



Fibers Analysis Test No. 21-5439 Summary Report

Each sample set consisted of one known piece of yarn and two sets 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:

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

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

Manufacturer's Information

Each sample pack consisted of one known piece of yarn (Item 1) and two sets of questioned yarn fibers (Items 2 and 3). All items were from different skeins of yarn. All yarn skeins were purchased from a local fabric store and all were labeled as 100% Acrylic. Participants were requested to examine the yarn and fibers, identify the fiber type, and determine if the questioned fibers could have originated from the known piece of yarn.

SAMPLE PREPARATION:

The outside of the yarn skein was rolled with a lint roller to remove any extraneous debris. All items were prepared at different times to prevent any possibility of cross-contamination.

ITEM 1 (ELIMINATION): For the known yarn, one inch sections were cut from the skein. They were then packaged into a glassine bag and a pre-labeled Item 1 envelope.

ITEMS 2 and 3 (ELIMINATION): For the questioned yarn fibers, one inch sections of yarn were cut from the skein. From each section, approximately 15-20 fibers were teased out and packaged into a glassine bag and a pre-labeled item envelope.

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

VERIFICATION:

All predistribution laboratories reported the expected identification results and identified the yarn in Items 1, 2, and 3 as Acrylic. One laboratory reported an association between Items 1 and 3. This finding was investigated thoroughly and the sample was deemed acceptable for release in this test. The following procedures were used to examine the items: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, macroscopic exam, IR/FTIR, microspectrophotometry, 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 one-inch known piece of yarn for Item 1, and a collection of questioned fibers for Items 2 and 3. They were requested to examine the submitted items and determine if either of the questioned fibers could have originated from the known piece of yarn. All items originated from different skeins of green yarn labeled as 100% Acrylic (Refer to the Manufacturer's Information for preparation details).

Table 1: Association Results:

Item 2 -

Of the 104 participants returning results, 78 (75%) reported that the questioned fibers found on the suspect's knife (Item 2) could not have originated from the victim's sweater (Item 1). Another seven participants (7%) reported results as inconclusive, with the majority of these noticing differences between Item 2 and the known Item 1 sample. These results were not considered as outliers and not marked as inconsistent. There were 19 participants (18%) that reported that the questioned fibers could have originated from the victim's sweater.

Item 3 -

There were 71 participants (68.3%) that reported that the questioned fibers found on the suspect's sweatshirt (Item 3) could not have originated from the victim's sweater (Item 1). Seven participants (7%) reported results as inconclusive, with the majority of these noticing differences between Item 3 and the known Item 1 sample. Twenty-five participants (24%) reported that the questioned fibers could have originated from the victim's sweater and one participant did not respond. Considering that a consensus was not reached for Item 3, no results were designated as inconsistent.

Table 2: Fiber Type Determination:

Regarding the fiber type determination results, 91 of 104 participants (87.5%) reported the expected fiber type of Acrylic for Items 1, 2, and 3. Of the remaining participants, one participant identified the fiber type as Animal (Wool), two identified the fiber type as manufactured ModAcrylic and ten identified the fiber type as manufactured but did not further classify the fiber. As per some laboratory protocols, it is not uncommon to discontinue analysis after inconsistencies between items have been found. Consequently, some results were not further classified.

Table 3: Examination Methods:

Across the 104 responding participants, 608 methods of analysis were reported in total. Stereo and Polarized light microscopy were the most commonly reported examination methods used, each reported 94 times. Another frequently reported method was IR/FTIR, reported 88 times. Although there was no direct correlation between the examination methods used by participants and the reporting of unexpected association results, it should be noted that 85% of participants that reported expected results used Fluorescence microscopy, which was the third most commonly reported examination method, compared to only 16% of participants that reported unexpected results. A closer look into the data revealed that 15 participants reported that both questioned fibers used in Item 2 and Item 3 could have originated from Item 1 and there were five that reported "inconclusive" for both questioned items. Of these 15 participants associating the two questioned

items, only two reported using fluorescence in their methods.

A review of participants' conclusions and additional comments provided additional information on the differences seen from the examinations performed. A total of 22 participants reported that differences were seen in the fluorescence of the fibers that made up Items 2 and 3 in comparison to Item 1. Of the participants that did not associate Item 2 to Item 1, 14 noted differences in size, some mentioning that Item 2 was smaller in diameter. Additionally, of the participants that did not associate Item 3 to the known Item 1 sample, 14 reported that there was a difference in color between Item 3 and Item 1.

Association Results

Could either of the questioned fibers found on the suspect's knife (Item 2) or the suspect's sweatshirt (Item 3) have originated from the victim's sweater (Item 1)?

TABLE 1

WebCode	Item 2	Item 3			
24RPRR	No	No	8QKPJV	No	No
29JWB2	No	Yes	8RT6Q2	Yes	Yes
2BAVNY	No	No	8WMYPN	Yes	Yes
2KCFQR	Inconclusive	No	8YEUCW	No	No
2NFBBU	No	No	96H2RY	No	No
2YXT32	No	No	9GP7HR	No	No
3AC6VP	Inconclusive	Inconclusive	9GTTWK	Yes	Yes
3DCFRP	Yes	Yes	9UD9ZK	No	No
3MXG8Y	Yes	Yes	A4XYZG	No	Yes
3P6WGQ	No	No	AEGE3J	Yes	Yes
3PPFNJ	No	No	BFU34B	No	No
3UW7QP	Yes	Yes	CFQ3GF	Inconclusive	Inconclusive
3YQZnQ	Yes	Yes	CVEFTM	No	No
436XUR	No	No	CWW84T	No	No
4769PR	No	No	D7GX4P	No	No
4ATKNX	No	No	DBBR2Q	No	No
4CWF8Z	No	No	DBQBLN	Yes	Inconclusive
4R9UPX	No	No	DDGCRC	Yes	Yes
6HDCNU	No	No	DU3ZYL	No	Yes
74QJDT	No	No	EMXFCG	No	No
7C9R2P	Inconclusive	Inconclusive	FXB3XM	No	No
7DFAYK	Yes	Yes	G4WCKQ	No	No
7MQCKL	No	No	GPZZCL	No	No
8NGUZR	No	No	GXQLHK	No	Inconclusive

TABLE 1- Association Results

WebCode	Item 2	Item 3			
H7JD4J	No	Yes	R2YD2A	Yes	No
HDF943	No	No	RCUKXT	No	No
HF86QB	No	No	RMD2PZ	Yes	Yes
HMQBP4	No	No	UGFJ2Y	No	No
HNYM6J	No	No	ULVQMD	No	Yes
HUNZ78	No	Yes	UQ884A	No	No
HXP9BH	Yes	Yes	UZCPUY	Yes	Yes
J7XZDK	No	No	VE8QK6	No	No
JJL2VD	No	No	VJL2ZU	No	No
JMHQCK	No	No	VTCPVX	No	No
JQNNUK	No	No	WCXY8	No	Yes
JUJ39G	No	No	VWMYL7	No	No
KCEVUF	No	No	VYDY2P	No	No
KFHQDH	No	No	WCFR78	Yes	Yes
KW3GCH	No	No	WFHPGZ	No	No
L4XY4Y	No	No	WH72F6	No	No
LHHTPH	No	No	XMU4YV	No	No
LMD86Y	No	No	XRQRF3	No	No
MD43R9	Inconclusive	Inconclusive	XUUMY7	No	No
MMP8Y9	No	No	XV4RDU	No	No
MTVZU4	Yes	No	Y34E39	Inconclusive	Yes
NVEC7E	Yes	Yes	Y9A8W4	No	No
NX7BJD	Inconclusive	Inconclusive	YPWLBW	No	No
PKXRLH	No	Yes	YRKXA2	No	No
PPAVAY	Yes		YTVZXL	No	No
QWKJLD	No	No	YVMVKU	No	Yes

Revised: June 10, 2021. Two participants results for Fiber Type Determination were updated as well as related totals.

TABLE 1- Association Results

WebCode	Item 2	Item 3
Z244T4	No	No
Z26Q2P	No	No
Z7WVR8	No	No
ZWVBRZ	No	No

Response Summary		Participants: 104	
<p>Could either of the questioned fibers found on the suspect's knife (Item 2) or the suspect's sweatshirt (Item 3) have originated from the victim's sweater (Item 1)?</p>			
	<u>Item 2</u>	<u>Item 3*</u>	
Yes:	19 (18.3%)	25 (24.0%)	
No:	78 (75.0%)	71 (68.3%)	
Inc:	7 (6.7%)	7 (6.7%)	
<p>The sum of the responses here may be less than the total number of participants responding due to missed or omitted responses.</p>			

Fiber Type Determination

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

TABLE 2

WebCode	Item 1	Item 2	Item 3
24PRR	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
29JWB2	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
2BAVNY	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
2KCFQR	Manufactured, ModAcrylic	Manufactured, ModAcrylic	Manufactured, ModAcrylic
2NFBBU	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
2YXT32	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
3AC6VP	Animal, wool	Animal, wool	Animal, wool
3DCFRP	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
3MXG8Y	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
3P6WGQ	Acrylic	Acrylic	Acrylic
3PPFNJ	Manufactured	Manufactured	Manufactured
3UW7QP	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
3YQZNQ	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
436XUR	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
4769PR	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
4ATKNX	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
4CWF8Z	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
4R9UPX	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
6HDCNU	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
74QJDT	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
7C9R2P	Manufactured /Acrylic	Manufactured /Acrylic	Manufactured /Acrylic
7DFAYK	Manufactured	Manufactured	Manufactured
7MQCKL	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
8NGUZR	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
8QKPJV	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
8RT6Q2	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
8WMYPN	Acrylic	Acrylic	Acrylic
8YEUCW	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic

TABLE 2- Fiber Type Determination

WebCode	Item 1	Item 2	Item 3
96H2RY	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
9GP7HR	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
9GTTWK	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
9UD9ZK	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
A4XYZG	Manufactured, ModAcrylic	Manufactured, ModAcrylic	Manufactured, ModAcrylic
AEGE3J	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
BFU34B	Manufactured, not further categorized	Manufactured, not further categorized	Manufactured, not further categorized
CFQ3GF	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
CVEFTM	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
CWW84T	Acrylic	Acrylic	Acrylic
D7GX4P	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
DBBR2Q	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
DBQBLN	Manufactured and Acrylic	Manufactured and Acrylic	Manufactured and Acrylic
DDGCRC	Manufactured-Acrylic	Manufactured-Acrylic	Manufactured-Acrylic
DU3ZYL	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
EMXFCG	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
FXB3XM	Acrylic	Acrylic	Acrylic
G4WCKQ	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
GPZZCL	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
GXQLHK	Acrylic	Acrylic	Acrylic
H7JD4J	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
HDF943	Manufactured, not further characterized	Manufactured, not further characterized	Manufactured, not further characterized
HF86QB	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
HMQBP4	Manufactured, not further characterized	Manufactured, not further characterized	Manufactured, not further characterized
HNYM6J	Acrylic (Manufactured)	Acrylic (Manufactured)	Acrylic (Manufactured)
HUNZ78	Acrylic	Acrylic	Acrylic
HXP9BH	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
J7XZDK	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
JJL2VD	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic

