



## Test No. 14-539: Fibers Analysis

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This test was sent to 193 participants. Each sample set consisted of pieces of two "known" fabric samples and two sets of "questioned" fibers. Participants were requested to compare the items and report their findings. Data were returned from 152 participants (78.8% response rate) and are compiled into the following tables:

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

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

# Manufacturer's Information

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Each sample pack consisted of two sections of known fabric (Items 1 and 2) and two sets of questioned fibers (Items 3 and 4). Items 1 and 3 were from the same red fabric labeled as 100% cotton, whereas Items 2 and 4 were from a different red fabric labeled as 60% cotton and 40% polyester. Both fabrics were purchased from a local crafts store. Participants were requested to examine the fibers, identify the fiber type, and determine if the questioned fibers could have originated from the known fabric.

## SAMPLE PREPARATION-

The fabric was laid out and rolled with a lint roller to remove any extraneous debris. Items 1/3 and Items 2/4 were prepared at different times to prevent any possibility of cross-contamination.

ITEMS 1 and 3 (IDENTIFICATION): For the known fabric (Item 1) and the questioned fibers (Item 3), a 2-yard section of fabric was first cut into 2" x 2" swatches. A predetermined number of full swatches were then packaged into glassine bags and pre-labeled manila envelopes (Item 1); the remaining swatches were used to prepare the questioned fibers (Item 3). For each item in this set, two warp and two weft fibers were teased from the edges of one fabric swatch, then packaged into a glassine bag and pre-labeled Item 3 coin envelope.

ITEMS 2 and 4 (IDENTIFICATION): For the known fabric (Item 2) and the questioned fibers (Item 4), a 2-yard section of fabric was first cut into 2" x 2" swatches. A predetermined number of full swatches were then packaged into glassine bags and pre-labeled manila envelopes (Item 2); the remaining swatches were used to prepare the questioned fibers (Item 4). For each item in this set, two warp and two weft fibers were teased from the edges of one fabric swatch, then packaged into a glassine bag and pre-labeled Item 4 coin envelope.

SAMPLE PACK ASSEMBLY: For each sample pack, an Item 1, 2, 3, and 4 were placed in a sample pack envelope and sealed with invisible tape. This process was repeated until all of the sample pack envelopes were prepared. Once verification was completed, the sample pack envelopes were sealed with evidence tape and initialed with "CTS".

VERIFICATION- Predistribution laboratories reported the expected association results. All three predistribution laboratories identified the fibers in Items 1/3 as "Vegetable/Cotton" and the fibers in Items 2/4 as "Vegetable/Cotton and Manufactured/Polyester." The following procedures were used to examine the items: Stereomicroscopy, Comparison Microscopy, Polarized Light Microscopy, Macroscopic examination, IR/FTIR, Microspectrophotometry, and Cross-Section Analysis.

# 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 two 2" x 2" swatches of known fabric (Items 1 and 2) and two sets of questioned fibers (Items 3 and 4). They were requested to examine the submitted items and determine if the questioned fibers could share a common origin with the fibers in either of the known items. Items 1 and 3 were from the same red fabric labeled as 100% cotton, whereas Items 2 and 4 were from a different red fabric labeled as 60% cotton and 40% polyester. [Refer to the Manufacturer's Information for preparation details.]

In Table 1 "Association Results", all 152 participants reported fiber associations. Of these, 151 (99.3%) reported that Item 3 could share a common origin with Item 1 and one participant reported that Item 3 could not share a common origin with Item 1. All 152 responding participants reported that Item 4 could share a common origin with Item 2. For the remaining comparisons, 148 (97.4%) responded that Item 4 could not have originated from the same source as Item 1 and Item 3 could not have originated from the same source as Item 2. The remaining four participants provided no response for these comparisons.

In Table 2 "Identification Results", 145 of the 152 participants (95.4%) reported the presence of cotton in Item 1 and 147 out of 152 participants (96.7%) reported the presence of cotton in Item 3. Four participants noted the presence of Rayon and Cotton fibers in Item 1 while two participants reported the presence of both Rayon and Cotton fibers in Item 3. One participant noted the presence of only Rayon in both items. One participant did not report any fiber type determinations and one participant reported that it was not their practice to identify fiber types.

Of the 152 participants, 144 (94.7%) reported the presence of both cotton and polyester fibers in Items 2 and 4. Two participants reported the presence of Rayon and Cotton fibers in both items, while another two participants reported the presence of Cotton, Polyester, and Rayon fibers in both items. Another participant reported the presence of Cotton and Nylon fibers in both items. One participant reported the presence of Polyester only in both items. One participant did not report any fiber type determinations and one participant reported that it was not their practice to identify fiber types.

# Association Results

Could the questioned fibers (Items 3 and 4) have originated from either the victim's scarf (Item 1) or the victim's shirt (Item 2)?

TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
28KU2X	Yes	No	No	Yes
2EZKDG	Yes	No	No	Yes
2JCXCX	Yes	No	No	Yes
2KWJCU	Yes	No	No	Yes
2WEL6R	Yes	No	No	Yes
2WK2VR	Yes	No	No	Yes
362GD2	Yes	No	No	Yes
3AX3FB	Yes	No	No	Yes
3ENF9D	Yes	No	No	Yes
3F8CWH	Yes	No	No	Yes
3NMXZU	Yes	No	No	Yes
4GWX4D	Yes	No	No	Yes
4KNAJK	Yes	No	No	Yes
4NJT3W	Yes	No	No	Yes
4UK6YU	Yes	No	No	Yes
4W4BVJ	Yes	No	No	Yes
4YXRTY	Yes	No	No	Yes
67VYQX	Yes	No	No	Yes
69RQHJ	Yes	No	No	Yes
6DFVUM	Yes	No	No	Yes
6PGHJK	Yes	No	No	Yes
72WTVT	Yes	No	No	Yes
7A84ZD	Yes	No	No	Yes
7BKQF7	Yes	No	No	Yes
7BL33W	Yes	No	No	Yes
7QDZ4R	Yes	No	No	Yes

TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
7QHJLG	Yes	No	No	Yes
849GZX	Yes	No	No	Yes
84JYKH	Yes	No	No	Yes
8CL2QN	Yes	No	No	Yes
8JNDML	Yes	No	No	Yes
8QRP84	Yes	No	No	Yes
8TJBPE	Yes	No	No	Yes
8YPV4W	Yes	No	No	Yes
94U6GJ	Yes	No	No	Yes
9HZ3TX	Yes			Yes
A984TC	Yes	No	No	Yes
A9PN93	Yes	No	No	Yes
ADJ28Q	Yes	No	No	Yes
ANYZV8	Yes	No	No	Yes
AV48LQ	No	No	No	Yes
AYK3D3	Yes	No	No	Yes
BLQ8A8	Yes	No	No	Yes
BPADWA	Yes	No	No	Yes
BQ4RGT	Yes	No	No	Yes
BXLQZT	Yes	No	No	Yes
CKKG24	Yes			Yes
CUYWTX	Yes	No	No	Yes
CVR6KD	Yes	No	No	Yes
D3YDX9	Yes	No	No	Yes
D83RGR	Yes	No	No	Yes
D9QH74	Yes	No	No	Yes
DEF38X	Yes	No	No	Yes
DHG2PH	Yes	No	No	Yes
DJULJD	Yes	No	No	Yes

TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
DNLCNH	Yes	No	No	Yes
DQR6TV	Yes	No	No	Yes
DVHPDE	Yes	No	No	Yes
E6ZJBU	Yes	No	No	Yes
E8G23K	Yes	No	No	Yes
E8GJXF	Yes	No	No	Yes
E99YBR	Yes	No	No	Yes
EC2V8Q	Yes	No	No	Yes
ECJRTY	Yes	No	No	Yes
EDUTEX	Yes	No	No	Yes
EGBYB8	Yes	No	No	Yes
EXQJ64	Yes	No	No	Yes
EZMVE4	Yes	No	No	Yes
FJN3JF	Yes	No	No	Yes
FM647M	Yes	No	No	Yes
GATE44	Yes	No	No	Yes
GNG98H	Yes	No	No	Yes
GTGQUX	Yes	No	No	Yes
H3KHHH	Yes	No	No	Yes
H6W277	Yes	No	No	Yes
H8X4P4	Yes	No	No	Yes
HBTWHY	Yes	No	No	Yes
HT4HRZ	Yes	No	No	Yes
HUDGLX	Yes	No	No	Yes
J8798D	Yes	No	No	Yes
J8ZH2A	Yes	No	No	Yes
JB3GEM	Yes	No	No	Yes
JGA37Q	Yes	No	No	Yes
JMJBVZ	Yes	No	No	Yes

TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
JQ8FWK	Yes	No	No	Yes
K2YQGW	Yes	No	No	Yes
KU22WL	Yes	No	No	Yes
LAFND2	Yes	No	No	Yes
LET6UX	Yes	No	No	Yes
LTYYKF	Yes	No	No	Yes
LU7GGP	Yes	No	No	Yes
M432Q6	Yes	No	No	Yes
M6QGW8	Yes	No	No	Yes
M7GC9U	Yes	No	No	Yes
MFHPZU	Yes	No	No	Yes
MT7U9Q	Yes	No	No	Yes
NM9Z6X	Yes	No	No	Yes
NT2F8H	Yes	No	No	Yes
NW4TXA	Yes	No	No	Yes
NXW7FF	Yes	No	No	Yes
P3H2KL	Yes	No	No	Yes
P46DQW	Yes	No	No	Yes
PJBN8N	Yes	No	No	Yes
PMA6HX	Yes	No	No	Yes
PPKPNL	Yes	No	No	Yes
QBW3WZ	Yes	No	No	Yes
QLQLXZ	Yes	No	No	Yes
QNEYFJ	Yes	No	No	Yes
QR6XBR	Yes	No	No	Yes
QRDFQR	Yes	No	No	Yes
R33TXA	Yes	No	No	Yes
R3RQZ3	Yes	No	No	Yes
R4BEP2	Yes	No	No	Yes

TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
R6F776	Yes	No	No	Yes
RDGGRD	Yes	No	No	Yes
RULD7Y	Yes	No	No	Yes
RWN9RN	Yes	No	No	Yes
RZETZJ	Yes	No	No	Yes
TMUZFQ	Yes	No	No	Yes
TP6AW9	Yes	No	No	Yes
TVCXCV	Yes	No	No	Yes
UAKLRX	Yes			Yes
UJEZWF	Yes	No	No	Yes
ULE674	Yes	No	No	Yes
ULGAVJ	Yes	No	No	Yes
UPZUUD	Yes	No	No	Yes
UTKM4U	Yes	No	No	Yes
VH3D8E	Yes	No	No	Yes
VYG9QN	Yes			Yes
WJD7ML	Yes	No	No	Yes
WLF23P	Yes	No	No	Yes
X6FC3D	Yes	No	No	Yes
X9P7F4	Yes	No	No	Yes
XHQKBA	Yes	No	No	Yes
XLUD69	Yes	No	No	Yes
XRKLVU	Yes	No	No	Yes
XRUXUY	Yes	No	No	Yes
XXLRQ	Yes	No	No	Yes
Y3GGHB	Yes	No	No	Yes
YF2QRE	Yes	No	No	Yes
YG2JXY	Yes	No	No	Yes
YJT6YA	Yes	No	No	Yes



TABLE 1

WebCode	Item 1: Known Fibers from Victim's Scarf		Item 2: Known Fibers from Victim's Shirt	
	Item 3	Item 4	Item 3	Item 4
YKR6CE	Yes	No	No	Yes
YM3VUW	Yes	No	No	Yes
YQTKNH	Yes	No	No	Yes
Z4KTF3	Yes	No	No	Yes
Z9HCG2	Yes	No	No	Yes
ZD9QZF	Yes	No	No	Yes
ZL43MB	Yes	No	No	Yes
ZMLWfy	Yes	No	No	Yes
ZXNQYB	Yes	No	No	Yes
ZZKPJA	Yes	No	No	Yes

**Response Summary**

Participants: 152

*Could the questioned fibers (Items 3 and 4) have originated from either the victim's scarf (Item 1) or the victim's shirt (Item 2)?*

	<b><u>Item 1: Known Fibers from Victim's Scarf</u></b>		<b><u>Item 2: Known Fibers from Victim's Shirt</u></b>	
	<b><u>Item 3</u></b>	<b><u>Item 4</u></b>	<b><u>Item 3</u></b>	<b><u>Item 4</u></b>
Yes	151	0	0	152
No	1	148	148	0
Inc	0	0	0	0

# Fiber Type Determination

What types of fibers were identified in Items 1-4?

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
28KU2X	Vegetable: Cotton	Vegetable: Cotton & Manufactured: Polyester (PET)	Vegetable: Cotton	Vegetable: Cotton & Manufactured: Polyester (PET)
2EZKDG	Vegetable, Cotton	fiber 1: Vegetable, Cotton fiber 2: Manufactured, Polyester (PET)	Vegetable, Cotton	fiber 1: Vegetable, Cotton fiber 2: Manufactured, Polyester (PET)
2JCXCX	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
2KWJCU	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
2WEL6R	Vegetable, Cotton	1) Vegetable, Cotton; 2) Manufactured, Polyester	Vegetable, Cotton	1) Vegetable, Cotton; 2) Manufactured, Polyester
2WK2VR	Manufactured, Rayon	Manufactured, Polyester	Manufactured, Rayon	Manufactured, Polyester
362GD2	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester
3AX3FB	Vegetable, Cotton	Manufactured, Polyester/ Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester/ Vegetable, Cotton
3ENF9D	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
3F8CWH	Vegetable, Cotton	(1) Vegetable, Cotton; (2) Manufactured, Polyester	Vegetable, Cotton	(1) Vegetable, Cotton; (2) Manufactured, Polyester
3NMXZU	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
4GWX4D	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
4KNAJK	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
4NJT3W	Vegetable-Cotton	Vegetable-Cotton; Manufactured-Polyester	Vegetable-Cotton	Vegetable-Cotton; Manufactured-Polyester
4UK6YU	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
4W4BVJ	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
4YXRTY	Vegetable (Cotton)	Vegetable (Cotton); Manufactured (Polyester)	Vegetable (Cotton)	Vegetable (Cotton); Manufactured (Polyester)
67VYQX	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
69RQHJ	Cotton (Vegetable)	Blended (Manufactured & Vegetable) - Cotton & Polyester	Cotton (Vegetable)	Blended (Manufactured & Vegetable) - Cotton & Polyester
6DFVUM	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
6PGHJK	Vegetable, Cotton	Manufactured, Polyester + Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester + Vegetable, Cotton
72WTVT	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
7A84ZD	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
7BKQF7	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
7BL33W	Vegetable-Cotton	Vegetable-Cotton; Manufactured-Polyester	Vegetable-Cotton	Vegetable-Cotton; Manufactured-Polyester
7QDZ4R	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
7QHJLG	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
849GZX	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
84JYKH	Vegetable, Cotton	Vegetable, Cotton & Mfg Polyester	Vegetable, Cotton	Vegetable, Cotton & Mfg Polyester
8CL2QN	Vegetable, Cotton	Manufactured, Polyester & Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester & Vegetable, Cotton
8JNDML	Vegetable-Cotton	Vegetable-Cotton, Manufactured-Polyester	Vegetable-Cotton	Vegetable-Cotton, Manufactured-Polyester
8QRP84	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
8TJBPE	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
8YPV4W	Vegetable, Cotton	Blend of Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Blend of Manufactured, Polyester and Vegetable, Cotton

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
94U6GJ	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester
9HZ3TX	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
A984TC	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
A9PN93	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
ADJ28Q	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
ANYZV8	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
AV48LQ	Vegetable Cotton	Vegetable Cotton and Manufactured Polyester	Vegetable Cotton	Vegetable Cotton and Manufactured Polyester
AYK3D3	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
BLQ8A8	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
BPADWA	Vegetable - Cotton	Vegetable - Cotton & Manufactured - Polyester	Vegetable - Cotton	Vegetable - Cotton & Manufactured - Polyester
BQ4RGT	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
BXLQZT	Vegetable, Cotton and Manufactured, Rayon	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
CKKG24	Vegetable, Cotton	Manufactured/Vegetable, Rayon/Cotton	Vegetable, Cotton	Manufactured/Vegetable, Rayon/Cotton
CUYWTX	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton
CVR6KD	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
D3YDX9	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
D83RGR	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
D9QH74	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
DEF38X	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
DHG2PH	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
DJULJD	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
DNLCNH	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
DQR6TV	Vegetable (Cotton)	Vegetable (Cotton) and Manufactured (Polyester)	Vegetable (Cotton)	Vegetable (Cotton) and Manufactured (Polyester)
DVHPDE	Vegetable, cellulose (e.g. Cotton)	Vegetable, cellulose (e.g. Cotton) plus Manufactured, Polyester (e.g. PET)	Vegetable, cellulose (e.g. Cotton)	Vegetable, cellulose (e.g. Cotton) plus Manufactured, Polyester (e.g. PET)
E6ZJBU	Vegetable, Cotton	Manufactured, Polyester. Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester. Vegetable, Cotton
E8G23K	Vegetable-Cotton	Vegetable-Cotton and Manufactured Polyester	Vegetable-Cotton	Vegetable-Cotton and Manufactured Polyester
E8GJXF	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester; Manufactured, Rayon	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester; Manufactured, Rayon
E99YBR	Manufactured, Rayon and Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
EC2V8Q	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
ECJRTY	Vegetable Fiber, Cotton	Vegetable/Manufactured Fiber Mix, Cotton and Polyester	Vegetable Fiber, Cotton	Vegetable/Manufactured Fiber Mix, Cotton and Polyester
EDUTEX	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
EGBYB8	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester
EXQJ64	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
EZMVE4	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
FJN3JF	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
FM647M	Vegetable, Cotton	Mixture of Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Mixture of Manufactured, Polyester and Vegetable, Cotton

