fibres, additional more discriminatory testing would have to be carried out at an external Forensic Provider
RG9DP4	1.The sample received as the "Known section of the victim ´s sweater" (Item 1)is made by red polyester fibers. 2. The sample received as the "Known section of the victim ´s coat" (Item 2)is made by red polyester fibers. 3. The sample received as the "Questioned fibers found on the suspect" (Item 3)is made by red polyester fibers. 4. According with the physical properties evaluated, the questioned fibers received as item 3 are indistinguishable from the sample received as item 1.
RL3KJQ	Items 1-3 were examined using alternate light sources (UV,LED), stereoscopically, microscopically and instrumentally using Fourier Transform Infrared Spectrometry. Item 3 fibers (dark pink/red fibers "found on the suspect") were consistent with item 1 fibers (submitted as a section of the "victim's sweater") with respect to measured properties as follows: Fluorescence under UV light sources. Stereoscopic and microscopic characteristics (including color, diameter range, presence of delusterant). Fiber type (polyester). This indicates that item 3 could have originated from item 1 or an item that is indistinguishable in all assessed examinations and analyses. No statistical or numerical probabilities can be applied to the conclusions of this report. Item 3 fibers were not consistent with item 2 fibers (polyester fibers submitted as a section of the "victim's coat").
TJRRT4	The findings give strong support to the hypothesis that red fibres found at the suspect, Item 3 originate from Item 1, the victims sweater. This hypothesis is held against the that the fibres collected from the suspect, Item 3 have another origin different from the victims sweater, Item 1. The findings give extremely strong support to the hypothesis that the fibres found at the suspect, Item 3 do not originate from Item 2, the victims coat. This hypothesis is held against the alternative that the fibres from the suspect, Item 3 originates from Item 2.
TWUQPU	The questioned Polyester fibers analyzed in Item 3 are consistent with the known Polyester fibers analyzed in Item 1 on the basis of color, thickness, fluorescence, organic composition, and fiber type. The questioned Polyester fibers analyzed in Item 3 are not consistent with the known Polyester fibers analyzed in Item 2 on the basis of fluorescence.
UCNDX8	Findings: Item 1 - Fabric comprised of red polyester fibers. Used for comparison Item 2 - Fabric comprised of red polyester fibers. Used for comparison Item 3 - Red polyester fibers observed. Similar to

TABLE 4

WebCode	Conclusions
	Item 1, dissimilar to Item 2. Conclusion: Item 3 - Red polyester fibers could have originated from the fabric in Item 1 and cannot be associated to the fabric in Item 2.
UF6ELL	Red polyester fibers recovered from Item 3 exhibit the same microscopic characteristics and optical properties as the red polyester fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the source of Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. These red polyester fibers recovered from Item 3 are microscopically dissimilar to the fibers comprising Item 2. Accordingly, these fibers are not consistent with originating from the source of Item 2.
UHVYQB	Item 1 comprised a square of satin weave fabric. The warp yarn (1:2 weave) comprised delustered red polyester and the weft yarns (1:7) comprised delustered red polyester. Item 2 comprised a square of satin weave fabric. The warp yarn (1:2 weave) comprised non-delustered red polyester and the weft yarns (1:4) comprised delustered red polyester. Item 3 comprised 2 yarns of fibres, designated yarn 1 and yarn 2. Yarn 1 comprised delustered red polyester with a regular undulating crimp. It was consistent in appearance, colour and composition to the warp yarns of Item 1. Yarn 2 comprised delustered red polyester with a regularly-spaced crimp. It was consistent in appearance, colour and composition to the weft yarns of Item 1. These results support the proposition that the fibres recovered from the suspect originated from the garment represented by Item 1. These results also support the proposition of contact between the sweater and the suspect. The frequency of garments indistinguishable from Item 1 is unknown.
UJQM6Z	Based on yarn construction and microscopic characteristics, fluorescence, instrumental colour analysis and chemical compositions of microscopically light red polyester fibres, the two red yarns in "Item 3" could have originated from the red yarns constituting the red fabric in "Item 1", or other sources containing yarns with similar characteristics. Based on yarn construction and/or microscopic characteristics of the fibres, the two red yarns in "Item 3" were found to be different from the red yarns constituting the red fabric in "Item 2".
UV8GF7	The two yarns from item #3, the questioned fibers found on the suspect could have originated from the fabric named item #1, a known section of the victim's sweater. Item #3 yarns are consistent in yarn structure, size, and fiber dimension of the yarns found in item #1 fabric. The yarns of item #3 do not have any key structural resemblance to that of the yarns found in item #2, a known section of the victim's coat.
UWBLZM	Two (2) types of red polyester found in the Item 3 debris exhibit the same microscopic characteristics and optional 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. The fibers recovered from Item 3 are microscopically dissimilar to the fibers comprising Item 2. Accordingly, these fibers are not consistent with originating from Item 2.
VB6QHJ	Red polyester fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the red polyester fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or from another item comprised of fibers with the same microscopic characteristics and optical properties. It should be noted that these fibers are microscopically dissimilar to the fibers comprising Item 2. Accordingly, these fibers are not consistent with originating from Item 2. No other fibers were found in Item 3. 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.
VWF2L8	The known section of the victim's sweater in Item 1 comprised red polyester fibres. The known section of the victim's coat in Item 2 comprised red polyester fibres. The questioned fibres from the suspect's clothing in Item 3 comprised red polyester fibres, agreeing in colour, fibre type and microscopic appearance under various conditions with the control red polyester fibres from the known section of the victim's sweater in Item 1, indicating that they could have originated from the same source. The