TABLE 2- Fiber Type Determination

WebCode	Item 1	Item 2	Item 3
JMHQCK	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
JQNNUK	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
JUJ39G	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
KCEVUF	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
KFHQDH	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
KW3GCH	Acrylic, Acrylic	Acrylic	Acrylic
L4XY4Y	Manufactured; not further characterized	Manufactured; not further characterized	Manufactured; not further characterized
LHHTPH	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
LMD86Y	Manufactured, not further categorized	Manufactured, not further categorized	Manufactured, not further categorized
MD43R9	Manufactured Acrylic	Manufactured Acrylic	Manufactured Acrylic
MMP8Y9	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
MTVZU4	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
NVEC7E	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
NX7BJD	Acrylic	Acrylic	Acrylic
PKXRLH	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
PPAVAY	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
QWKJLD	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
R2YD2A	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
RCUKXT	Manufactured, not further categorized	Manufactured, not further categorized	Manufactured, not further categorized
RMD2PZ	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
UGFJ2Y	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
ULVQMD	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
UQ884A	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
UZCPUY	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
VE8QK6	Manufactured, Acrylic and Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
VJL2ZU	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
VTCPVX	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
WCXY8	Manufactured-Acrylic	Manufactured-Acrylic	Manufactured-Acrylic
VWMYL7	Acrylic, manufactured	Acrylic, manufactured	Acrylic, manufactured

TABLE 2- Fiber Type Determination

WebCode	Item 1	Item 2	Item 3
VYDY2P	Manufactured, Not further characterized	Manufactured, Not further characterized	Manufactured, Not further characterized
WCFR78	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
WFHPGZ	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
WH72F6	Manufactured Acrylic	Manufactured Acrylic	Manufactured Acrylic
XMU4YV	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
XRQRF3	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
XUUMY7	Manufactured, Acrylic (multiple types)	Manufactured, Acrylic (multiple types)	Manufactured, Acrylic (multiple types)
XV4RDU	Manufactured fibers, Acrylic	Manufactured fibers, Acrylic	Manufactured fibers, Acrylic
Y34E39	Acrylic	Acrylic	Acrylic
Y9A8W4	Acrylic	Acrylic	Acrylic
YPWLBW	Manufactured - Acrylic	Manufactured - Acrylic	Manufactured - Acrylic
YRKXA2	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
YTVZXL	Manufactured; not further characterized	Manufactured; not further characterized	Manufactured; not further characterized
YVMVKU	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic
Z244T4	Acrylic	Acrylic	Acrylic
Z26Q2P	Manufactured fiber-Acrylic	Manufactured fiber-Acrylic	Manufactured fiber-Acrylic
Z7WVR8	Manufactured Acrylic	Manufactured Acrylic	Manufactured Acrylic
ZWVBRZ	Manufactured, Acrylic	Manufactured, Acrylic	Manufactured, Acrylic

Response Summary			Participants: 104
<u>Item 1</u>	<u>Item 2</u>	<u>Item 3</u>	
Acrylic: 91 (87.50%)	Acrylic: 91 (87.50%)	Acrylic: 91 (87.50%)	
*Other: 13 (12.50%)	*Other: 13 (12.50%)	*Other: 13 (12.50%)	
*This category represents the total number of participants that reported a response other than that which is listed above.			

Examination Methods

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
24RPRR	✓	✓	✓	✓		✓	✓				
29JWB2	✓	✓	✓	✓	✓	✓	✓	✓			
2BAVNY	✓	✓	✓	✓	✓	✓		✓			
2KCFQR	✓		✓	✓	✓	✓	✓	✓			
2NFBBU	✓		✓	✓		✓		✓			
2YXT32	✓		✓	✓	✓	✓	✓				
3AC6VP	✓	✓	✓		✓	✓		✓			
3DCFRP	✓		✓	✓	✓	✓		✓			
3MXG8Y	✓	✓	✓		✓	✓	✓	✓			
3P6WGQ			✓	✓		✓	✓	✓			GC/MS pyrolysis
3PPFNJ	✓	✓	✓	✓			✓				
3UW7QP			✓			✓					
3YQZLNQ	✓		✓		✓	✓		✓			
436XUR	✓	✓	✓	✓	✓	✓		✓			pyrolysis GCMS
4769PR	✓	✓	✓	✓	✓	✓	✓				
4ATKNX	✓	✓	✓	✓	✓	✓		✓			
4CWF8Z	✓	✓	✓	✓	✓	✓	✓				
4R9UPX	✓	✓	✓	✓	✓	✓	✓				
6HDCNU	✓	✓	✓	✓	✓	✓	✓				
74QJDT	✓	✓	✓	✓		✓	✓	✓			
7C9R2P	✓	✓	✓	✓	✓	✓	✓				Raman
7DFAYK	✓										
7MQCKL	✓	✓	✓			✓	✓				

TABLE 3- Examination Methods

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
8NGUZR	✓	✓	✓	✓	✓	✓					
8QKPJV	✓	✓	✓	✓	✓	✓	✓	✓			
8RT6Q2	✓					✓					
8WMPN		✓	✓								
8YEUCW	✓	✓	✓	✓		✓	✓				
96H2RY	✓	✓	✓	✓		✓	✓				Raman Spectroscopy
9GP7HR	✓	✓	✓	✓	✓						
9GTTWK	✓					✓		✓			PY-GCMS;SEM/EDS;ALS
9UD9ZK	✓	✓	✓	✓		✓					
A4XYZG						✓					SEM/EDS
AEGE3J	✓					✓					
BFU34B	✓	✓	✓	✓	✓						
CFQ3GF	✓	✓	✓	✓	✓	✓	✓	✓			
CVEFTM	✓	✓	✓	✓	✓	✓	✓				
CWW84T	✓		✓	✓		✓					
D7GX4P	✓	✓	✓	✓	✓	✓	✓				alternate light source
DBBR2Q	✓	✓	✓	✓	✓	✓	✓				
DBQBLN	✓	✓	✓		✓	✓	✓	✓			
DDGCRC	✓	✓	✓		✓	✓					
DU3ZYL	✓	✓	✓		✓	✓	✓	✓			
EMXFCG			✓	✓		✓	✓	✓			
FXB3XM	✓	✓	✓	✓	✓	✓	✓				
G4WCKQ		✓		✓		✓	✓				
GPZZCL	✓	✓	✓	✓	✓	✓					

TABLE 3- Examination Methods

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
GXQLHK	✓	✓	✓		✓						
H7JD4J	✓	✓	✓		✓	✓				✓	
HDF943	✓	✓	✓	✓	✓					✓	
HF86QB	✓	✓		✓	✓	✓					
HMQBP4	✓	✓	✓	✓	✓					✓	
HNYM6J	✓	✓	✓	✓	✓	✓	✓	✓	✓		
HUNZ78	✓	✓	✓	✓	✓	✓	✓			✓	
HXP9BH			✓	✓		✓	✓			✓	
J7XZDK	✓	✓	✓	✓	✓	✓	✓			✓	
JJL2VD	✓	✓	✓	✓	✓	✓	✓	✓			
JMHQCK	✓	✓	✓	✓	✓	✓	✓			✓	
JQNNUK	✓	✓	✓	✓		✓	✓			✓	
JUJ39G	✓		✓		✓	✓			✓		TLC - Dye composition
KCEVUF	✓	✓	✓	✓		✓					
KFHQDH	✓	✓	✓	✓	✓	✓					
KW3GCH	✓	✓	✓	✓	✓	✓	✓				
L4XY4Y	✓	✓	✓	✓	✓		✓				
LHHTPH	✓	✓		✓	✓	✓					Raman Spectroscopy
LMD86Y	✓	✓	✓	✓			✓				
MD43R9	✓	✓	✓	✓	✓	✓	✓			✓	
MMP8Y9	✓		✓	✓		✓	✓				
MTVZU4	✓				✓	✓	✓				
NVEC7E	✓	✓	✓		✓	✓					
NX7BJD	✓	✓	✓	✓	✓	✓	✓			✓	

Revised: June 10, 2021. Two participants results for Fiber Type Determination were updated as well as related totals.

TABLE 3- Examination Methods

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
PKXRLH				✓	✓			✓	✓		
PPAVAY	✓		✓			✓		✓	✓		
QWKJLD	✓	✓	✓	✓	✓	✓		✓	✓		
R2YD2A	✓	✓	✓	✓	✓	✓	✓				
RCUKXT	✓	✓	✓	✓							
RMD2PZ	✓		✓			✓					
UGFJ2Y	✓	✓	✓	✓	✓	✓	✓				
ULVQMD	✓	✓	✓		✓	✓	✓		✓		
UQ884A	✓	✓	✓	✓	✓	✓					
UZCPUY			✓		✓						
VE8QK6	✓	✓	✓	✓	✓	✓			✓		
VJL2ZU	✓		✓	✓		✓	✓				
VTCPVX	✓		✓	✓	✓	✓			✓		Visible spectrophotometry of dye extracts. X-ray microanalysis.
VWCXY8	✓	✓	✓	✓	✓	✓			✓		Optical microscope
VWMYL7	✓	✓	✓	✓	✓	✓	✓				UV-VIS MSP
VYDY2P	✓	✓	✓	✓	✓		✓				
WCFR78	✓	✓	✓		✓	✓			✓		
WFHPGZ	✓	✓	✓	✓	✓	✓		✓			
WH72F6	✓	✓	✓	✓	✓	✓	✓		✓		
XMU4YV		✓	✓	✓	✓	✓					
XRQRF3	✓	✓	✓	✓	✓	✓			✓		
XUUMY7	✓	✓	✓	✓	✓	✓		✓	✓		
XV4RDU	✓	✓	✓	✓	✓	✓					

TABLE 3- Examination Methods

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
Y34E39	✓	✓	✓		✓	✓		✓			
Y9A8W4	✓	✓	✓	✓	✓	✓					
YPWLBW	✓	✓	✓			✓					ALS/fluorescence - stereomicroscope
YRKXA2	✓		✓	✓	✓	✓	✓				
YTVZXL	✓	✓	✓	✓	✓			✓			
YVMVKU	✓	✓	✓		✓			✓		✓	
Z244T4	✓	✓	✓	✓		✓	✓				
Z26Q2P	✓	✓	✓	✓	✓	✓					
Z7WVR8	✓	✓	✓	✓	✓	✓	✓				
ZWVBRZ	✓	✓	✓		✓	✓	✓	✓			

Response Summary											
	Participants	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point
	104	94	79	94	75	74	89	51	9	42	2
Percent	90%	76%	90%	72%	71%	86%	49%	9%	40%	2%	