TABLE 2

WebCode	Fiber Type Determination			
	Item 1	Item 2	Item 3	Item 4
GATE44	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
GNG98H	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
GTGQUX	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
H3KHHH	Vegetable (Cotton)	Blend: Vegetable (Cotton) and Polyester	Vegetable (Cotton)	Blend: Vegetable (Cotton) and Polyester
H6W277	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
H8X4P4	Vegetable, Cotton	Polyester and Vegetable, Cotton	Vegetable, Cotton	Polyester and Vegetable, Cotton
HBTWHY	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
HT4HRZ	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton
HUDGLX	Cotton	Cotton & Polyester	Cotton	Cotton & Polyester
J8798D	Vegetable Cotton	Vegetable Cotton and Manufactured[sic] Polyester	Vegetable Cotton	Vegetable Cotton and Manufactured[sic] Polyester
J8ZH2A	Vegetable, Cotton	Manufactured, Polyester + Cotton	Vegetable, Cotton	Manufactured, Polyester + Cotton
JB3GEM	Vegetable, Cotton	Manufactured, Polyester (PET) and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester (PET) and Vegetable, Cotton
JGA37Q	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
JMJBVZ	Vegetable, Cotton	Vegetable(Cotton), Manufactured(Polyester)	Vegetable, Cotton	Vegetable(Cotton), Manufactured(Polyester)
JQ8FWK	Vegetable, Cotton	Vegetable Cotton and Manufactured Polyester	Vegetable, Cotton	Vegetable Cotton and Manufactured Polyester
K2YQGW				
KU22WL	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
LAFND2	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
LET6UX	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
LTYKFK	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
LU7GGP	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
M432Q6	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton
M6QGW8	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
M7GC9U	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
MFHPZU	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester
MT7U9Q	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured Polyester
NM9Z6X	Vegetable, Cotton	Manufactured, Polyester & Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester & Vegetable, Cotton
NT2F8H	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
NW4TXA	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
NXW7FF	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester
P3H2KL	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester
P46DQW	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
PJBN8N	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
PMA6HX	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
PPKPNL	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
QBW3WZ	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
QLQLXZ	Our procedure is for fiber comparison, not for fiber type determination	Our procedure is for fiber comparison, not for fiber type determination	Our procedure is for fiber comparison, not for fiber type determination	Our procedure is for fiber comparison, not for fiber type determination

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
QNEYFJ	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
QR6XBR	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
QRDFQR	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
R33TXA	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
R3RQZ3	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
R4BEP2	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton Manufactured, Polyester
R6F776	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
RDGGRD	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
RULD7Y	Vegetable Cotton	Manufactured Polyester and Vegetable Cotton	Vegetable Cotton	Manufactured Polyester and Vegetable Cotton
RWN9RN	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester (PET type)	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester (PET)
RZETZJ	Vegetable - Cotton	Vegetable - Cotton & Nylon	Vegetable - Cotton	Vegetable - Cotton & Nylon
TMUZFQ	Vegetable, Cotton	Vegetable, Cotton & Manufactured Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured Polyester
TP6AW9	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
TVCXCV	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
UAKLRX	Manufactured (Rayon), Vegetable (Cotton)	Manufactured (Polyester), Vegetable (Cotton)	Manufactured (Rayon), Vegetable (Cotton)	Manufactured (Polyester), Vegetable (Cotton)
UJEZWF	Vegetable; Cotton	Vegetable; Cotton; Synthetic Manufactured; Polyester	Vegetable; Cotton	Vegetable; Cotton; Synthetic Manufactured; Polyester
ULE674	Vegetable, Cotton	Vegetable, Cotton/ Manufactured[sic] Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured[sic] Polyester
ULGAVJ	Vegetable-Cotton	Vegetable-Cotton, Manufactured-Polyester	Vegetable-Cotton	Vegetable-Cotton, Manufactured-Polyester



TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
UPZUUD	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
UTKM4U	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
VH3D8E	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton & Manufactured, Polyester
VYG9QN	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester
WJD7ML	Vegetable, Cotton	Vegetable, Cotton	Vegetable, Cotton	Vegetable, Cotton
WLF23P	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester
X6FC3D	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
X9P7F4	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
XHQKBA	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
XLUD69	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester
XRKLVU	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
XRUXUY	Vegetable Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton, and Manufactured Polyester
XXLRQ	Vegetable - Cotton	Vegetable-Coton[sic] and Manufactured-Polyester	Vegetable - Cotton	Vegetable-Coton[sic] and Manufactured-Polyester
Y3GGHB	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
YF2QRE	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
YG2JXY	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured, Polyester
YJT6YA	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton; Manufactured, Polyester
YKR6CE	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester; Vegetable, Cotton
YM3VUW	Vegetable, Cotton	Vegetable, Cotton/ Manufactured[sic], Polyester	Vegetable, Cotton	Vegetable, Cotton/ Manufactured[sic], Polyester

TABLE 2

Fiber Type Determination				
WebCode	Item 1	Item 2	Item 3	Item 4
YQTKNH	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
Z4KTF3	Vegetable, Cotton	Synthetic (Polyester PET) and fiber Vegetable (Cotton)	Vegetable, Cotton	Synthetic (Polyester PET) and fiber Vegetable (Cotton)
Z9HCG2	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton + Manufactured, Polyester
ZD9QZF	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Polyester and Vegetable, Cotton
ZL43MB	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton and Manufactured, Polyester
ZMLWFY	Cotton	Polyester and Cotton	Cotton	Polyester and Cotton
ZXNQYB	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester	Vegetable, Cotton	Vegetable, Cotton / Manufactured, Polyester
ZZKPJA	Vegetable-Cotton, Manufactured-Rayon	Vegetable-Cotton, Manuf-Polyester, Manuf-Rayon	Vegetable-Cotton, Manuf-Rayon	Vegetable-Cotton, Manuf-Polyester, Manuf-Rayon

<i>Response Summary</i>	
Participants: 152	
<i>What types of fibers were identified in Items 1-4?</i>	
Cotton Fibers were identified in Items 1 and 3.	
<u>Item 1</u>	<u>Item 3</u>
145 (95.4%)	147 (96.7%)
Cotton and Polyester Fibers were identified in Items 2 and 4.	
<u>Item 2</u>	<u>Item 4</u>
144 (94.7%)	144 (94.7%)

# Examination Methods

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
28KU2X	✓	✓	✓	✓		✓	✓				HPLC, dye analysis
2EZKDG	✓	✓	✓		✓	✓		✓			
2JCXCX	✓	✓	✓	✓	✓	✓	✓				
2KWJCU	✓		✓		✓	✓					
2WEL6R		✓		✓		✓	✓				
2WK2VR	✓	✓	✓		✓	✓		✓			IR/ATR
362GD2	✓	✓	✓	✓	✓	✓	✓				
3AX3FB	✓					✓	✓				
3ENF9D	✓	✓	✓	✓		✓		✓			Raman
3F8CWH	✓	✓	✓	✓		✓	✓				
3NMXZU	✓		✓	✓	✓	✓	✓				
4GWX4D	✓	✓	✓		✓	✓	✓	✓			TLC on polyester fibers
4KNAJK	✓		✓	✓	✓	✓		✓			Raman
4NJT3W	✓	✓	✓	✓		✓	✓				
4UK6YU	✓	✓	✓		✓	✓	✓				
4W4BVJ	✓		✓		✓	✓		✓			Pyrolysis GC/MSD
4YXRTY	✓	✓	✓	✓	✓	✓	✓				
67VYQX	✓	✓	✓		✓	✓	✓				drying twist test, optical cross-section
69RQHJ	✓		✓			✓					Flame test
6DFVUM	✓	✓	✓	✓		✓	✓				
6PGHJK	✓		✓		✓	✓					
72WTVT	✓	✓	✓	✓	✓	✓	✓				
7A84ZD	✓		✓		✓	✓	✓				

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
7BKQF7	✓	✓	✓	✓	✓	✓	✓				
7BL33W	✓	✓	✓	✓	✓	✓	✓				
7QDZ4R	✓	✓	✓	✓	✓	✓	✓				
7QHJLG	✓	✓	✓		✓	✓	✓				
849GZX	✓	✓	✓	✓	✓	✓	✓				
84JYKH	✓	✓	✓		✓						
8CL2QN	✓		✓	✓	✓	✓		✓			Pyrolysis - GC/MS, FT-Raman, SEM/EDS
8JNDML	✓	✓	✓	✓		✓	✓				
8QRP84	✓	✓	✓	✓	✓	✓	✓				
8TJBPE	✓	✓	✓		✓	✓	✓			✓	
8YPV4W	✓	✓	✓	✓	✓	✓	✓				
94U6GJ	✓	✓	✓	✓	✓	✓	✓				TLC
9HZ3TX	✓	✓	✓	✓	✓	✓					HPTLC - High Performance Thin Layer Chromatography
A984TC	✓	✓	✓	✓		✓	✓	✓	✓		
A9PN93	✓	✓	✓	✓	✓	✓	✓				
ADJ28Q	✓	✓	✓	✓	✓	✓	✓			✓	
ANYZV8	✓	✓	✓	✓	✓	✓	✓			✓	
AV48LQ	✓		✓		✓	✓				✓	
AYK3D3	✓	✓	✓		✓	✓					
BLQ8A8	✓	✓	✓		✓	✓		✓		✓	TLC of dye (Items 2 and 4)
BPADWA	✓	✓	✓	✓	✓	✓	✓		✓	✓	
BQ4RGT	✓	✓	✓	✓	✓	✓	✓				
BXLQZT	✓	✓	✓		✓	✓	✓			✓	
CKKG24	✓	✓	✓	✓							