TABLE 4

WebCode	Conclusions
	questioned red polyester fibres from the suspect's clothing in Item 3 agreed in fibre type but differed in microscopic appearance under various conditions with the control fibres from the known section of the victim's coat in Item 2, indicating that they did not originate from the same source.
W47N9X	The questioned fibers (item #3) could have originated from item #1 as represented by the known submitted exemplar or from another source exhibiting all of the same analyzed characteristics. Item #3 fibers could not have originated from known item #2.
W4TP6V	Microscopical characteristics, optical properties, and chemical composition are consistent between samples 1 and 3. Fibers from both directions were sampled. Fibers from sample 3 could have originated from sample 1. Samples 2 is not a possible source for the fibers in sample 3.
WAP8X	Item 1 is composed by a single type of red fibers, with delustrant, polygonal cross section, dichroism under polarized light and positive under light fluorescence. They are manufactured fiber identified as Polyester by FTIR. Item 2 is composed by two types of red fibers. Both are manufactured fiber, identified as polyester by FTIR. One of them has delustrant, polygonal cross section, dichroism under polarized light and is positive under light fluorescence. The other one does not have delustrant, has a triangular cross section, dichroism under polarized light and is positive under light fluorescence. Item 3 is composed by a single type of red fibers. All fibers are similar to Item 1 fibers, in color, morphology, behavior under polarized and fluorescence light and cross section. Item 3 fibers differ from Item 2 fibers in color (Item 2 fibers have a more intensive red color than Item 3 fibers), behavior under fluorescence light and one of the types of fibers from Item 2 has a different cross section than Item 3 fibers (triangular vs. polygonal). We determine that the fibers found on the suspect could have come from the sweater worn by the victim.
X6BVQG	CONCLUSIONS: Questioned fibers identified as found on the suspect (item 1C/ CTS item 3) originated from the victim's sweater (item 1A/ CTS item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. RESULTS: Questioned fibers identified as found on the suspect (item 1C/ CTS item 3) were examined to determine whether or not there are any fibers present that are consistent with known fabric from the victim's sweater (item 1A/ CTS item 1) or coat (item 1B/ CTS item 2). The sample of fabric identified as from the victim's sweater (item 1A/ CTS item 1) is primarily composed of red polyester. The sample of fabric identified as from the victim's coat (item 1B/ CTS item 2) is primarily composed of red polyester. Examination and comparison of questioned fibers identified as found on the suspect (item 1C/ CTS item 3) with known fibers of the victim's coat (item 1B/ CTS item 2) reveals they are inconsistent in microscopic and optical characteristics. It is therefore concluded the questioned fibers did not originate from the victim's coat (item 1B/ CTS item 2). Further examination of these fibers reveals they are consistent in microscopic, optical, and chemical characteristics with the known fibers of the sweater (item 1A/ CTS item 1). It is therefore concluded the questioned fibers originated from the sweater (item 1A/ CTS item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, fluorescence microscopy, microspectrophotometry, thermal microscopy and Fourier transform infrared microspectroscopy.
X9UK2Z	The fibers in item 1 and item 3 display similar class characteristics and may share a common source. The fibers in item 2 and item 3 display dissimilar class characteristics and do not share a common source.
XB4V8W	All fibre samples (item 1-3) are made of polyester. The questioned fibres found on the suspect (item 3) match in all criteria the fibres of the victim's sweater (item 1). Therefore it is likely that the questioned fibres found on the suspect's clothing come from a textile similar to the sweater that the victim has worn during the incident. The questioned fibres found on the suspect (item 3) don't match in all criteria the fibres of the victim's coat (item 2). There is no evidence that the questioned fibres found on the suspect's clothing come from the victim's coat.