Conclusions

TABLE 4

WebCode	Conclusions
24RPRR	Neither of the questioned fibers found on the suspect's knife (Item 2) and on the suspect's sweatshirt (Item 3) could have originated from the victim's sweater (Item 1).
29JWB2	Microscopic and instrumental examination of the questioned fibers in Item 2 and comparison against the known fibers in Item 1 reveals sufficient dissimilarities such that it can be concluded that Item 2 did not originate from the same source as Item 1. Microscopic and instrumental examination of the questioned fibers in Item 3 and comparison against the known fibers in Item 1 reveals sufficient similarities that it can be concluded that Item 3 could have originated from the same source as Item 1 or a similarly constructed material.
2BAVNY	The questioned green acrylic fibers in Exhibit 3 corresponded in microscopic characteristics (PLM) and chemical composition (FTIR) to the known green acrylic fibers in Exhibit 1. However, there were differences in fluorescence that indicate that the fibers do not have a common source (Exclusion with limitations). It should be noted that additional color analysis by microspectrophotometry was not currently available and this technique could add further discrimination. It also should be noted that different parts of the same garment may have different fibers. Further comparisons can be performed if the sweater or additional known samples from the sweater are submitted. The green acrylic fibers in Exhibit 2 were different in size and fluorescence to the known fibers in Exhibit 1. Therefore, Exhibit 1 can be eliminated as having a common source with Exhibit 2 (Exclusion).
2KCFQR	Could either of the questioned fibers found on the suspect's knife (Item 2) or the suspect's sweatshirt (Item 3) have originated from the victim's sweater (Item 1)? (-) The colour of the fibres on the suspects sweatshirt (Item 3) are distinguishable from the two colours of the yarn from the victim's sweater (Item 1). So the fibres found on the suspect's sweatshirt (Item 3) do not originate from the victim's sweater (Item 1). (+) The colour of the fibres on the suspect's knife (Item 2) are quite similar to one of the colours of the yarn from victim's sweater (Item 1). (+) The fibres on the suspect's knife (Item 2) and those of the yarn from victim's sweater (Item 1) are all made out of Modacrylics. (-) The Green-Fluorescence of both types of fibres from Item1 are stronger than those of the fibres from Item 2. (-) The fibres (item 1) are on average slightly thicker than those of item 2. So it's inconclusive if the fibres from the suspect's knife (Item 2) really originate from the victim's sweater (Item 1) or not.
2NFBBU	1. Based on microscopic characteristics, chemical composition and solubility test, Item 1, Item 2 and Item 3 were found to consist of green acrylic fibres. 2. Based on fluorescence of the fibres, green acrylic fibres in Item 2 and Item 3 were found to be different from the green acrylic fibres constituting Item 1. 3. Note: Colours of fibres described are colours observed microscopically.
2YXT32	Based on comparisons to the submitted exemplar, items 2 and 3 could not have originated from the sweater represented by item 1.
3AC6VP	Items 1, 2 and 3 look very similar in the microscopic exam, as well as in the IR tests, but in the solubility test with a solution 5% NaOH in water item 1 has a different behaviour than items 2 and 3. Due to this, we cannot confirm or discard that the 3 items have the same source.
3DCFRP	Clear similarities between the fibers of the victim's sweater (item 1) and the fibers found on the suspect's knife (item2) and the suspect's sweatshirt (item 3).
3MXG8Y	Item 1 is composed of bright green acrylic fibers. Five green fibers from item 1 were analyzed; two of them (Fibers 1A and 1E) were compared to five fibers from item 2 (Fibers 2A-2E) and five fibers from item 3 (Fibers 3A-3E). Fibers 2A-2E, 3A, and 3D have similar microscopic, optical, cross-sectional characteristics and a similar infrared spectral pattern to Fiber 1E. Fibers 3B, 3C, and 3E have similar microscopic, optical, cross-sectional characteristics and a similar infrared spectral pattern to Fiber 1A. These results indicate that the fibers found on the suspect's knife and sweatshirt could have come from the victim's sweater or any other textile with the same class characteristics.
3P6WGQ	The questioned fiber (item2) that found on suspect's knife has not been originated from the victim's

TABLE 4

WebCode	Conclusions
	sweater (item1), because of their differences in physical properties and chemical compositions. The questioned fiber (item3) that found on suspect's sweatshirt has not been originated from the victim's sweater (item1), because of their differences in physical properties and chemical compositions.
3PPFNJ	The greenish yellow manufactured fibers in Item 1 (Your Item 2) are microscopically dissimilar to the known section of yarn from the victim's sweater (Your Item 1). Accordingly, these fibers are not consistent with originating from Item 3. The green manufactured fibers in Item 2 (Your Item 3) are microscopically dissimilar to the known section of yarn from the victim's sweater (Your Item 1). Accordingly, these fibers are not consistent with originating from Item 3. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, and instrumentally using microspectrophotometry, where appropriate.
3UW7QP	The sample consists of textile material contained in three small tape sealed envelopes identified as item 1, item 2, and item 3. The three envelopes were received in a sealed envelope labeled as "Test No. 21-5439: Fibers analysis." Each item contains the following: Item 1: Light green yarn (from victim's sweater); Item 2: Non-woven light green fibers (from suspect's knife); Item 3: Non-woven light green fibers (from suspect's sweatshirt). The fibers from the three items were identified as acrylic, a manufactured fiber.
3YQZNR	Item 1, Item 2, and Item 3 each contain acrylic fibers. Based on the analyses performed, no exclusionary differences were identified between the chemical and physical characteristics of the fibers. Based on the available data and information, the questioned fibers found on the suspect's knife (Item 2) and the questioned fibers found on the suspect's sweatshirt (Item 3) could have originated from the victim's sweater (Item 1) or another source of fibers with the same characteristics.
436XUR	Items 1, 2, and 3 were examined visually, by stereomicroscopy including fluorescence properties and analyzed by polarized light microscopy, fluorescence microscopy, infrared spectroscopy, and pyrolysis gas chromatography/mass spectrometry. Items 1 and 2 are dissimilar in microscopic properties and chemical composition, indicating that they did not originate from the same source. (Elimination). Items 1 and 3 are dissimilar in microscopic properties and chemical composition, indicating that they did not originate from the same source. (Elimination).
4769PR	The trace fibres from the suspect's knife (Item 2) and the sweatshirt (Item 3), could not have originated from the victim's sweater (Item 1).
4ATKNX	CONCLUSIONS: The known section of yarn from the victim's sweater (item 1) was eliminated as a possible source of the fibres collected from the suspect's knife and sweatshirt (items 2 & 3). Therefore, the fibres collected from the suspect's knife and sweatshirt (items 2 & 3) did not come from the known section of yarn from the victim's sweater (item 1).
4CWF8Z	Item 1: This item was used for comparison purposes. Item 2: This item is composed of yellow-green acrylic fibers. The yellow-green acrylic fibers from the suspect's knife are dissimilar in fluorescence to the victim's sweater. It is my opinion that these yellow-green acrylic fibers did not originate from the victim's sweater (Category 5). No further analysis done. Item 3: This item is composed of yellow-green acrylic fibers. The yellow-green acrylic fibers from the suspect's sweatshirt are dissimilar in color to the victim's sweater. It is my opinion that these yellow-green acrylic fibers did not originate from the victim's sweater (Category 5). No further analysis done.
4R9UPX	The fibers found on the suspect's knife (Item 2) and sweatshirt (Item 3) do not originate from the victim's sweater (Item 1).
6HDCNU	Examination of Exhibit 1 (known section of yarn from victim's sweater) disclosed the presence of a light green yarn composed of acrylic fibers. Examination of Exhibit 2 (questioned fibers found on the suspect's knife) disclosed the presence of light green acrylic fibers. Comparative examinations of the light green acrylic fibers in Exhibit 2 to the light green acrylic fibers that compose the yarn in Exhibit 1 disclosed them to be inconsistent in their physical characteristics. As a result of these findings, these questioned light green acrylic fibers could not have originated from the source of yarn in Exhibit 1. Examination of Exhibit 3 (questioned fibers found on the suspect's sweatshirt) disclosed the presence of light green acrylic fibers. Comparative examinations of the light green acrylic fibers in Exhibit 3 to the

TABLE 4

WebCode	Conclusions
	light green acrylic fibers that compose the yarn in Exhibit 1 disclosed them to be inconsistent in their physical characteristics. As a result of these findings, these questioned light green acrylic fibers could not have originated from the source of yarn in Exhibit 1.
74QJDT	Comparative examinations of Exhibit 1 (known section of yarn from victim's sweater) with fibers recovered from Exhibit 2 (questioned fibers found on the suspect's knife) and Exhibit 3 (questioned fibers found on the suspect's sweater) disclosed them to be inconsistent in their overall physical characteristics and chemical characteristics. As a result of these findings, the recovered fiber(s) from Exhibits 2 and 3 could not have originated from Exhibit 1.
7C9R2P	The fibers found on the suspect's knife (item-2) and the fibers found on the suspect's sweatshirt (item 3) were inconsistent with the fibers from the section of yarn of the victim's sweater (item-1). To ensure that the yarn (Item-1) is representative of the entire victim's sweater and to exclude the victim's sweater as a potential source, further reference sample should be taken from that sweater.
7DFAYK	In my opinion, using low power microscopy only, comparisons show that the fibres submitted as items two and three (from the suspect) are indistinguishable from the constituent fibres of item one (victim's sweater). 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.
7MQCKL	The samples were examined utilizing polarized light microscopy, infrared spectrometry (FTIR) and UV-VIS Microspectrophotometry (MSP). The questioned acrylic fibers from Item #2 differed in diameter with the submitted known acrylic fiber sample from Item #1 and did not originate from that source (elimination). The questioned acrylic fibers from Item #3 differed in color (as measured via MSP) with the submitted known acrylic fiber sample from Item #1 and did not originate from that source (elimination). Note that the questioned fibers were very close in the characteristics that eliminated the fibers from the known sample. It is possible that these samples are from the same source and the differences are due to sample heterogeneity. Please submit the entire sweater from which the Item 1 known sample was taken for additional sampling.
8NGUZR	Items 1, 2, and 3 were analyzed using stereomicroscopy, polarized light microscopy, comparison polarized light microscopy, infra-red spectroscopy, and fluorescence microscopy. Two (2) types of light green acrylic fibers found in Item 1 were different from the light green acrylic fibers found in Items 2 and 3 (Elimination). This means that the fibers found on the suspect's knife and sweatshirt did not originate from the victim's sweater. 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.