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
CUYWTX	✓	✓	✓		✓	✓					
CVR6KD	✓	✓	✓	✓	✓	✓	✓		✓		
D3YDX9	✓	✓	✓	✓	✓	✓	✓				UV MSP
D83RGR	✓	✓	✓	✓	✓	✓	✓				
D9QH74	✓	✓	✓	✓					✓		
DEF38X	✓	✓	✓	✓	✓	✓	✓	✓			
DHG2PH	✓	✓	✓		✓	✓	✓				
DJULJD	✓	✓	✓	✓	✓	✓	✓				
DNLCNH	✓	✓	✓		✓	✓	✓				
DQR6TV	✓	✓	✓	✓	✓	✓	✓	✓			
DVHPDE	✓		✓		✓						filaments per yarn; IR/FTIR (micro); Melting Point (DSC)
E6ZJBU	✓		✓			✓					
E8G23K	✓		✓		✓						
E8GJXF	✓	✓	✓	✓	✓	✓	✓				
E99YBR	✓	✓	✓		✓	✓	✓	✓			Alternate Light Source
EC2V8Q	✓	✓	✓	✓	✓		✓				Raman
ECJRTY	✓		✓		✓	✓		✓			
EDUTEX	✓	✓	✓			✓					
EGBYB8	✓		✓		✓	✓	✓				Pyrolyzer-EGA/MS
EXQJ64	✓		✓	✓	✓	✓		✓		✓	
EZMVE4	✓		✓		✓	✓		✓			
FJN3JF	✓	✓	✓		✓	✓	✓	✓			
FM647M	✓	✓	✓	✓		✓					
GATE44	✓	✓	✓		✓	✓	✓				

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
GNG98H	✓	✓	✓	✓	✓	✓	✓				Raman Spectroscopy
GTGQUX			✓		✓	✓		✓	✓		Keyence Digital microscope
H3KHHH	✓		✓		✓						
H6W277	✓	✓	✓	✓	✓	✓	✓				
H8X4P4	✓		✓		✓	✓					
HBTWHY	✓		✓			✓					
HT4HRZ	✓	✓	✓		✓	✓					
HUDGLX	✓	✓	✓	✓			✓				Macroscopical Exam
J8798D	✓	✓	✓	✓	✓	✓	✓		✓		
J8ZH2A	✓	✓				✓					
JB3GEM	✓	✓	✓	✓	✓	✓		✓	✓		
JGA37Q	✓	✓	✓			✓	✓				
JMJBVZ	✓		✓			✓	✓				
JQ8FWK	✓				✓	✓					
K2YQGW	✓	✓		✓		✓	✓				
KU22WL	✓		✓	✓	✓	✓	✓				
LAFND2	✓	✓	✓	✓	✓	✓	✓				
LET6UX	✓		✓		✓	✓	✓		✓		
LTYKFK	✓	✓	✓	✓	✓	✓	✓		✓		
LU7GGP	✓		✓	✓		✓	✓				TLC
M432Q6	✓	✓	✓		✓	✓					Micro FTIR, dyes extraction
M6QGW8	✓	✓	✓		✓	✓					
M7GC9U	✓	✓	✓	✓	✓	✓	✓				
MFHPZU	✓	✓	✓		✓	✓			✓		

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
MT7U9Q	✓	✓			✓	✓	✓				
NM9Z6X	✓		✓			✓	✓				
NT2F8H	✓	✓	✓	✓	✓	✓	✓	✓			birefringence
NW4TXA	✓	✓	✓			✓	✓				
NXW7FF	✓	✓	✓	✓	✓		✓				
P3H2KL	✓	✓	✓	✓	✓	✓	✓				
P46DQW	✓	✓	✓	✓	✓	✓		✓	✓		Thin layer chromatography
PJBN8N	✓	✓	✓	✓	✓	✓	✓	✓			
PMA6HX	✓	✓	✓	✓	✓	✓	✓	✓			
PPKPNL	✓	✓	✓	✓	✓	✓	✓	✓			
QBW3WZ	✓	✓	✓	✓	✓	✓	✓				Thin-layer Chromatography
QLQLXZ	✓	✓			✓	✓					Pyrolysis-GC
QNEYFJ	✓	✓	✓		✓	✓					
QR6XBR	✓	✓	✓		✓	✓	✓				Brightfield microscopy, Pyrolysis/GC-MSD
QRDFQR	✓	✓	✓		✓	✓	✓	✓			
R33TXA	✓	✓	✓	✓	✓	✓	✓	✓			
R3RQZ3	✓	✓	✓	✓	✓	✓	✓				Thin Layer Chromatography
R4BEP2	✓	✓	✓	✓	✓	✓	✓				
R6F776	✓	✓	✓	✓	✓	✓	✓				
RDGGRD	✓		✓		✓	✓		✓			TLC
RULD7Y	✓	✓	✓	✓	✓	✓	✓				
RWN9RN	✓				✓	✓	✓	✓			TLC
RZETZJ	✓	✓	✓		✓						
TMUZFQ	✓	✓	✓			✓					

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
TP6AW9	✓	✓	✓	✓	✓	✓	✓				
TVCXCV	✓	✓	✓	✓	✓	✓	✓	✓			
UAKLRX	✓			✓		✓			✓		
UJEZWF	✓	✓	✓		✓	✓					
ULE674	✓	✓	✓	✓		✓	✓				UVMSP
ULGAVJ	✓	✓	✓	✓		✓	✓		✓		ALS examination (Alternate Light Source)
UPZUUD	✓	✓	✓	✓	✓	✓	✓				
UTKM4U	✓	✓	✓	✓	✓	✓	✓		✓		Thin Layer Chromatography
VH3D8E	✓	✓	✓	✓	✓	✓	✓				TLC
VG9Q9N	✓	✓	✓			✓					SEM
WJD7ML		✓	✓			✓					
WLF23P	✓		✓	✓	✓		✓				Raman
X6FC3D	✓	✓	✓			✓					
X9P7F4	✓	✓	✓	✓	✓	✓	✓				
XHQKBA	✓	✓	✓	✓	✓	✓	✓		✓		
XLUD69	✓	✓	✓	✓		✓	✓				
XRKLVU	✓	✓	✓	✓	✓	✓	✓		✓		Visual characteristics of the threads
XRUXUY	✓					✓			✓		SEM-EDX-Burning Test
XXLRQ	✓	✓	✓	✓	✓	✓	✓				
Y3GGHB	✓	✓	✓	✓	✓	✓	✓		✓		
YF2QRE	✓	✓	✓		✓	✓	✓		✓		
YG2JXY	✓	✓	✓	✓	✓	✓	✓				
YJT6YA	✓	✓	✓	✓	✓	✓			✓	✓	
YKR6CE	✓	✓	✓	✓	✓	✓					



TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
YM3VUW	✓	✓	✓	✓	✓	✓	✓				
YQTKNH	✓	✓	✓	✓	✓	✓	✓				
Z4KTF3	✓	✓	✓	✓	✓	✓	✓				Raman
Z9HCG2	✓	✓	✓	✓	✓	✓					Raman spectroscopy, Classification of Dyes
ZD9QZF	✓		✓		✓		✓				Pyrolysis/GC/MS and Raman spectroscopy
ZL43MB	✓	✓	✓	✓	✓	✓	✓	✓			
ZMLWFY	✓	✓		✓		✓	✓				Pyrolysis GC/MS
ZXNQYB	✓	✓	✓		✓	✓					UV light
ZZKPJA	✓	✓	✓	✓	✓	✓	✓				

<b>Response Summary</b>											
	Participants	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point
	152	149	119	141	89	118	140	100	9	45	9
Percent	98%	98%	78%	93%	59%	78%	92%	66%	6%	30%	6%