TABLE 4

WebCode	Conclusions
XJC74A	Pink polyester fibers with two different diameters from Item 3 exhibit the same microscopic characteristics and optical properties as the pink polyester fibers with two different diameters comprising the known section of the victim's sweater (Item 1). Accordingly, these fibers are consistent with originating from Item 1 or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The pink polyester fibers with two different diameters from Item 3 are microscopically dissimilar to the known section of the victim's coat (Item 2). Accordingly, these fibers are not consistent with originating from Item 2. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, and instrumentally using microspectrophotometry and infrared spectroscopy, where appropriate.
XMYGK3	Results of Fiber Analysis: Microscopic and instrumental examination of the representative fibers in Items 1, 2, and 3 revealed red polyester fibers. Results of Fiber Comparison: The representative red polyester (A and B) fibers in Items 1 and 3 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. The representative red polyester fibers (A and B) in Items 2 and 3 were found to be dissimilar in physical and microscopic characteristics and color properties. They could not have come from the same source.
XVQPRR	Item 1: This item was used for comparison purposes. Item 2: This item was used for comparison purposes. Item 3: The questioned threads are similar in visual color, but different in construction and optical properties, to the known threads from the victim's coat (01-02-AA). It is my opinion that the questioned threads did not originate from this item (Category 5). The questioned threads are similar in visual color and construction to the known threads from the victim's sweater (01-01-AA). A portion of fibers from the questioned threads were selected for further analysis and are similar in optical properties, color, fiber type, and dye composition to fibers from the known threads from the victim's sweater. It is my opinion that the questioned threads could have come from the victim's sweater or any other fabric with similar characteristics (Category 2B).
XYRZ2T	The red polyester fibers labeled questioned fibers found on the suspect, item 3, are consistent in color, physical characteristics, and chemical composition as compared to the red polyester fibers labeled known section of the victim's sweater, item 1. Level III association. The red polyester fibers labeled questioned fibers found on the suspect, item 3, display differences in color, physical characteristics, and chemical composition as compared to the red polyester fibers labeled known section of the victim's coat, item 2. Elimination.
Y688UH	The pink polyester fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the pink polyester fibers comprising Item 1; accordingly, these fibers are consistent with originating from the Item 1 fabric or from other items comprised of fibers which exhibit the same microscopic characteristics and optical properties. The pink polyester fibers found in Item 3 are microscopically dissimilar to the textile fibers comprising Item 2; accordingly, these fibers are not consistent with originating from Item 2. The items were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy and instrumentally using microspectrophotometry and Fourier transform infrared analysis, as appropriate.
Y7KUCW	The fibres recovered from the suspects clothing (item 3) were found to be indistinguishable in terms of microscopic appearance, colour and chemical composition to the fibres used in the construction of the victims sweater (item 1). This is as I would expect if the suspect had been in recent contact with the victim or another item made of similar fibres. In my opinion this provides strong support for the view that the suspect had been in recent contact with the victim rather than he had not. In expressing the evidential significance of my findings I have used the following scale of support: no support, weak, moderate, moderately strong, strong, very strong, extremely strong support.
YKM9Q9	Pink polyester fibers of two different diameters recovered from Item 3 (Your Item 3) have the same microscopic characteristics and optical properties as the pink polyester fibers that comprise the warp