TABLE 4

WebCode	Conclusions
8QKPJV	Microscopic and UV-Vis/IR Spectroscopic examination of item #1 revealed a textile yarn that was composed of green acrylic fibers (K1). Microscopic examination and comparison of item #2 revealed numerous green acrylic fibers (Q1) that were not consistent with K1 from item #1 with respect to color, diameter and fluorescent properties. Therefore, item #2 (Q1) could not have originated from item #1 (K1). Microscopic and UV-Vis/IR Spectroscopic examination and comparison of item #3 revealed numerous green acrylic fibers (Q2) that were not consistent with K1 from item #1 with respect to fluorescent and UV-Vis properties. Therefore, item #3 (Q2) could not have originated from item #1 (K1).
8RT6Q2	On analysis, I found: i. The questioned fibers found on the suspect's knife (Item 2) to be acrylic, similar to the known section of yarn from victim's sweater (Item 1). ii. The questioned fibers found on the suspect's sweatshirt (Item 3) to be acrylic, similar to the known section of yarn from victim's sweater (Item 1). Therefore, I am of the opinion that: i. The questioned fibers found on the suspect's knife (Item 2) could have originated from the known section of yarn from victim's sweater (Item 1). ii. The questioned fibers found on the suspect's sweatshirt (Item 3) could have originated from the known section of yarn from victim's sweater (Item 1).
8WMPYN	ITEMS: 1 a sealed manila envelope identified as "2021 CTS Forensic Testing Program TEST No. 21-5439: FIBER ANALYSIS" containing: 1-1 a light green fiber bundle in a sealed manila envelope identified as "Test No. 21-5349 Item 1"; 1-2 light green fibers in a sealed manila envelope identified as "Test No. 21-5349 Item 2"; 1-3 light green fibers in a sealed manila envelope identified as "Test No. 21-5349 Item 3." RESULTS: The light green fibers in items #1-1, #1-2, and #1-3 were examined using comparison microscopy and polarized light microscopy (PLM). Based upon the fibers analyzed, the light green, synthetic fibers in item #1-2 were consistent in physical and optical properties with the fibers composing the representative sample from the sweater, item #1-1. No observable differences were observed in the physical or optical properties when comparing the fibers from item #1-2 to the representative sample of fibers from item #1-1. Due to limitations with laboratory instrumentation, a comparison of the chemical properties of item #1-2 to item #1-1 could not be completed at this time. Further analysis can be performed when the Fourier Transform Infrared Spectrometer has been installed and validated. Based upon the fibers analyzed, the light green, synthetic fibers in item #1-3 were consistent in physical and optical properties with the fibers composing the representative sample from the sweater, item #1-1. No observable differences were observed in the physical or optical properties when comparing the fibers from item #1-3 to the representative sample of fibers from item #1-1. Due to limitations with laboratory instrumentation, a comparison of the chemical properties of item #1-3 to item #1-1 could not be completed at this time. Further analysis can be performed when the Fourier Transform Infrared Spectrometer has been installed and validated. The light green, synthetic fibers in items #1-1, #1-2, and #1-3 optically correspond to acrylic fibers. OPINION: The light green, synthetic fibers from item #1-2 could have originated from the representative sample from the sweater, item #1-1, or another source of fibers with the same physical and optical properties. This is a Type IV Association. See Association key below. The light green, synthetic fibers from item #1-3 could have originated from the representative sample from the sweater, item #1-1, or another source of fibers with the same physical and optical properties. This is a Type IV Association. See Association key below.
8YEUCW	The questioned fibers from the suspect's knife (Item 2) and suspect's sweatshirt (Item 3) consisted of light green acrylic fibers. These fibers are dissimilar in color and/or optical properties to the known fibers from the yarn from the victim's sweater (Item 1). It is my opinion that these fibers did not originate from the yarn from the victim's sweater.
96H2RY	The questioned fibers found on the suspect's knife (Item 2) and the suspect's sweatshirt (Item 3) couldn't have originated from the victim's sweater (Item 1).
9GP7HR	On the basis of the samples received and the examinations conducted, I have formed the opinion that the fibres comprising item 1 (known section of yarn from victim's sweater) could not be a source of the fibres found in either of items 2 (questioned fibers found on the suspect's knife) or 3 (questioned fibers found on the suspect's sweatshirt).
9GTTWK	1.) Item1 have four ties of fibers. Two of those have fluorescence under UV light, and the others don't.

TABLE 4

WebCode	Conclusions
	2.) According to the results of microscopic examination, cross-section, FTIR, PY-GCMS, SEM/EDS and UV light, the composition of Item2 and Item3 are similar to Item1. 3.) The diameter of Item2 is slightly smaller than that of Item1 and Item3, when using SEM(x1000) to observe. Maybe it's caused by pulling fibers.
9UD9ZK	The fibres recovered from the suspect's knife and sweatshirt are different to the component fibres of the victim's sweater.
A4XYZG	Combining results from FTIR and SEM techniques we conclude that Item 2 (suspect's knife) can be excluded as having originated from Item 1 (victim's sweater) even though the chemical composition appears to be very similar, as the diameter of the fibres is different. Item 3 (suspect's sweatshirt), however, cannot be excluded as having originated from Item 1 (victim's sweater) as the chemical composition appears to be very similar and although the diameter of the fibres is larger than those from Item 1, the results fall within the 5% error margin.
AEGE3J	Items number 2 x 3 could have been originated from the same source.
BFU34B	The results of the trace evidence (fiber) examinations are included in this report. Methods: Microscopic examination of textile fibers is accomplished by using one or more analytical techniques including stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy. The microscopic characteristics and optical properties determined by these techniques are used for the examination and comparison of fibers. Results of Examination: Green manufactured fibers recovered from Items 2 and 3 exhibit dissimilar optical properties to fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the same source as Item 1. No other fibers were recovered from Items 2 and 3. The specimens were examined using the following techniques as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy. Interpretation: Fibers can differ as to type (e.g., rayon, cotton), color, shape, size, microscopic features (e.g., delustrant, voids) and optical properties (e.g., refractive index, sign of elongation). These are characteristics that may associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods. The characteristics and optical properties of the fiber(s) are used as comparison criteria. When the characteristics and optical properties of a recovered fiber(s) are the same as a known sample, the recovered fibers are consistent with originating from the source of the known sample, or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. However, due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a fiber selected at random to be consistent with a particular item. The inability to associate persons/items through a microscopic fiber examination does not necessarily mean the persons/items of interest had no contact. A number of factors can produce this result, including: 1) Fiber evidence may not have transferred. 2) Fibers that did transfer may have been lost prior to submission to the laboratory. 3) The fibers transferred or the known sample submitted may not be representative of the source. 4) The fibers may be from a different source.
CFQ3GF	Fibers from the yarn in item 1 share similar chemical, morphological, and microscopic characteristics with fibers from items 2 and 3; however, differences in fluorescence microscopy characteristics were observed between item 1 and items 2 and 3. These differences could be due to various reasons including but not limited to: the fibers originate from different sources; the fibers are dyed with different dyes, environmental factors, non-homogeneous samples, differences in fibers from various locations on the garment, laundry detergent effects, time between deposition of the fibers and recovery of the reference garment, etc. Because an explanation for these inconsistencies is unknown, it is inconclusive as whether items 2 and 3 share a common source with item 1.
CVEFTM	The fibers from Item 1 (known yarn from victim's sweater), Item 2 (from suspect's knife), and Item 3 (from suspect's sweatshirt) were identified as acrylic fibers. The fibers in Item 2 are similar in color, physical properties, and chemistry to some of the acrylic fibers in Item 1 but differ in fluorescence

TABLE 4

WebCode	Conclusions
	microscopy. The fibers from Item 2 could not have originated from the same fiber source of Item 1. The fibers in Item 3 are similar in physical properties and chemistry to some of the fibers in Item 1 but differ in measured color and fluorescence microscopy when compared with the fibers in Item 1 and could not have originated from the same source of fibers as Item 1. Items 1, 2, and 3 were examined visually and using stereomicroscopy, Polarized Light Microscopy (PLM), Fluorescence Microscopy, Fourier-Transform Infrared Spectroscopy (FT-IR), and Microspectrophotometry (MSP).
CWW84T	Based on microscopic and physical properties, the known fibers (item 1) are not a source of the fibers in items 2 and 3.
D7GX4P	Fibers from the knife (Item 2) and sweatshirt (Item 3) could not have originated from the sweater as represented by the submitted Item 1 yarn.
DBBR2Q	Item 1: Known section of yarn from victim's sweater. This item was used as a comparison standard. Item 2: Questioned fibers found on the suspect's knife. The questioned fibers are dissimilar in fluorescence to the known section of yarn from the victim's sweater (Item 1). It is our opinion that the questioned fibers did not originate from the victim's sweater. Please note that a visual color comparison was started, however, not completed due to the above results. Item 3: Questioned fibers found on the suspect's sweater. The questioned fibers are dissimilar in fluorescence to the known section of yarn from the victim's sweater (Item 1). It is our opinion that the questioned fibers did not originate from the victim's sweater. Please note that a visual color comparison was started, however, not completed due to the above results.
DBQBLN	The examined light green acrylic fibers from items 1 and 2 were similar by comparison microscopy, cross sections, infrared spectroscopy, and microspectrophotometry. Item 2 could have originated from the victim's sweater (as represented by item 1) or another textile of similar manufacture. The examined light green acrylic fibers from items 1 and 3 were similar by comparison microscopy, cross sections, and infrared spectroscopy. There were some slight differences between the items by microspectrophotometry. Thus, it is inconclusive whether item 3 could have originated from the victim's sweater (as represented by item 1). Please contact the Crime Laboratory for submission of the victim's sweater for additional testing and comparisons.
DDGCRC	The source of Item 1 is included as a possible source of unknown items 2 and 3 based on class characteristics. Class characteristics include manufacturing characteristics and fiber type.
DU3ZYL	The fibers in Items 1 and 3 were found to be alike in chemical composition and physical characteristics. Therefore, the fibers in Item 3 may have originated from the same source as the fibers in Item 1. The fibers in Item 2 were found to be dissimilar to the fibers in Item 1. Methods of Analysis: Polarized Light Microscopy, Micro Spectrophotometry, Fourier Transform Infrared Spectrophotometry
EMXFCG	Microspectrophotometry and fluorescence microscopic exams yielded two different types of acrylic fibers in item 1 (victim's sweater). While one of these two fiber types matches all criteria of fibers in item 2 (fibers found on suspect's knife), the second fiber type of the victim's sweater is missing on the suspect's knife. Assuming a contact between the knife and the sweater, in which the sweater was damaged by the knife's blade, it is unlikely that the fibers from the suspect's blade (item 2) originate from a textile similar to the victim's sweater (item 1). The questioned fibers found on the suspect's sweater (item 3) do not match the fibers from the sweater worn by the victim (item 1) in all examined criteria.
FXB3XM	The above items were submitted for examination and comparison to determine if the questioned fibers (Items 2 and 3) could have come from the victim's sweater as represented by the yarn section (Item 1). Item 2 consisted of light green synthetic fibers that were reportedly collected from the suspect's knife, and Item 3 consisted of light green synthetic fibers that were reportedly collected from the suspect's sweatshirt. The questioned fibers from the knife and sweatshirt (Items 2 and 3) were compared to the known yarn fibers from the victim's sweater (Item 1) using the following methods: brightfield microscopy, fluorescence microscopy, microspectrophotometry (MSP), and infrared spectroscopy (IR). Items 1, 2, and 3 were all composed of acrylic fibers that were similar in brightfield microscopic characteristics (e.g., color, diameter, approximate shape, and birefringence). Due to limitations of the samples, MSP provided inconclusive results. The fluorescence properties of the known fibers of Item 1 and the