# Conclusions

TABLE 4

WebCode	Conclusions
28KU2X	The section of the victims scarf (1) is not the source of the questioned fibres from the seatbelt buckle (4). The known section of the victim's shirt (2) is not the source of the questioned fibres from the leather gloves (3). The results form a - moderate support for the hypothesis that the victims scarf (1) is the source of the questioned fibres from the leather gloves (3)*. - strong support for the hypoyhesis[sic] that the victims's[sic] shirt (2) is the source of the questioned fibres of the seatbelt buckle (4)*. *The alternate hypothesis is that an arbitrary other textile is the source of the questioned fibres.
2EZKDG	The red fibers found on the suspect's gloves are visually and chemically indistinguishable from the fibers of the victim's scarf. Item 1 could be the source of fibers from item 3. The two types of red fibers found on the seatbelt buckle are visually and chemically indistinguishable from the two types of fibers from which the victims shirt is made. Item 2 could be the source of the fibers from Item 4.
2JCXCX	Red cotton fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the source of Item 1, or another source comprised of fibers that exhibit the same microscopic characteristics and optical properties. Red/white cotton fibers and red/white polyester fibers found in Item 4 exhibit the same microscopic characteristics and optical properties as the red/white cotton fibers and red/white polyester fibers comprising Item 2. Accordingly, these fibers are consistent with originating from the source of Item 2, or another source comprised of fibers that exhibit the same microscopic characteristics and optical properties. No other apparent transfer of textile fibers was detected between Items 1 and 2 and Items 3 and 4. The specimens were examined using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorecence microscopy, microspectrophotometry, and infrared spectroscopy.
2KWJCU	The fibers found on the gloves, Item 3, could have come from the victim's scarf, Item 1. Item 1 and Item 3 could have originated from the same source. The fibers found on the passenger side seatbelt buckle, Item 4, could have come from the victim's shirt, Item 2. Item 2 and Item 4 could have originated from the same source.
2WEL6R	Twenty red cotton fibres which could have originated from the victim's scarf (item 1) were found on the questioned fibres from the leather gloves (item 3). This provides support for the proposition that the scarf or another item with identical fibre composition, has been in contact with the leather gloves. Nine red synthetic fibres which could have originated from the victim's shirt (item 2) were found on the questioned fibres from the passenger side seatbelt buckle (item 4). Nine red cotton fibres which could have originated from the victim's shirt (Item 2) were found on the questioned fibres from the passenger side seatbelt buckle (item 4). This provides strong support for the proposition that the shirt or another item with identical fibre composition, has been in contact with the passenger side seatbelt buckle.
2WK2VR	Examinations Performed: Visual, Stereomicroscopy, Comparative Light Microscopy, Polarized Light Microscopy, IR/FTIR, IR/ATR, and cross section analysis. The red rayon fiber in Item 3(Questioned fibers from the suspect's leather gloves) exhibits the same microscopic characteristics as the known red rayon fibers in Item 1(Known section of fabric from the victim's scarf). Therefore, the questioned red rayon fibers in Item 3(Questioned fibers from the suspect's leather gloves) could have originated from the same source as the known red rayon fibers in Item 1(Known section of fabric from the victim's scarf). The red polyester fiber in Item 4(Questioned fibers from the passenger side seatbelt buckle) exhibits the same microscopic characteristics as the known red polyester fibers in Item 2(Known section of fabric from the torn bottom of the victim's shirt). Therefore, the questioned red polyester fibers in Item 4(Questioned fibers from the passenger side seatbelt buckle) could have originated from the same source as the known red polyester fibers in Item 2(Known section of fabric from the torn bottom of the victim's shirt).
362GD2	The red cotton fibers from item 3, the questioned red threads from the suspect's leather gloves, are similar to the red cotton fibers from the warp threads and the fill threads of item 1, the known section of red fabric from the victim's scarf. The red cotton fibers from item 3, the questioned red threads from the suspect's leather gloves, are not consistent with the blend of red cotton and red polyester fibers from the warp threads and the fill threads of item 2, the known section of red fabric from the torn bottom of the

TABLE 4

WebCode	Conclusions
	victim's shirt. The blend of red cotton and red polyester fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are not consistent with the red cotton fibers from the warp threads and the fill threads of item 1, the known section of red fabric from the victim's scarf. The red cotton fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are similar to the red cotton fibers from the warp threads and the fill threads of item 2, the known section of red fabric from the torn bottom of the victim's shirt. The red polyester fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are consistent with the red polyester fibers from the warp threads and the fill threads of item 2, the known section of red fabric from the torn bottom of the victim's shirt.
3AX3FB	The FT-IR spectra of Items 1 and 3 were comparable indicating the same fiber class. (Cellulose such as cotton) The FT-IR spectra of Items 2 and 4 were comparable indicating the same fiber class. (Polyester/cotton)
3ENF9D	Item 1 and Item 3 were consistent in physical, chemical and optical properties. It is concluded that Item 3 fibers could have originated from Item 1 or another source composed of fibers w/ the same physical, chemical, and optical properties. Item 2 and Item 4 were consistent in physical, chemical, and optical properties. It is concluded that Item 4 fibers could have originated from Item 2, or another source composed of fibers with the same physical, chemical and optical properties.
3F8CWH	Based on physical, optical, and chemical characteristics, items 1 and 3 are similar. Items 1 & 3 exhibited similar characteristics in all examinations conducted. Based on physical, optical, and chemical characteristics, items 2 and 4 are similar. Items 2 and 4 exhibited similar characteristics in all examinations conducted. Items 1 and 3 are not similar to items 2 and 4.
3NMXZU	The fibers in the known section of fabric from victim's scarf (Item 1) and the questioned fibers from the suspect's leather gloves (Item 3) exhibited no significant differences in color, optical characteristics or chemical composition. The fibers in item 3 could have originated from item 1 or another source of the red cotton fibers. The fibers in the known section of fabric from the torn bottom of the victim's shirt (Item 2) and the questioned fibers from the passenger side seatbelt buckle (Item 4) exhibited no significant differences in color, optical characteristics or chemical composition. The fibers in item 4 could have originated from item 2 or another source of the red cotton and polyester fibers.
4GWX4D	The questioned fibers recovered from the suspect's gloves are similar in optical characteristics, color, and fiber type to the fibers from the victim's scarf. It is my opinion that the questioned fibers could have come from the victim's scarf or any other fabric with similar fiber characteristics (category 2B). The questioned fibers recovered from the passenger side seatbelt buckle are similar in optical characteristics, color, dye composition, and fiber type to the fibers from the victim's shirt. It is my opinion that the questioned fibers could have come from the victim's shirt or any other fabric with similar fiber characteristics (category 2B).
4KNAJK	According to stereomicroscope and FT/IR results, Item 3 contains red cotton fibers only and Item 1 is interwoven with yarns composed of red cotton fibers only. Item 4 contains red cotton fibers and red polyester fibers and Item 2 is interwoven with yarns composed of red cotton fibers and polyester fibers. According to microscopic exams including polarized light and fluorescence, solubility tests and Raman spectroscopy, fibers in Item 3 and Item 1 are consistent in appearance, solubility tests, microscopic characteristics and spectroscopic properties. Cotton fibers and polyester fibers in Item 2 are consistent with the corresponding fibers in Item 4 in the appearance, solubility tests, microscopic characteristics and spectroscopic properties. Raman spectroscopy reveals that the cotton fibers in Item 3 and Item 1 are different from the cotton fibers in Item 4 and Item 2. Therefore, the questioned fibers from the suspect's leather gloves (Item 3) could have originated from the known section of fabric from the victim's scarf (Item 1); the questioned fibers from the passenger side seatbelt buckle (Item 4) could have originated from the known section of fabric from the torn bottom of the victim's shirt (Item 2).
4NJT3W	Item #3 was identified as red cotton fibers that are microscopically consistent with Item #1; therefore, Item 3 could have originated from the same source as Item #1. Item #4 was identified as red cotton and red polyester fibers that are microscopically consistent with Item #2; therefore, Item #4 could have originated from the same source as Item #2.
4UK6YU	The item 3 questioned fibers (said to be from the suspect's leather gloves) corresponded to the item 1