TABLE 4

WebCode	Conclusions
	<p>and weft of the Item 1 fabric (Your Item 1). Accordingly, these pink polyester fibers are consistent with originating from Item 1 or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The pink polyester fibers recovered from Item 3 (Your Item 3) are microscopically dissimilar from the fibers comprising Item 2 (Your Item 2). Accordingly, these fibers are not consistent with having originated from Item 2. 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>
YWFDPD	<p>Items 1, 2, and 3 were examined using stereomicroscopy, comparison polarized light microscopy, and infra-red spectroscopy. Items 1 and 3 were additionally examined using fluorescence microscopy, microspectrophotometry, and thin layer chromatography. Item 1 contained red woven fabric made up of polyester fibers with two (2) distinct crimp patterns. Item 2 contained red woven fabric made up of polyester fibers with two (2) distinct crimp patterns. Item 3 contained red polyester fibers with two (2) distinct crimp patterns. The two (2) types of red polyester fibers found in Item 3 were indistinguishable from the two (2) types of red polyester fibers found in Item 1 in color, general fiber type, and microscopic/macrosopic characteristics (Type 3 Association).* The two (2) types of red polyester fibers found in Item 3 were different from the two (2) types of red polyester fibers found in Item 2 (Elimination).** *This means that the two types of red polyester fibers found on the suspect could have originated from the victim's sweater. **This means that the two types of red polyester fibers found on the suspect did not originate from the victim's coat. 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>
ZBDNVW	<p>The questioned fibers reportedly found on the suspect (Item 3) were compared to the known red material from the victim's sweater and victim's coat (Items 1 and 2, respectively). The known red material from both the sweater and coat were constructed of red woven fibers. The tested fibers from Items 1 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 sweater, Item 1, is a possible source of the questioned fibers found on the suspect, Item 3 (Level 3 Association - see association scale below [See notes in additional comments.]). Because other items have been manufactured that would also be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned fibers found on the suspect (Item 3) differed in microscopical properties from the known fibers in the material from the victim's coat (Item 2). The victim's coat as represented by Item 2 is eliminated as a possible source of the questioned fibers in Item 3 (Elimination).</p>

TABLE 4

WebCode	Conclusions
ZT9GGU	The questioned sample item 3 could have originated from item 1 as represented by the known submitted exemplar or from another source exhibiting all of the same analyzed/measured characteristics. Based on comparisons to the submitted exemplar, item 3 could not have originated from the coat represented by item 2.

Additional Comments

TABLE 5

WebCode	Additional Comments
7KZ74R	(*) Further details of the circumstances and the nature of the Suspect's clothing would be required in order to make an assessment of the evidential strength of these findings. As the findings were threads rather than transferred fibres the threads would have to have originated from a damaged area or a fraying seam of the Victim's "sweater". I have no information as to whether this item was damaged. Information as to the retentive properties of the Suspect's clothing would be required in order to assess the likelihood of these threads being retained for several hours following the alleged contact. Re Q2 Item 2 is classed as synthetic. As the fibres did not match those in Item 3 the provisional identification by polarized microscopy of polyester was not confirmed by FTIR.
87YJYN	Note: Because yarns and fabric are mass produced, it is not possible to state that a yarn originated from a particular textile source to the exclusion of all other materials composed of fibers which exhibit the same properties.
BJ972G	In fabric (Item 1) both threads comprise with delustered PES fibers. One thread from fabric (Item 2) comprise with delustered PES fibers while second thread consist of non-delustered PES fibers. Two separate threads of Item 3 comprise with delustered PES fibers. Questioned fibers found on the suspect (Item 3) match with fibers of the victim sweater (Item 1) in the range of all examined features. Although questioned fibers found on the suspect (Item 3) belong to the same type as fibers of the victim's coat (Item 2) they are different in colour which was confirmed through MSP and fluorescence microscopy analysis as well as in morphology features (the lack of delustrant in fibers which built one thread of Item 2).
C6QDV4	By definition, a sweater is a knit garment, but the Item 1 sample was a woven piece of fabric. I thought my samples had been mixed up until I saw that Item 2 was also woven.
EZ8KRL	It is necessary to continue with these tests
H7HZRK	All fibers are polyester, sample 1 and 3: delustered but sample 2 have lustered and delustered fibers. The woven pattern (size/lenth between each wave)is the same for sample 1 and 3 but different for sample 2.
L82PAA	As we only worked with optical methods, no identification of the fibre type was possible. A further discrimination and identification of the fibres could be made by using applying further methods like FTIR.
NHE2PW	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. 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.
NTBGJM	Interpretation section Item 3 – Questioned fibres found on the suspect, were found to be indistinguishable from those of item 2, victim's coat, in terms of microscopic appearance, fluorescence, instrumental colour analysis, chemical composition and dye composition. They were distinguishable from those of item 1: victim's sweater, and therefore could not have originated from this item. In addressing the significance of the evidence, I have considered the following two alternative propositions: 1) The fibres in item 3 originated from the victim's coat (item2), 2) The fibres in item 3 did not originate from the victim's coat and match by chance . Empirical studies have shown that the chance of finding matching fibres on a surface chosen at random is small. Taking into account the nature of the fibres concerned and the number of different techniques employed, in my opinion, the findings provide very strong support for the first proposition over the second.
PX8TAX	It is unusual to recover threads in cases unless the incident involved the snagging of material on a window for example. Generally our cases involve trace fibres.
R768TF	In my opinion, the fibres recovered from item three can be eliminated as having originated from item