TABLE 4

WebCode	Conclusions
	questioned fibers of Items 2 and 3 differed. Therefore, in the opinion of the undersigned, the sweater represented by known fibers within Item 1 is excluded as the source of the questioned fibers in Items 2 and 3 (Elimination). Note: Due to the limited sample size of the known fibers, please contact the undersigned if the entire victim's sweater is available to be submitted for further comparisons. Additional comparisons can also be performed between the questioned fibers and the suspect's sweatshirt. Please contact the undersigned if these known items will be submitted to the laboratory.
G4WCKQ	Items 2 and 3 were examined for the presence of fibers that could have originated from item 1; none were found. This finding provides no support for the proposition that items 2 & 3 had been in contact with item 1*. *In assessing the evidential significance of the finding I have used the following scale of support- no support, weak support, support, strong support.
GPZZCL	The requested analysis was to determine if the questioned fibers found on the suspect (Items 2 and 3) could have come from the sweater worn by the victim (Item 1 known fibers). Items 1, 2 and 3 were examined visually, microscopically (stereo, polarized light, and fluorescence) and by infrared spectroscopy. The acrylic questioned fibers from Items 2 and 3 differed by fluorescence microscopy from the known acrylic fibers from Item 1 and did not originate from that source (Elimination). No further examinations were conducted.
GXQLHK	All are acrylic but the phenology of the fiber's "waves" are different. Waves of sample 2 fibers are very short for some of them compared to sample 1. Sample 3, fiber's waves are very flat. Is it because of packaging? Also, fibers from sample 3 were very very static compared to all the other samples. Inconclusive for sample 3.
H7JD4J	The fibers from Item 3 are similar to the fibers from Item 1 in color, diameter, cross-section, and chemical composition, and could have originated from Item 1 or another yarn with the same characteristics. The fibers from Item 2 are dissimilar to the fibers from Item 1 in color and diameter, and could not have originated from Item 1.
HDF943	Light green fibers recovered from the Item 2 and Item 3 debris are dissimilar to the light green fibers comprising the Item 1 yarn. Accordingly, the fibers are not consistent with originating from Item 1. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, where appropriate.
HF86QB	IMO, the fibres recovered from the suspects knife (item 2) & suspects sweatshirt (item 3) could not have originated from the victims sweater (item 1)
HMQB4P4	Methods: Microscopic examination of fibers is accomplished by using one or more analytical techniques including stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy. The microscopic characteristics and optical properties determined by these techniques are used for the examination and comparison of fibers. Results of Examinations: Textile fibers recovered from Items 2 and 3 exhibit dissimilar optical properties to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the source of Item 1. These fibers have been preserved for future comparison purposes. The specimens were examined visually and using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy. Interpretation: Fibers can differ as to type (e.g. rayon, cotton), color, shape, size, microscopic features (e.g. delusterant, voids) and optical properties (e.g. refractive index, sign of elongation). These are characteristics that may associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods. The characteristics and optical properties present in fiber(s) are used as comparison criteria. When the characteristics and optical properties of a recovered fiber(s) are the same as a known sample, the recovered fibers are consistent with originating from the source of the known sample, or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. However, due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a fiber selected at random to be consistent with a particular item. The inability to associate persons/items

TABLE 4

WebCode	Conclusions
	<p>through a microscopic hair/fiber examination does not necessarily mean the persons/items of interest had no contact. A number of factors can produce this result, including: 1) Hair/fiber evidence may not have transferred. 2) Hairs/fibers that did transfer may have been lost prior to submission to the laboratory. 3) The hairs/fibers transferred or the known sample submitted may not be representative of the source. 4) The hairs/fibers may be from a different source.</p>
HNYM6J	<p>METHODS: Fibers composing Item 1 and fibers from Items 2 and 3 were examined using stereomicroscopy, comparison microscopy, fluorescence microscopy, polarized light microscopy (PLM), microchemical tests, Fourier Transform Infrared Spectrophotometry (FTIR), and Microspectrophotometry (MSP). RESULTS AND INTERPRETATIONS: Item 1 consisted of one (1) piece of green yarn composed of yellow-green acrylic fibers. Items 2 and 3 contained yellow-green acrylic fibers. Based on the fibers examined, the Item 2 and 3 yellow-green acrylic fibers could not be associated with the yellow-green acrylic fibers composing Item 1 due to differences in color and fluorescence (Exclusion/Elimination). TERMINOLOGY KEY FOR COMPARATIVE EXAMINATIONS: Level I - Physical/Fracture Match: Physical Fit is reached when the items that have been broken, torn, or separated exhibit physical features that correspond/re-align in a manner that is not expected to be replicated. Level II - Association with Highly Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Additionally, the items share unusual characteristics that would rarely be expected to occur in the relevant population. This is the highest degree of association that can be determined in the absence of a Physical Fit. Level III - Association with Discriminating Characteristics: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. Other items have been manufactured or could occur in nature that would also be indistinguishable from the submitted items and could be encountered in the relevant population. The analytical techniques used in the analysis of these items can provide high levels of discrimination among natural and manufactured materials. This is considered a high degree of association. Level IV - Association with Limitations: An association in which items could not be differentiated based on the examinations conducted. Therefore, the possibility that the items came from the same source cannot be eliminated. As compared to the categories above, this type of association has decreased evidential value. For example, the items are more commonly encountered in the relevant population, minor variations were observed, or a complete analysis was not performed due to limited characteristics or sample size. Minor variations, for certain types of examinations, could be due to factors such as contamination of the sample(s) or having a sample of insufficient size to adequately assess heterogeneity of the entity from which it was derived. Inconclusive: No conclusion could be reached regarding an association or an elimination between the items. Exclusion with Limitations: The item exhibits differences from the comparison sample that support that it did not originate from the source, as represented by the comparison sample. An Exclusion/Elimination conclusion was not reached due to limiting factors, such as possible natural or manufactured source variations. Exclusion/Elimination: The items exhibit differences that demonstrate the items did not originate from the same source.</p>
HUNZ78	<p>Microscopic and instrumental examination and comparison of the representative fibers from Items 1 and 3 revealed lime green kinky acrylic fibers found to be similar in microscopic and chemical properties, and color characteristics. They could have come from the same source or any other source with the same properties. Microscopic and instrumental examination and comparison of the representative fibers from Items 1 and 2 revealed lime green kinky acrylic fibers found to be dissimilar in chemical properties. They could not have come from the same source.</p>
HXP9BH	<p>The fibers in Items 2 and 3 exhibited no significant differences in optical characteristics, physical characteristics, fluorescence and chemical composition from Item 1, therefore the fibers in Items 2 and 3 could have originated from the same source as the fibers in Item 1 or another similar source of light green acrylic fibers.</p>
J7XZDK	<p>Item 1 - The yarn from the victim's sweater is composed of light green acrylic fibers and was used for comparison purposes. Item 2 - The questioned fibers from the suspect's knife are composed of light green synthetic fibers. A portion of the questioned fibers were selected for further analysis and were</p>

TABLE 4

WebCode	Conclusions
	determined to be dissimilar in size and fluorescent properties to the known light green acrylic fibers from the victim's sweater (01-01). It is our opinion that the questioned fibers from the suspect's knife did not originate from the victim's sweater. (Category 5) No analysis was performed on the remaining fibers. Item 3 - The questioned fibers from the suspect's sweatshirt are composed of light green acrylic fibers. A portion of the questioned fibers were selected for further analysis and were determined to be dissimilar in color to the known light green acrylic fibers from the victim's sweater (01-01). It is our opinion that the questioned fibers from the suspect's sweatshirt did not originate from the victim's sweater. (Category 5) No analysis was performed on the remaining fibers.
JL2VD	Item 1 to Item 3 were found to consist of acrylic fibres based on microscopic characteristics, chemical composition and solubility test. Based on fluorescence, the clump of green fibres marked Item 2 and Item 3 were found to be different from the fibres constituting the green yarn marked Item 1.
JMHQCK	The green acrylic fibers in items 2 and 3 were instrumentally (microspectrophotometry) different from the green acrylic fibers in item 1. This indicates that the fibers in items 2 and 3 do not share a common origin with the fibers in item 1.
JQNNUK	The known yarn from the victim's sweater (item 1) contained two different types of pale green acrylic fibres. The questioned fibres found on the suspect's knife (item 2) and the questioned fibres found on the suspect's sweatshirt (item 3) both contained pale green acrylic fibres. These questioned fibres were compared to the known yarn by their microscopic appearance, fluorescent properties, cross-section shape and chemical composition. The fibre colours were also compared using microspectrophotometry. The questioned fibres found on the suspect's knife (item 2) had different fluorescent properties compared to the known fibres from the victim's sweater. Therefore, in my opinion, the fibres from the knife have not come from the victim's sweater. The questioned fibres found on the suspect's sweatshirt (item 3) were distinguished from the known fibres from the victim's sweater using microspectrophotometry. Therefore, in my opinion, the fibres from the suspect's sweatshirt have not come from the victim's sweater.
JUU39G	The section of yarn from the victim's sweater (item 1) was found to consist of a section of light green, acrylic yarn. The fibres recovered from the suspect's knife (item 2) were also found to consist of light green acrylic. However these fibres were found to have a different dye composition to the yarn from the victim's sweater (item 1) and therefore could not have originated from that source. The fibres recovered from the suspect's sweatshirt (item 3) were also found to consist of light green acrylic. However these fibres were found to have a different dye composition to the yarn from the victim's sweater (item 1) and therefore could not have originated from that source.
KCEVUF	Items 1, 2, and 3 were examined by stereomicroscopy, polarized light microscopy, comparison light microscopy, fluorescence microscopy, and infrared spectroscopy. The lime-green acrylic fibers found on Items 2 and 3 were different from the lime-green acrylic fibers in Item 1 (Elimination). This means the fibers found on the suspect's knife and on the suspect's sweatshirt did not come from the victim's sweater.
KFHQDH	The fibres recovered from the suspect's knife and sweatshirt can be discriminated from those used to produce the victim's sweater. The (received part of the) sweater (Item 1) is excluded as the source of the fibres recovered from suspect's knife (Item 2) and sweatshirt (Item 3).
KW3GCH	The questioned fibres from the knife (Item 2) and the suspect's sweatshirt (Item 3) did not originate from the sample of yarn from the victim's sweater (Item 1).
L4XY4Y	The green fibers found in Items 2 and 3 are microscopically dissimilar to the green fibers comprising the known yarn sample in Item 1; accordingly, the Item 2 and Item 3 green fibers are not consistent with originating from the same source as the Item 1 known yarn sample. The items were examined visually using stereomicroscopy, comparison microscopy, and polarized light microscopy, and instrumentally using microspectrophotometry, as appropriate.
LHHTPH	Based on fluorescence microscopy, the fibres recovered from the suspect's knife (Item 2) and the fibres recovered from the suspect's sweatshirt (Item 3) were differentiated from the victim's sweater (as represented by Item 1). Therefore, the fibres recovered from the suspect's knife (Item 2) and the fibres recovered from the suspect's sweatshirt (Item 3) could not have come from the victim's sweater (as