TABLE 4

WebCode	Conclusions
	known fibers (from the victim's scarf) in fiber type (cotton), microscopic characteristics, and color (MSP). Therefore, the fibers from the victim's scarf could be the source of the unknown fibers in item 3. The item 4 questioned fibers (said to be from the passenger side seat belt buckle) corresponded to the item 2 known fibers (from the victim's shirt) in fiber type (cotton and polyester), microscopic characteristics, infrared spectra (FTIR) and color (MSP). Therefore[sic], the fibers from the victim's shirt could be the source of the unknown fibers in item 4.
4W4BVJ	The questioned fibers from the suspect's leather gloves (item 3) has been associated with the known section of fabric from the victim's shirt (item 1) - morphological, fiber type, and chemical composition. The questioned fibers from the passenger side seatbelt buckle (item 4) has been associated with the known section of fabric from the torn bottom of the victim's shirt (item 2) - morphological, fiber type, and chemical composition.
4YXRTY	The questioned fibers in Item 3 corresponded in microscopic characteristics (PLM), color, crimp, type (cotton), fluorescence and visible spectra (MSP) to the Item 1 known fibers from the fabric from the victim's scarf. Therefore, Items 1 and 3 could have a common source (Type 3 Association). It should be noted that since similar items may have been manufactured which would be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned fibers in Item 3 were different than the known fibers from the fabric from the victim's shirt and therefore Item 2 can be eliminated as being the source of the Item 3 fibers (Elimination). The questioned fibers in Item 4 corresponded in microscopic characteristics (PLM), color, crimp, type (cotton and polyester), fluorescence, infrared spectra (FTIR) and visible spectra (MSP) to the Item 2 known fibers from the fabric from the victim's shirt. Therefore, Items 2 and 4 could have a common source (Type 3 Association). It should be noted that since similar items may have been manufactured which would be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned fibers in Item 4 were different than the known fibers from the fabric from the victim's scarf and therefore Item 1 can be eliminated as being the source of the Item 4 fibers (Elimination).
67VYQX	The fibers from the suspect's leather gloves Item 3 and the fibers composing the victim's scarf Item 1 are red cotton fibers. They are consistent with each other with respect to visual, microscopic and instrumental color (MSP) characteristics. Therefore, the fibers from the suspect's gloves could have originated from the victim's scarf or another textile source exhibiting the same analyzed characteristics. Discriminating differences were observed between the fibers from the suspect's leather gloves Item 3 and the fibers composing the victim's shirt Item 2 and, therefore, the fibers from the suspect's leather gloves could not have originated from the victim's shirt. The fibers from the passenger side seatbelt buckle Item 4 and the fibers composing the victim's shirt Item 2 are red cotton and polyester fibers. They are consistent with each other with respect to visual, microscopic, instrumental color (MSP) and instrumental chemical (FTIR) characteristics. Therefore, the fibers from the passenger side seatbelt buckle could have originated from the victim's shirt or another textile source exhibiting the same analyzed characteristics. Discriminating differences were observed between the fibers from the passenger side seatbelt buckle Item 4 and the fibers composing the victim's scarf Item 1 and, therefore, the fibers from the passenger side seatbelt buckle could not have originated from the victim's scarf.
69RQHJ	Based on the analyses performed, it would appear that Items 1 and Item 3 were of a cotton origin that were dyed with an illustrious red dye. They appear to originate from the same source on the basis of identification of fibre type and appearance. Items 2 and 4 appear to be blended. A mixture of cotton and polyester fibres are seen, both red in colour along with an illustrious appearance. There appear to be more cotton than polyester fibres present. They appear to originate from the same source on the basis of identification of fibre type and appearance.
6DFVUM	The red cotton fibers found from suspect's leather gloves (item 3) are consistent with the red cotton fibers of victim's scarf (item 1). Item 3 could be originated from item 1. The red cotton and red polyester fibers found from the passanger[sic] side seatbelt buckle (item 4) are consistent with the red cotton and red polyester fibers of the torn bottom of the victims shirt (item 2). Item 4 could be originated from item 2.
6PGHJK	The fibers in item 3 were similar to the fibers in item 1 and different from item 2. The fibers in item 4 were similar to the fibers in item 2 and different from item 1. Item 1 and 3 consisted of vegetable cotton fibers. Item 2 and 4 consisted of manufactured polyester and vegetable cotton fibers.

TABLE 4

WebCode	Conclusions
72WTVT	<p>1. The known fabric standard in Exhibit 1 (known section of fabric from the victim's scarf) is composed of red cotton fibers. 2. The known fabric standard in Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt) is composed of red polyester and red cotton fibers. 3. Exhibit 3 (questioned fibers from the suspect's leather gloves) contained four threads each approximately 2 inches in length. The physical construction of the threads were compared to the physical construction of the warp and weft threads that compose the fabric in Exhibits 1 and 2 and were found to be consistent in physical construction with the threads that compose the section of fabric in Exhibit 1. Further, the red cotton fibers that compose the threads in Exhibit 3 were compared to the red cotton fibers that compose the fabric in Exhibit 1 and were found to be consistent in physical and microscopic characteristics. Thus, the threads/fibers in Exhibit 3 could have originated from the known section of fabric in Exhibit 1. 4. Exhibit 4 (questioned fibers from the passenger side seatbelt buckle) contained four threads each approximately 2 inches in length. The physical construction of the threads were compared to the physical construction of the warp and weft threads that compose the fabric in Exhibits 1 and 2 and were found to be consistent in physical construction with the threads that compose the section of fabric in Exhibit 2. Further, the red cotton fibers that partially compose the threads in Exhibit 4 were compared to the red cotton fibers that partially compose the fabric in Exhibit 2 and were found to be consistent in physical and microscopic characteristics. Additionally, the red polyester fibers that partially compose the threads in Exhibit 4 were compared to the red polyester fibers that partially compose the fabric in Exhibit 2 and were found to be consistent in physical characteristics, microscopic characteristics, and organic composition. Thus, the threads/fibers in Exhibit 4 could have originated from the known section of fabric in Exhibit 2.</p>
7A84ZD	<p>The red fabric from the scarf (Item 1) is composed of cotton. The red cotton fibers from the scarf fabric (Item 1) are similar in color in comparison to the red cotton fibers composing the threads recovered from the leather gloves (Item 3). Also, the threads recovered from the leather gloves (Item 3) are similar in construction to the threads composing the red fabric from the scarf (Item 1). The red cotton threads recovered from the gloves (Item 3) could have come from the red fabric from the scarf (Item 1), or from any other source of red cotton threads with similar color and construction. The red fabric from the shirt (Item 2) is composed of a blend of polyester and cotton. The red cotton fibers from the shirt (Item 2) are similar in color in comparison to the red cotton fibers composing the threads recovered from the seatbelt buckle (Item 4). The red polyester fibers from the shirt (Item 2) are similar in color, microscopic characteristics and chemistry in comparison to the red polyester fibers composing the threads recovered from the seatbelt buckle (Item 4). Also, the red cotton and polyester threads recovered from the seatbelt buckle (Item 4) are similar in construction to the threads composing the red fabric from the shirt (Item 2). The red cotton and polyester threads (Item 4) could have come from the red fabric from the shirt (Item 2), or from any other source of red cotton and polyester threads with similar color and construction. The red threads from Item 3 are not similar in color, microscopic characteristics, or chemistry to the red fabric from the shirt (Item 2). The red threads from Item 3 could not have come from the shirt (Item 2). The red threads from Item 4 are not similar in color, microscopic characteristics, or chemistry to the red fabric from the scarf (Item 1). The red threads from Item 4 could not have come from the scarf (Item 1). Samples collected and analyzed during the examination and analysis of the items in this case (ex. Slides) have been returned to and retained with original item. Analysis performed includes: Polarized light microscopy, microspectrophotometry and Fourier Transform Infrared Spectroscopy.</p>
7BKQF7	<p>The known section of fabric from the victim's scarf (Item 1) consists of red threads composed of cotton fibers. The known section of fabric from the torn bottom of the victim's shirt (Item 2) consists of red threads composed of cotton and polyester fibers. The questioned fibers from the suspect's leather gloves (Item 3) consists of multiple red threads composed of cotton fibers which are similar in color, optical properties, and fiber type to the cotton fibers from the known section of fabric from the victim's scarf (Item 1). It is our opinion that these threads/fibers could have come from the victim's scarf or any other source with similar thread/fiber characteristics. Additionally, the questioned fibers from the suspect's leather gloves (Item 3) are dissimilar to the threads/fibers from the known section of fabric from the victim's shirt (Item 2). It is our opinion that these threads/fibers did not come from the victim's shirt. The questioned fibers from the passenger side seatbelt buckle (Item 4) consists of multiple red threads composed of cotton and polyester fibers which are similar in color, optical properties, and fiber type to the cotton and polyester fibers from the known section of fabric from the victim's shirt (Item 2). The</p>