TABLE 5

WebCode	Additional Comments
	two as they are distinguishable in colour from the consistent fibres plucked from the warp and weft of the control sample item 2 (victims coat)
TWUQPU	It should be noted that textile fibers do not possess enough individual microscopic characteristics to be positively identified as originating from a particular source to the exclusion of all other sources. The conclusions in this report pertain only to the fibers that were analyzed from each item and makes no assumptions about the whole.
Y7KUCW	We have no version of events from suspect with which to fully evaluate the findings
ZBDNWW	An association scale would be included.
ZT9GGU	Because textile materials are mass produced, it is not possible to state that a fiber originated from a particular textile source to the exclusion of all other textile materials composed of fibers which exhibit the same chemical and optical properties.

-End of Report-
(Appendix may follow)

Test No. 20-5439: Fibers Analysis

DATA MUST BE SUBMITTED BY **March 16, 2020, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234E

WebCode: AVT9RP

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 assault and robbery of a woman walking to her car. The victim was wearing a red sweater and jeans with a red coat. The victim's description led to a suspect who was apprehended hours later. The police recovered fibers from the suspect's clothing. Police are requesting you to examine the fibers, report their identification(s), and determine if the fibers found on the suspect could have come from the sweater and/or the coat worn by the victim.

CTS will not reproduce Interpretation Scales, Scale of Conclusions or Terminology Keys in the final report, please do not submit with the participant's data sheet.

Items Submitted (Sample Pack FIBR):

Item 1: Known section of the victim's sweater

Item 2: Known section of the victim's coat

Item 3: Questioned fibers found on the suspect

1.) Could the questioned fibers found on the suspect (Item 3) have originated from either the victim's sweater (Item 1) and/or the victim's coat (Item 2)?

Item 1 (Known section of victim's sweater)

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

Item 2 (Known section of the victim's coat)

	Yes	No	Inconclusive
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.

<u>Microscopic Exams:</u>	<input type="checkbox"/> Stereo	<input type="checkbox"/> Comparison
	<input type="checkbox"/> Polarized Light	<input type="checkbox"/> Fluorescence
<input type="checkbox"/> Macroscopic Exam	<input type="checkbox"/> IR/FTIR	<input type="checkbox"/> Microspectrophotometry
<input type="checkbox"/> Solubility Tests	<input type="checkbox"/> Cross-Section	<input type="checkbox"/> Melting Point
Other (specify): <input type="text"/>		

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 hydroxybenzoate 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) Nytril

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) Elastoester

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.

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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.

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Step 2: Complete the Laboratory Identifying Information in its entirety

Authorized Contact Person and Title

Laboratory Name

Location (City/State)