TABLE 4

WebCode	Conclusions
	represented by Item 1). Based on FTIR and Raman analysis the fibres constituting Item 1 (know section of yarn from the victim's sweater), Item 2 (questioned fibres found on the suspect's knife), and Item 3 (questioned fibres found on the suspect's sweatshirt) are identified as acrylic.
LMD86Y	Green textile fibers recovered from Item 2 and Item 3 exhibit dissimilar microscopic characteristics and optical properties to the green textile fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the source of Item 1.
MD43R9	The samples from Item 1, 2 and 3 are very pale. Fibers from each item are not "homogeneous" (for color analysis). Analytical techniques used show differences and similarities for the 3 items. Those differences (and similarities) are not "sufficient" to allow us to determine if Item 2 and Item 3 can come from the same source as Item 1.
MMP8Y9	The fibers found on the suspect's knife (Item 2) and on the suspect's sweatshirt (Item 3) don't match the fibers from victim's sweater (Item 1).
MTVZU4	Examination and comparison between the questioned fiber found on the suspect's knife (Item 2) and known fiber from victim's sweater were consistent in microscopic structures, colour, diameter of fiber and chemical composition (Both Item 1 and Item 2 were identified as Acrylic Fiber). Examination and comparison between the questioned fiber found on the suspect's sweatshirt (Item 3) and known fiber from victim's sweater (Item 1) were consistent in microscopic structures and chemical composition (Both Item 1 and Item 3 were identified as Acrylic Fiber). However, they also have significant differences in terms of colour and diameter of fiber between questioned fiber found on the suspect's sweatshirt (Item 3) and known fiber from victim's sweater (Item 1). Based on the above findings, in my professional opinion; I. Questioned fiber found on the suspect's knife (Item 2) could have originated from the victim's sweater (Item 1). II. Questioned fiber found on the suspect's sweatshirt (Item 3) could not have originated from the victim's sweater (Item 1).
NVEC7E	Items 1A-1C were examined visually, stereoscopically, microscopically and instrumentally using Fourier Transform Infrared Spectrometry (FTIR). The fibers from Items 1B and 1C were visually, microscopically and instrumentally consistent with the fibers from the yarn in Item 1A. This indicates the fibers recovered from the suspect's knife (Item 1B) and the suspect's sweatshirt (Item 1C) and the yarn from the victim's sweater (Item 1A) could share a common origin. Questioned Items 1B and 1C could also have originated from additional sources that are indistinguishable in all assessed examinations and analyses. No statistical or numerical probabilities can be applied to the conclusions of this report.
NX7BJD	I started the examination of the submitted evidence items on March 1, 2021. The section of yarn, item 001-1, consists of four plies of fibers twisted together. I compared the fibers in this yarn with the tufts of fibers in items 001-2 and 001-3. I assumed that each tuft of fibers in each item represents fibers from a single source. I used stereo microscopy, polarized light microscopy, comparison microscopy, fluorescence microscopy, infrared microspectrophotometry, and ultraviolet-visible microspectrophotometry in this comparison. The fibers in all three items are the same type of acrylic fiber of similar color. The fibers in item 001-1 and 001-3 exhibit similar variation in diameter and cross sectional shape of the fibers. The fibers in item 001-2 exhibit a smaller average diameter than the reference fiber, item 001-1, however, the range of the diameters of the fibers in 001-2 overlaps the range of diameters in item 001-1. The reference yarn, item 001-1, shows significant variation in its fluorescence colors and intensity within each ply of fibers in the yarn. Comparison of items 001-2 and 001-3 to item 001-1 shows differences in fluorescence. Therefore, the fibers in item 001-1 are distinguishable from the fibers in items 001-2 and 001-3. CONCLUSION: The fibers in item 001-1 are distinguishable from the fibers in items 001-2 and 001-3 by fluorescence microscopy. The fibers from item 001-2 and 001-3 either did not originate from fabric as represented by the yarn, item 001-1, or the reference yarn sample, item 001-1, is not representative of the fluorescence features of the reference fabric. The fluorescence of fibers can change because of differences in environmental conditions or treatment of a fabric. For this reason, a determination as to whether items 001-2 and 001-3 could have originated from item 001-1 is inconclusive.
PKXRLH	Item 2 is not consistent with item 1. Item 3 is consistent with item 1.

TABLE 4

WebCode	Conclusions
PPAVAY	[No Conclusions Reported.]
QWKJLD	<p>The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, fluorescence, FTIR and solubility testing. Examination of Item 1 revealed the presence of a lime green yarn. Examination of Item 2 revealed the presence of a clump of light green fibers. These fibers are not consistent with the fibers from the yarn in Item 1. Therefore, the fibers in Item 2 could not have originated from the same source as the yarn in Item 1. Examination of Item 3 revealed the presence of a clump of light green fibers. These fibers are not consistent with the fibers from the yarn in Item 1. Therefore, the fibers in Item 3 could not have originated from the same source as the yarn in Item 1. According to the Technical Procedure for the Examination of Fibers at this laboratory, if at any point during the course of examination items are found to be inconsistent with one another, analysis may be halted and a lab report issued stating a negative finding. However, as it was requested to identify the fiber types in these items, representative samples of fibers from Items 1, 2 and 3 were analyzed for identification purposes only. Analysis of the representative fibers from Items 1, 2 and 3 revealed them each to be acrylic fibers.</p>
R2YD2A	<p>CONCLUSIONS: Questioned fibers identified as from the suspect's knife (Item 2) originated from the sweater (Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Questioned fibers identified as from the suspect's sweatshirt (Item 3) did not originate from the area of the sweater represented by Item 1. RESULTS: Questioned fibers identified as collected from the suspect's knife and sweatshirt (Items 2 and 3) were examined to determine whether or not they are consistent with known fibers identified as from the victim's sweater (Item 1). The yarn identified as from the victim's sweater (Item 1) is primarily composed of two types of light green acrylic fibers. Examination and comparison of questioned fibers identified as from the suspect's knife (Item 2) reveals they are consistent in microscopic, optical, and chemical characteristics with one of the types of known fibers of the victim's sweater (Item 1). It is therefore concluded the questioned fibers originated from the sweater or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Examination and comparison of questioned fibers identified as from the suspect's sweatshirt (Item 3) with known fibers of the victim's sweater (Item 1) reveals they are inconsistent in optical characteristics. It is therefore concluded the questioned fibers did not originate from the area of the sweater represented by Item 1. METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform infrared microspectroscopy.</p>
RCUKXT	<p>The green manufactured fibers recovered from Item 2 and Item 3 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, based on the Item 1 known sample, the Item 2 and Item 3 fibers are not consistent with originating from the Item 1 sweater. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, where appropriate.</p>
RMD2PZ	<p>All three items are found to contain manufactured fiber Acrylic. Item 2 and Item 3 are found to be similar, therefore, they could have originated from Item 1</p>
UGFJ2Y	<p>In my opinion the fibres recovered from the suspect's knife (Item 2) and the fibres recovered from the suspect's sweatshirt (Item 3) cannot have originated from the victim's sweater as represented by Item 1.</p>
ULVQMD	<p>The questioned light green acrylic fibers recovered from the Suspect's Sweatshirt (Item #3) exhibits the same physical, chemical and microscopic properties as the known light green acrylic yarn recovered from the Victim's Sweater (Item #1) indicating that these acrylic fibers could have originated from the same source. It should be noted that individual textile fibers do not possess enough distinct microscopic characteristics to be positively identified as originating from a particular garment to the exclusion of all other garments. The questioned light green acrylic fibers recovered from the Suspect's Knife (Item #2) do not exhibit the same physical properties as the known light green acrylic fibers recovered from the Victim's Sweater (Item #1) indicating that these acrylic fibers could not have originated from the same source.</p>

TABLE 4

WebCode	Conclusions
UQ884A	Based on the examinations conducted, it is my opinion that the questioned fibres submitted from both the suspect's knife and suspect's sweatshirt did not come from the yarn said to be from the victim's sweater.
UZCPUY	A) Items 1, 2 and 3 displayed microscopic characteristics and birefringent properties consistent with one another. All 3 fibres could therefore have originated from the same source. B) The microscopic and birefringent properties are consistent with that of acrylic.
VE8QK6	Examination of Item 2, questioned fibers represented as having been collected from the suspect's knife, revealed the presence of numerous light green fibers. Macroscopic and microscopic examinations and comparisons of at least 50 of the light green fibers from the suspect's knife (Item 2) revealed that they were different in microscopic characteristics from the light green acrylic fibers comprising the section of yarn from the victim's sweater (Item 1), and therefore could not have originated from that source. Examination of Item 3, questioned fibers represented as having been collected from the suspect's sweatshirt, revealed the presence of numerous light green fibers. Macroscopic and microscopic examinations and comparisons of at least 50 of the light green fibers from the suspect's sweatshirt (Item 3) revealed that they were different in microscopic characteristics from the light green acrylic fibers comprising the section of yarn from the victim's sweater (Item 1), and therefore could not have originated from that source.
VJLZU	Item 2 and Item 3 could have not originated from Item 1 because both Item 2 and 3 are not consistent with Item 1 in fluorescent characteristic.
VTCPVX	Items 1, 2 and 3 all contain one fiber type and color. The fibers are acrylic. The fiber size and cross sections are all very similar. X-ray spectra of the fibers from each Item are also similar. The fibers in Item 2 appear to have greater crimp than the fibers in Items 1 and 3. Based on this we concluded that Item 2 is not from Item 1. We extracted the dyes from each Item and obtained visible spectra of the dye extracts. The visible spectra for the dye from Item 3 is different from the visible spectra of the dye from Item 1. Based on this we concluded that Item 3 is not from Item 1.
VWCXY8	Item 1 is composed by light green fibers, without delustrant, they have a lobed cross-section and show dichroism under polarized light. Under fluorescence light, we could differentiate between two types of fibers, most of them have strong fluorescence under N2.1 Filter (515-560 nm) and weak fluorescence under A filter (340-380 nm), D Filter (355-380 nm) and I3 filter (450-490 nm). Others have strong fluorescence under all the filters. Regarding the type of fibers they are manufactured fibers identified as Acrylic by FTIR. Item 2 is composed by light green fibers, without delustrant, they have a lobed cross-section, and show dichroism under polarized light. Under fluorescence light, there is only one type of fibers with a weak fluorescence under all the filters. Regarding the type of fibers, they are manufactured fibers identified as Acrylic by FTIR. Item 3 is composed by light green fibers, without delustrant, they have a lobed cross-section and show dichroism under polarized light. Under fluorescence light, there is only one type of fibers with a strong fluorescence under N2.1 Filter (515-560 nm) and weak fluorescence under A filter (340-380 nm), D Filter (355-380 nm) and I3 filter (450-490 nm). Regarding the type of fibers, they are manufactured fibers identified as Acrylic by FTIR. Item 2 fibers differ from Item 1 fibers in size (Item 2 fibers are slightly smaller in diameter than Item 1 fibers) and in behavior under fluorescence light. In our opinion, that differences indicate that the fibers found on the suspect's knife have a different origin other than the victim's sweater. Item 3 fibers are very similar to Item 1 fibers in size, color, cross-section, etc... The only difference that we could find while comparing Item 1 and Item 3 fibers was a slightly different behavior under fluorescence light between Item 3 fibers and those Item 1 fibers that have strong fluorescence under N2.1 Filter (515-560 nm) and weak fluorescence under A filter (340-380 nm), D Filter (355-380 nm) and I3 filter (450-490 nm). In our opinion, this small difference is not significant enough as to exclude that the fibers found on the suspect's sweatshirt (item3) have probably originated from the victim's sweater (item1).
VWMYL7	The light green acrylic fibers found on the suspect's knife(item 2)are not consistent with the light green acrylic fibers of the yarn from victim's sweater(item 1). Item 2 could not be originated from item 1. The light green acrylic fibers found found on the suspect's sweatshirt (item 3)are not consistent with the light green acrylic fibers of the yarn from victim's sweater(item 1). Item 3 could not be originated from item 1.