TABLE 4

WebCode	Conclusions
	questioned polyester fibers are additionally similar in shape to the polyester fibers from the known section of fabric from the victim's shirt (Item 2). It is our opinion that these threads/fibers could have come from the victim's shirt or any other source with similar thread/fiber characteristics. Additionally, the questioned fibers from the passenger side seatbelt buckle (Item 4) are dissimilar to the threads/fibers from the known section of fabric from the victim's scarf (Item 1). It is our opinion that these threads/fibers did not come from the victim's scarf.
7BL33W	Red cotton fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item 1; accordingly, these fibers are consistent with originating from the source of Item 1 or from another item comprised of textile fibers which exhibit the same microscopic characteristics and optical properties. Pink cotton fibers found in Item 4 exhibit the same microscopic characteristics and optical properties as the pink cotton fibers comprising Item 2; accordingly, these fibers are consistent with originating from the source of Item 2 or from another item comprised of textile fibers which exhibit the same microscopic characteristics and optical properties. Red and light red polyester fibers found in Item 4 exhibit the same microscopic characteristics and optical properties as the red and light red polyester fibers comprising Item 2; accordingly, these fibers are consistent with originating from the source of Item 2 or from another item comprised of textile fibers which exhibit the same microscopic characteristics and optical properties. The submitted specimens were examined using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform infrared spectroscopy, where appropriate.
7QDZ4R	Red cotton fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the source of Item 1 or another item whose fibers exhibit the same microscopic characteristics and optical properties. Red cotton fibers found in Item 4 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item 2. Accordingly, these fibers are consistent with originating from the source of Item 2 or another item whose fibers exhibit the same microscopic characteristics and optical properties. Red polyester fibers found in Item 4 exhibit the same microscopic characteristics and optical properties as the red polyester fibers comprising Item 2. Accordingly, these fibers are consistent with originating from the source of Item 2 or another item whose fibers exhibit the same microscopic characteristics and optical properties. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy.
7QHJLG	The red fibers in Item #3 are similar in all examined characteristics to the red fibers in Item #1. Item #3 could have originated from Item #1 or another source of similar fibers. The red fibers in Item #4 are similar in all examined characteristics to the red fibers in Item #2. Item #4 could have originated from Item #2 or another source of similar fibers. In addition, Item #1 is excluded as the source of the red fibers in Item #4, and Item #2 is excluded as the source of the red fibers in Item #3.
849GZX	Lab Item 1. Visual and microscopic examination of Lab Item 1 revealed a piece of red woven fabric. Yarns in one direction were flat, 1-ply yarns with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: K1 - red cotton fibers. The yarns in the other direction of Lab Item 1 were crimped, 1-ply with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: K2 - red cotton fibers. Lab Item 2. Visual and microscopic examination of Lab Item 2 revealed a piece of red woven fabric. Yarns in one direction were crimped, 2-ply yarns with an "S" twist. Microscopic examination disclosed that these yarns were constructed of: K3 - red to white cotton fibers. K4 - Semi-dull, red to white, round polyester fibers. The yarns in the other direction of Lab Item 2 were crimped, 1-ply with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: K5 - red to white cotton fibers. K6 - Semi-dull, red to white, round polyester fibers. Lab Item 3. Visual and microscopic examination of Lab Item 3 revealed four red yarns. Two yarns were flat, 1-ply yarns with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: Q1 - red cotton fibers. The other two yarns were crimped, 1-ply with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: Q2 - red cotton fibers. Lab Item 4. Visual and microscopic examination of Lab Item 4 revealed four red yarns. Two yarns were crimped, 2-ply yarns with an "S" twist. Microscopic examination disclosed that these yarns were constructed of: Q3 - red to white cotton fibers. Q4 - Semi-dull, red to white, round polyester fibers. The other two yarns were crimped, 1-ply with a "Z" twist. Microscopic examination disclosed that these yarns were constructed of: Q5 - red to white cotton

TABLE 4

WebCode	Conclusions
	<p>fibers. Q6 - Semi-dull, red to white, round polyester fibers. Microscopic and instrumental (UV-Vis MSP) comparison of the Q1 and Q2 fibers with the K1 and K2 fibers showed them to be similar in their physical and optical properties. The yarns that were composed from these fibers showed similar constructions. It is the opinion of the undersigned that the Item 3 yarns could have originated from the source represented by Item 1 or from a similarly manufactured and colored item. Microscopic and instrumental (UV-Vis MSP) comparison of the Q3, Q4, Q5, and Q6 fibers with the K3, K4, K5, and K6 fibers showed them to be similar in their physical and optical properties. One Q4 fiber (designated Q4a) was analyzed and compared instrumentally (FTIR) to one K4 fiber (designated K4a). FTIR revealed that both fibers were polyester and were similar in their chemical properties. One Q6 fiber (designated Q6a) was analyzed and compared instrumentally (FTIR) to one K6 fiber (designated K6a). FTIR revealed that both fibers were polyester and were similar in their chemical properties. The yarns that were composed from the above fibers showed similar constructions. It is the opinion of the undersigned that the Item 4 yarns could have originated from the source represented by Item 2 or from a similarly manufactured and colored item.</p>
84JYKH	<p>Known fabric from the victim's scarf (Item 1) was examined visually and microscopically and found to be composed of red cotton fibers. Known fabric from the victim's shirt (Item 2) was examined visually and microscopically and found to be composed of red cotton fibers and red delustered polyester fibers. Questioned fibers reportedly from the suspect's gloves (Item 3) were examined visually and microscopically and found to be red cotton fibers. Questioned fibers reportedly from the passenger side seatbelt buckle (Item 4) were examined visually and microscopically and found to be red cotton fibers and red delustered polyester fibers. The questioned cotton fibers from the suspect's gloves (Item 3) were found to be consistent with the known cotton fibers from the victim's scarf (Item 1) with respect to color, morphology and fiber type. Based upon these observations, it is the opinion of this analyst that the questioned fibers (Item 3) and the known fibers (Item 1) are of the same type and could have come from the same source. This analyst recognizes that another source of fibers with properties consistent with the above fibers exists. The questioned cotton fibers from the suspect's gloves (Item 3) were found to be inconsistent with the known cotton fibers from the victim's shirt (Item 2) with respect to color. The questioned cotton and polyester fibers from passenger side seatbelt buckle (Item 4) were found to be consistent with the known cotton and polyester fibers from the victim's shirt (Item 2) with respect to color, morphology, fiber type and optical properties. Based upon these observations, it is the opinion of this analyst that the questioned fibers (Item 4) and the known fibers (Item 2) are of the same type and could have come from the same source. This analyst recognizes that another source of fibers with properties consistent with the above fibers exists. The questioned cotton fibers from the passenger side seatbelt buckle (Item 4) were found to be inconsistent with the known cotton fibers from the victim's scarf (Item 1) with respect to color.</p>
8CL2QN	<p>Based on the physical properties and chemical analysis, it was concluded that the questioned fiber from the prospect's leather gloves (Item-3) could have originated from the victim's scarf (Item -1). It was also concluded that the fibers from the passenger side seat belt buckle (Item-4) could have originated from the victim's torn shirt (Item-2).</p>
8JNDML	<p>The fibres (item 3) recovered from the suspect's gloves are indistinguishable from the constituent red cotton fibres (item 1) of the victim's scarf. The fibres (item 4) recovered from the seat belt buckle are indistinguishable from the constituent red cotton and red polyester fibres (item 2) from the victim's shirt. In my opinion the results, taken collectively, provide very strong support for the view that the fibres recovered from the leather gloves and the seat belt buckle have originated from the victim's clothing.</p>
8QRP84	<p>Fibers from Item 3 are consistent with Item 1; therefore, Item 3 could have come from Item 1 or an item with the same set of characteristics. Fibers from Item 3 are not consistent with Item 2; therefore, Item 3 could not have come from Item 2. Fibers from Item 4 are not consistent with Item 1; therefore, Item 4 could not have come from Item 1. Fibers from Item 4 are consistent with Item 2; therefore, Item 4 could have come from Item 2 or an item with the same set of characteristics.</p>
8TJBPE	<p>Item 1 contained a piece of fabric constructed of red cotton fibers. Item 2 contained a piece of fabric constructed of red cotton and red polyester fibers. Item 3 contained threads constructed of red cotton fibers. The physical construction of the threads and color characteristics of the cotton fibers are indistinguishable from item 1. Therefore the fibers collected from the glove in item 3 could have come</p>