TABLE 4

WebCode	Conclusions
VYDY2P	The yellow with green edge fibers recovered from Item 1 (Your Item 2) and the green fibers recovered from Item 2 (Your Item 3) are microscopically dissimilar from the fibers comprising Item 3 (Your Item 1). Accordingly, the fibers from Items 1 and 2 are not consistent with having originated from Item 3. The specimens were examined visually using stereomicroscopy, comparison microscopy, fluorescence microscopy, and polarized light microscopy, and instrumentally using microspectrophotometry, where appropriate.
WCFR78	1:In the sample analyzed, green acrylic fibers were found. These fibers were analyzed for comparison to items 2 and 3. 2:In the sample analyzed, light green acrylic fibers were found. The unknown fibers found on the suspect's knife either originated from the fiber standard from the victim's sweater (item #1) or another source of fibers possessing the same distinct physical, chemical and optical characteristics. 3:In the sample analyzed, light green acrylic fibers were found. The unknown fibers found on the suspect's sweatshirt either originated from the fiber standard from the victim's sweater (item #1) or another source of fibers possessing the same distinct physical, chemical and optical characteristics.
WFHPGZ	Based on microscopic characteristics, chemical composition and solubility tests, "Item 1" to "Item 3" were found to consist of acrylic fibres. Based on fluorescence, "Item 2" and "Item 3" were found to be different from "Item 1".
WH72F6	Item 2, the questioned fibers found on the suspect's knife, was revealed to contain one (1) bundle of green fibers. Approximately twenty-two (22) of the green fibers were macroscopically and microscopically examined and compared to the fibers comprising Item 1, the known section of yarn from the victim's sweater. These examinations revealed that the green fibers (Item 2) are different in microscopic characteristics from the green acrylic fibers comprising Item 1, the known section of yarn from the victim's sweater, and therefore could not have originated from that source. Item 3, the questioned fibers found on the suspect's sweatshirt, was revealed to contain one (1) bundle of green fibers. Approximately thirty (30) of the green fibers were macroscopically and microscopically examined and compared to the fibers comprising Item 1, the known section of yarn from the victim's sweater. These examinations revealed that the green fibers (Item 2) are different in microscopic characteristics from the green acrylic fibers comprising Item 1, the known section of yarn from the victim's sweater, and therefore could not have originated from that source.
XMU4YV	Item 1, recovered from the female's sweater, contained a thread comprised of two sorts of pale green acrylic fibres. Items 2 and 3, recovered from the male's knife and sweatshirt respectively, both contained a clump of fibres comprised of pale green acrylic fibres. The fibres comprising Items 2 and 3 were very similar to one sort of the pale green acrylic fibres comprising Item 1 but they were found to be distinguishable by microscopy. As such, there was no evidence to support the view that Items 2 and 3 could have originated from the female's sweater. In my opinion, one possible explanation for these findings is that the male had not grabbed the female as alleged. However, in my opinion, other possible explanations could include that he had grabbed the female as alleged but either without the transfer of her sweater fibres to his knife and sweatshirt or fibres were transferred but have been lost prior to the recovery of the items. Therefore, in my opinion, these findings do not assist in determining whether or not the male had grabbed the female as alleged.
XRQRF3	Exhibits 1, 2 and 3 are all comprised of microscopically similar green acrylic fibers that are consistent to one another in chemical composition; however, differences in size/diameter and fluorescence of the fibers were observed in the submitted samples that would support the conclusion that Exhibits 2 and 3 did not originate from the victim's sweater as represented by Exhibit 1 (EXCLUSION WITH LIMITATIONS). Since variability within one garment is possible, please submit the victim's sweater if additional comparisons are desired.
XUUMY7	The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, fluorescence, solubility, and FTIR. Examination of Lab Item # 1 (Known section of yarn from victim's sweater) revealed the presence of one (1) lime green yarn comprised of at least seven (7) different types of acrylic fibers found to be not consistent with the acrylic fibers in Lab Items # 2 or 3. Therefore, the fibers in Lab Items # 2 or 3 could not have originated from the same source as the yarn in Lab Item # 1. Examination of Lab Item # 2 (Questioned fibers found on the

TABLE 4

WebCode	Conclusions
	suspect's knife) revealed the presence of a tuft of lime green fibers comprised of at least two (2) different types of acrylic fibers found to be not consistent with the acrylic fibers from the yarn in Lab Item # 1. Therefore, the fibers in Lab Item # 2 could not have originated from the same source as the yarn in Lab Item # 1. Examination of Lab Item # 3 (Questioned fibers found on the suspect's sweatshirt) revealed the presence of a tuft of lime green fibers from comprised of at least three (3) different types of acrylic fibers found to be not consistent with the acrylic fibers from the yarn in Lab Item # 1. Therefore, the fibers in Lab Item # 3 could not have originated from the same source as the yarn in Lab Item # 1.
XV4RDU	The questioned fibers found on the suspect's knife (Item2) are dissimilar to the Known section of yarn from victim's sweater (Item1) (distinguishable). Therefore the questioned fibers found on the suspect's knife (Item2) could not have come from the Known section of yarn from victim's sweater (Item1). The questioned fibers found on the suspect's sweatshirt (Item3) are dissimilar to the Known section of yarn from victim's sweater (Item1) (distinguishable). Therefore the questioned fibers found on the suspect's sweatshirt (Item3) could not have come from the Known section of yarn from victim's sweater (Item1).
Y34E39	The green colored fibers recovered from the suspect's sweatshirt (Item #3) are similar in color, diameter, 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's sweatshirt (Item #3). The green colored fibers recovered from the suspect's knife (Item #2) are similar in color, some optical properties, and chemical properties to the known fibers from the victim's sweater (Item #1). Slight differences in fiber diameter were observed, however these differences were not deemed significant enough to exclude a common source. It is inconclusive whether the fibers from the victim's sweater (Item #1) could have been the source of the fibers found on the suspect's knife (Item #2) due to the differences noted.
Y9A8W4	A sample of fibers from the suspect's knife (exhibit 2), the suspect's sweatshirt (exhibit 3), and yarn from the victim's sweater (exhibit 1) were examined and compared using microscopic and instrumental methods*. The preponderance of the data indicated exhibits 1,2, and 3 were acrylic fibers. Additionally, differences were observed between exhibits 1, 2, and 3 using fluorescence comparison microscopy. Therefore in my opinion, the samples of questioned fibers from the suspect's knife and sweatshirt (exhibits 2 and 3) were dissimilar to the sample from the victim's sweater (exhibit 1). *Stereomicroscopic examination and comparison, light microscopic comparison, polarized light microscopic comparison, fluorescence microscopic comparison, and microscopic FT/IR spectroscopic analysis.
YPWLBW	Items #2 and #3 could not have originated from item #1.
YRKXA2	No fibres agreeing with the control fibres from victim's sweater were found from the questioned fibres from the suspect's knife or the suspect's sweatshirt. Based on the above laboratory findings, evidence of contact in the form of fibre transfer between the victim and the suspect could not be established through the examination of the respective items.
YTVZXL	Textile fibers found in Items 2 and 3 are optically dissimilar to fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined using stereomicroscopy, comparison microscopy, polarized light microscopy, and fluorescence microscopy, where appropriate.
YVMVKU	1.The sample received as the "Known section of yarn from victims sweater" (Item 1) is made by green acrylic fibers. 2. The sample received as the "Questioned fibers found on the suspect's knife" (Item 2)is made by green acrylic fibers. 3. The sample received as the "Questioned fibers found on the suspect's sweatshirt" (Item 3) is made by green acrylic fibers. 4. According with the physical properties evaluated, the questioned fibers received as item 3 are indistinguishable from the sample received as item 1.
Z244T4	Item 1 comprised a 4-ply yarn comprised of green fibres. These fibres were identified as non-delustered acrylic. Two fibre types with slight difference in colour were identified throughout the yarn. Item 2 comprised a tuft of green fibres. These fibres were identified as non-delustered acrylic. The fibres recovered from the suspect's knife (Item 2) differed in colour and fluorescence from both types of constituent fibres from the victim's sweater (Item 1) and could not have originated from this source. Item 3 comprised a tuft of green fibres. These fibres were identified as non-delustered acrylic. The fibres

TABLE 4

WebCode	Conclusions
Z26Q2P	<p>recovered from the suspect's sweatshirt (Item 3) differed in colour and fluorescence from both types of constituent fibres from the victim's sweater (Item 1) and could not have originated from this source.</p> <p>The light green acrylic fibers from items 1, 2 and 3 exhibit differences in their fluorescence. Accordingly, based on the known sample provided, item 1 cannot be included as a possible source of the item 2 or 3 questioned fibers.</p>
Z7WVR8	<p>The green acrylic fibers labeled questioned fibers found on the suspect's knife, item 2, display differences in color and physical characteristics as compared to the green acrylic fibers labeled known section of yarn from victim's sweater, item 1. Elimination. The green acrylic fibers labeled questioned fibers found on the suspect's sweatshirt, item 3, display differences in color and physical characteristics as compared to the green acrylic fibers labeled known section of yarn from victim's sweater, item 1. Elimination.</p>
ZWVBRZ	<p>Items 1, 2, and 3 are all vinyl acetate based acrylics (PLM / FTIR) with soft C-shaped cross-sections. Illumination with an alternate light source (455nm) revealed the known Item 1 yarn (from the victim's sweater) to be comprised of two different fibers, one of which fluoresces yellow (through an orange filter). No fluorescing fibers were seen amongst the two questioned samples (Item 2 from the suspect knife and Item 3 from the suspect sweatshirt). Additionally, the two known Item 1 fibers and both questioned fiber samples (Items 2 and 3) were found to be dissimilar in color (MSP). Although the spectral differences (MSP) between the non-fluorescing fibers in the known Item 1 yarn and the questioned Item 2 fibers from the knife were very slight, it should also be noted that the questioned Item 2 fibers were found to be finer than the known. The victim's sweater (as sampled) does not appear to be the source of the questioned fibers from the suspect's knife or sweatshirt.</p>

Additional Comments

TABLE 5

WebCode	Additional Comments
2BAVNY	MSP was not available.
2YXT32	The following disclaimer would be added: 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.
3DCFRP	This finding argues for direct contact between the victim's sweater, the suspected knife and the suspect's sweatshirt.
4769PR	Differences between trace fibres and comparison fibres in MSP-spectra.
4R9UPX	We have assumed that Item 1 is a representative sample of the victim's sweater. Item 1 contained two different fiber types, both were manufactured, acrylic.
74QJDT	differences in fluorescence microscopy and slight differences in microspectrophotometry lead to the elimination of items 2 and 3.
7MQCKL	I'm really not sure if this was a good test or a terrible one. The samples were more alike than in most other proficiency tests. The known sample had two types of acrylic fibers, one type was not found in the either questioned sample; the other type was similar to the questioned fibers from Items 2 and 3. These fibers varied in predominant diameter between items 1 and 2, but there was some overlap of diameter between the samples. Therefore; there were indistinguishable fibers between Items 1 and 2 but as so many were submitted, taken as a whole, the fibers from Item #2 were of a significantly smaller diameter. Item 3 differed slightly but consistently in MSP spectra with the known from Item 1. I am not entirely convinced that these differences are not due to sampling issues by CTS in preparation of the test but were significant enough to eliminate from the known sample as represented by the sample received.
8WMYPN	NOTE: Generally, textile materials are mass produced and it is not possible to state that a fiber originated from a particular garment.
9GP7HR	Laboratory processes usually require manufactured fibres to undergo analysis using FTIR microscopy to confirm their polymer type. Given the known and questioned fibres submitted in this instance could be differentiated based on their fibre diameters and fluorescence properties, the fibre types indicated in each of items 1 to 3 inclusive using the technique of polarised light microscopy were not confirmed using the technique of FTIR microscopy.
9UD9ZK	The fibres of items 2 and 3 were found to be different to fibres from item 1 following fluorescence microscopy. Therefore, for the purposes of this trial we have not explored further comparison by instrumental colour analysis. However, in casework we would consider further exploration, given the finding of large numbers of highly unusual fibres similar to a donor garment on critical recipient item (eg. a knife from a suspect). Consideration would also be given to the possibility of microscopic differences between the donor garment and the recovered fibres as a result of panel variation in the donor garment. In this trial we have assumed that item 1, a single yarn, is fully representative of the content of the victim's sweater. We are also aware that differences in the fluorescence of fibres can be caused by the action of chemical agents/environmental factors.
AEGE3J	The above conclusion is made based on FT-IR examination.
CFQ3GF	I would request answers to numerous questions that might explain these differences, and ask for submission of the entire garment related to item 1 if available.
DDGCRC	For other fibers to be considered as possible sources, they would have to possess the same class characteristics as items 2 and 3.
EMXFCG	For better concluding, information if the victim's sweater was damaged by the knife's blade would be desirable in the scenario. Normally in such a case we would additionally examine the victim's sweater regarding textile damages.
FXB3XM	An Association Scale would be provided.

TABLE 5

WebCode	Additional Comments
KCEVUF	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.
KFHQDH	Item 1 is a thread consisting of four strands. These strands are similar in colour, but have different fluorescence properties. Both traces (samples 2 and 3) are similar to fibres in sample 1 with respect to colour and material type. Nevertheless, consistent differences were found. It is known that fluorescence properties can be affected by external factors, including washing and exposure to sunlight. However, the obtained information states that the suspect was apprehended shortly after the incident. Therefore we concluded that the differences between items 1, 2, and 3 are not caused by external factors. It is assumed that item 1 is representative of the victim's sweater. However, the fibre content of a garment can be inhomogeneous. We would urge further sampling of the sweater.
KW3GCH	The conclusion is based on the samples submitted.
MMP8Y9	Item 1 consists two acrylic fibers with different properties in fluorescence microscopy and different MSP VIS spectra. All examined fibers (Item 1, 2 and 3) are the most probably composed of acrylonitrile-vinyl acetate copolymer.
NX7BJD	The reference yarn exhibits a great deal of variation in fluorescence between the various fibers within this sample. Therefore, assessing the weight of differences between the known and the questioned fibers is difficult. Fluorescence can change with fabric treatments and environmental conditions. I have no idea whether this was done intentionally or accidentally or if all the yarns in this fabric exhibit similar variation in fluorescence microscopy. For this reason, I chose inconclusive as the best conclusion in this case.
QWKJLD	Having loose clumps of fibers submitted as questioned items and requesting the analyst to identify all fiber types in the item is not a practical or fair test of analyst's knowledge. A loose clump could contain several fiber types; numerous fiber types (determined by cross-section and fluorescence differences) were noted in all of these items. The only way to be entirely sure that all fiber types are accounted for is to analyze every single fiber - which is not feasible in the timeline given. This lab does not analyze loose questioned fibers "as a group". Suggest submitting yarns or fabric swatches, or if only loose fibers are available, then only a few (not hundreds in a clump). Additionally, at this laboratory, fiber analyses with a negative association stop as soon as a difference is noted; the exam does not continue to identify the fiber types. Even with positive associations, it is not required to identify ALL fiber types in an item. The examination of this proficiency test did not follow our lab's Technical Procedures in that aspect.
UGFJ2Y	Item 1 was found to be composed of two types of acrylic fibre that could be distinguished from each other by their fluorescence characteristics. As well as being distinguishable from Item 1, Item 2 and Item 3 can also be distinguished from each other.
VJL2ZU	Item 1 and Item 2 were consistent in observed microscopic examination by the stereo and polarized microscopes as well as measured chemical composition by FTIR and microspectrophotometry. Item 1 and Item 3 were consistent in observed microscopic examination by the stereo and polarized microscopes as well as measured chemical composition by FTIR. However, Item 3 showed slightly different spectrum with Item 1 by microspectrophotometry. In addition, Item 2 and Item 3 were not consistent with Item 1 in fluorescent characteristic.
VWMYL7	On item 1 were at least two different acrylic fibers which have different fluorescent colours by three different filters. On item 2 was only one kind of acrylic fibers by three different fluorescent filters. As well as item 3. But both (item 2 and 3) have different fluorescent colours than item 1 and they are not similar with each other. Also there was differences on UV-VIS MSP curves. Item 1 and Item 3 were easily recognise different. Item 1 and item 2 were not so easy, but anyway there was clear differences around 517-525 nm. Because the differences with the fluorescent AND the MSP curves we ended up the conclusion the both samples (item 2 and 3) are not consistent with the item 1.
XMU4YV	Note it is not known how well/if the female's sweater sheds its constituent fibres, or whether it would shed threads/clumps of fibres - this would affect my expectations. - If the female's sweater was available, I would likely take further controls from the item to assess whether any variation was seen given that the fibres recovered from the suspect were similar and in my opinion, uncommon.
XRQRF3	The MSP in our system was not working during this test.

TABLE 5

WebCode	Additional Comments
XUUMY7	<p>At this laboratory a fiber examination can be halted if at any point during the course of examination the questioned and known items are found to be inconsistent with one another. The proficiency requests that all fiber types be identified which is not in accordance with our laboratory guidelines. This proficiency also asked for not only a yarn but a clump of fibers to be analyzed and all fiber types identified. All items in this case contained multiple fiber compositions (varying cross-section as well as fluorescence). The construction of the yarn is typically more uniform but a loose clump of fibers could have originated from any source and could contain a large variance of fibers from one source or multiple sources. Due to the large variation in composition of the fibers noted in microscopy across Lab Items # 1, 2, and 3 the identification process the proficiency requires resulted in a large amount of analysis time that would be unnecessary in casework. Currently as the question is posed in regards to this proficiency there is no way to properly answer the question of identification for a clump of loose fibers unless every fiber were tested individually and a result reported for each individual fiber present. If the test is to stay with the same format/questions then the questioned item(s) needs to be comprised of an individual fiber, a yarn, or a piece of fabric and not a loose clump of fibers that cannot all be guaranteed to have originated from one source and only one source.</p>

-End of Report-
(Appendix may follow)

Test No. 21-5439: Fibers Analysis

DATA MUST BE SUBMITTED BY **March 15, 2021, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234J

WebCode: QZPG4D

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 an attempted assault on a woman walking through the park. The victim was wearing a light green sweater and jeans. A masked man with a knife grabbed the woman, and a struggle ensued; the woman escaped. Witnesses saw the man running through the park and alerted police. The suspect was apprehended shortly after that and taken into police custody. Police recovered fibers from a pocket knife found on the suspect and on the suspect's sweatshirt. Police are requesting you to examine the fibers, report their identification, and determine if the fibers found on the suspect could have come from the sweater worn by the victim.

Items Submitted (Sample Pack FIBR):

Item 1: Known section of yarn from victim's sweater

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

Item 3: Questioned fibers found on the suspect's sweatshirt.

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

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

2.) Fiber Type Determination.

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

Item 1:

Item 2:

Item 3:

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

Please check all that apply.

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

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

Other (specify):

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

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

5.) Additional Comments

Appendix: Manufactured Fibers - Names & Definitions

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

§303.7 Generic Names and Definitions for Manufactured Fibers

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

(a) Acrylic

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

(b) Modacrylic

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

(c) Polyester

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

(d) Rayon

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

(e) Acetate

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

(f) Saran

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

(g) Azlon

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

(h) Nylril

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

(i) Nylon

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

(j) Rubber

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

(k) Spandex

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

(l) Vinal

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

(m) Olefin

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

(n) Vinyon

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

(o) Metallic

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

(p) Glass

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

(q) Anidex

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

(r) Novoloid

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

(s) Aramid

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

(t) Sulfar

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

(u) PBI

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

(v) Elastoeater

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

(w) Melamine

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

(x) Fluoropolymer

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

(y) PLA

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

RELEASE OF DATA TO ACCREDITATION BODIES

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

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

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

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

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

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

A2LA Certificate No.

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

Authorized Contact Person and Title

Laboratory Name

Location (City/State)