TABLE 4

WebCode	Conclusions
	<p>from the same source as item 1 or any other source with indistinguishable red cotton threads. Significant differences were found in the visual appearance of the red cotton fibers in item 3 and the red cotton fibers in item 2. Therefore, the fibers from the glove in item 3 did not come from the same source as item 2. Item 4 contained threads constructed of red cotton and red polyester fibers. The physical construction of the threads as well as the chemical and color characteristics of the cotton and polyester fibers are indistinguishable from item 2. Therefore, the fibers collected from the seatbelt buckle could have come from the same source as item 2 or any other source with indistinguishable red cotton and red polyester fibers. Significant differences were found in fiber composition of item 4 and the fibers in item 1. Therefore, the fibers from the seatbelt buckle in item 4 did not come from the same source as item 1.</p>
8YPV4W	<p>Item 1 comprised a section of red fabric which was composed of red cotton fibres. Item 2 comprised a section of red fabric which was composed of a blend of red delustered polyester fibres and red cotton fibres. Item 3 comprised a collection of red yarns which were composed of red cotton fibres. No significant difference was observed between the red cotton fibres from Item 3 and Item 1 with respect to their composition and colour. It is therefore concluded that the yarns recovered from the gloves (Item 3) may have originated from the victim's scarf (Item 1). Item 4 comprised a collection of red yarns which were composed of a blend of red delustered polyester fibres and red cotton fibres. No significant difference was observed between the red cotton fibres from Item 4 and Item 2 with respect to their composition and colour. Further, no significant difference was observed between the red polyester fibres from Item 4 and Item 2 with respect to their composition, colour, dimensions and delusterant distribution. It is therefore concluded that the yarns recovered from the passenger side seatbelt buckle (Item 4) may have originated from the victim's shirt (Item 2).</p>
94U6GJ	<p>Two (2) distinct red cotton yarns were found in Item 3. These two (2) yarns were similar to the red cotton yarns from the red fabric in Item 1 in color, fiber type, construction, and microscopic characteristics.* These two (2) yarns were different from the red yarns in Item 2.** Two (2) distinct red cotton and polyester yarns were found in Item 4. These two (2) yarns were identical to the red cotton and polyester yarns from the red fabric in Item 2 in color, fiber type, construction, and microscopic characteristics.*** These two (2) yarns were different from the red yarns in Item 1.****. *This means that the red yarns from the suspect's leather gloves could have come from the victim's scarf. **This means that the red yarns from the suspect's leather gloves did not come from the victim's shirt. ***This means that the red yarns from the passenger side seatbelt buckle could have come from the victim's shirt. ****This means that the red yarns from the passenger side seatbelt buckle did not come from the victim's scarf.</p>
9HZ3TX	<p>I was unable to distinguish between the fibres comprising each of Items 1 (known section of fabric from the victim's scarf) and 3 (questioned fibres from the suspect's leather gloves) on the basis of their colour (red), fibre type (cotton), fibre diameters, fibre morphologies and optical properties. I am therefore of the opinion that, based upon the testing conducted, the fabric from the victim's scarf (Item 1), or a similar fabric from the same manufacturer, could have been the source of the questioned fibres from the suspect's gloves (Item 3). I was unable to distinguish between the fibres comprising each of Items 2 (known section of fabric from the torn bottom of the victim's shirt) and 4 (questioned fibres from the passenger side seatbelt buckle) on the basis of their colour (red), fibre types (cotton and polyester), fibre diameters, fibre morphologies, optical properties and dye composition (polyester fibres only). I am therefore of the opinion that, based upon the testing conducted, the fabric from the victim's shirt (Item 2), or a similar fabric from the same manufacturer, could have been the source of the questioned fibres from the seatbelt buckle (Item 4).</p>
A984TC	<p>Items 1, 2, 3, and 4 were examined using stereomicroscopy, comparison microscopy, fluorescence microscopy, polarized light microscopy (PLM), Microspectrophotometry (MSP), microchemical tests, and microsolubility tests. Polyester fibers contained in Items 2 and 4 were further examined using Fourier Transform Infrared Spectrophotometry (FTIR). The Item 3 red yarns were composed of cotton fibers and were consistent in physical, chemical, and optical properties with the yarns and fibers composing the Item 1 fabric. It was concluded that the Item 3 red cotton yarns could have originated from Item 1 or another source composed of yarns with the same physical, chemical, and optical properties. Item 4 contained two types of red yarns, each composed of cotton and polyester fibers. The Item 4 yarns were consistent in physical, chemical and optical properties with the respective yarns and fibers composing the Item 2 fabric. It was concluded that the Item 4 red cotton and polyester yarns could have originated</p>



TABLE 4

WebCode	Conclusions
	from Item 2 or another source composed of yarns with the same physical, chemical, and optical properties.
A9PN93	Item 3 could have come from Item 1 or an item with the same set of characteristics. Item 4 could have come from Item 2 or an item with the same set of characteristics.
ADJ28Q	1. Exhibit 1 (known section of fabric from the victim's scarf) consists of red cotton fibers. Examination of the fibers removed from the red threads from Exhibit 3 (questioned fibers from the suspect's leather gloves) disclosed the presence of numerous red cotton fibers which are similar in microscopic characteristics to red cotton fibers from Exhibit 1. In conclusion, the red threads composed of red cotton fibers recovered from Exhibit 3 could have originated from Exhibit 1. 2. Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt) consists of red cotton and red polyester fibers. Examination of the fibers removed from the red threads from Exhibit 4 (questioned fibers from the passenger side seatbelt buckle) disclosed the presence of numerous red cotton fibers and red polyester fibers which are similar in microscopic characteristics to red cotton fibers and red polyester fibers from Exhibit 2. Additional examinations disclosed the red polyester fibers to be similar in organic composition when compared to similar fibers originating from Exhibit 2. In conclusion, the red threads composed of red cotton fibers and red polyester fibers recovered from Exhibit 4 could have originated from Exhibit 2.
ANYZV8	Item 1 and Item 2 were used as comparison standards. Item 1 consists of red cotton fibers and Item 2 consists of red cotton and red polyester fibers. Item 3 consists of threads of red cotton fibers which are similar in fiber type and color to the red cotton fibers from Item 1. Item 3 is dissimilar in fiber composition to Item 2. It is my opinion that Item 3 could have originated from Item 1 or any other source with similar characteristics. Item 4 consists of threads of red cotton and red polyester fibers. The red cotton fibers are similar in fiber type and color to the red cotton fibers from Item 2. The red polyester fibers are similar in fiber type, optical properties, size, shape, and color to the red polyester fibers from Item 2. Item 4 is dissimilar in fiber composition to Item 1. It is my opinion that Item 4 could have originated from Item 2 or any other source with similar characteristics.
AV48LQ	Questioned fibers from the suspect's teather[sic] gloves are not consistent with any of the known samples. Questioned fibers from the passenger side seatbelt buckle are not consistent with the known section of the fabric from the victim's scarf (item 1) but it is consistent with the section of fabric from the torn botton[sic] of the victims shirt (item 2).
AYK3D3	The submitted items were analyzed by stereomicroscope, comparison polarized light microscopy (PLM) and Fourier Transform Infrared Spectroscopy (FT-IR). Item 1 consisted of red cotton fibers. Item 2 consisted of red cotton and red polyester fibers. The red cotton fibers found in item 3 were the same in microscopic appearance and characteristics as the red cotton fibers found in item 1. Therefore, these fibers cannot be excluded as having originated from the scarf in item 1. The red cotton and red polyester fibers found in item 4 were the same in microscopic appearance and chemical characteristics as the red fibers found in item 2. Therefore, these fibers cannot be excluded as having originated from the shirt in item 2.
BLQ8A8	The fibers from Item 3 were red cotton fibers which could have come from the victim's red cotton scarf, Item 1. The fibers from Item 4 were a mixture of red cotton and red polyester fibers which exhibited the same microscopic and physical characteristics as the red cotton and red polyester fibers from the victim's shirt, Item 2, and therefore could have come from the shirt.
BPADWA	The known section of fabric, item 001-1, from the victim's scarf is composed of red cotton fibers. The known section of fabric, item 001-2, from the torn bottom of the victim's shirt is composed of a blend of red cotton and red polyester fibers. The questioned threads, item 001-3, from the suspect's leather gloves are composed of red cotton fibers. The questioned threads, item 001-4, from the passenger side seatbelt buckle are composed of a blend of red cotton and red polyester fibers. I compared the questioned threads, items 001-3 and 001-4, to the threads from the two pieces of fabric, items 001-1 and 001-2. I used stereo microscopy, polarized light microscopy, fluorescence microscopy, comparison microspectrophotometry in this comparison. I found the questioned threads, item 001-3, were indistinguishable from the threads in the section of fabric, item 001-1, from the victim's scarf. I also found the questioned threads, item 001-4, were indistinguishable from the threads in the section of fabric, item 001-2, from the torn bottom of the victim's shirt. The questioned threads, item 001-3, could

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	have come from the fabric, item 001-1, or another fabric woven with the same type of red cotton threads. The questioned threads, item 001-4, could have come from the fabric, item 001-2, or another fabric woven with the same type of threads that are a blend of red cotton and polyester fibers.
BQ4RGT	Item 3 consisted of four yarns containing pink questioned fibers and these were compared to the Item 1 known fabric which contained yarns with pink fibers. Items 3 and 1 corresponded with respect to yarn construction, fiber type (cotton), microscopic characteristics (PLM), fluorescence, and visible spectra (MSP). Therefore, these questioned yarns could have originated from the same source as Item 1 (Type 3 Association). It should be noted that since similar items may have been manufactured which would be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned yarns in Item 3 were different than the known yarns from Item 2 and therefore Item 2 can be eliminated as being the source of Item 3 (Elimination). Item 4 consisted of four yarns containing pink questioned fibers and these were compared to the Item 2 known fabric which contained yarns with pink fibers. Items 4 and 2 corresponded with respect to yarn construction, fiber type (cotton and polyester), microscopic characteristics (PLM), fluorescence, chemical composition (FTIR) and visible spectra (MSP). Therefore, these questioned yarns could have originated from the same source as Item 2 (Type 3 Association). It should be noted that since similar items may have been manufactured which would be indistinguishable from the submitted evidence, an individual source cannot be determined. The questioned yarns in Item 4 were different than the known yarns from Item 1 and therefore Item 1 can be eliminated as being the source of Item 4 (Elimination).
BXLQZT	The thinner yarns in item 1 cannot be excluded as a possible source of the fibers from the thinner yarns in item 3. Therefore, the thinner yarns of item 3 could have originated from item 1 or from another source composed of the same analyzed characteristics. The thicker yarns in item 1 are excluded as a possible source of the fibers in the thicker yarns of item 3. Item 1 is excluded as a possible source of the fibers in both the thinner and thicker yarns of item 4. Item 2 cannot be excluded as a possible source of fibers in both the thinner and thicker yarns of item 4. Therefore, the fibers in item 4 could have originated from item 2 or from another source composed of the same analyzed characteristics. Item 2 is excluded as a possible source of the fibers in item 3. 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.
CKKG24	Fiber examinations which included stereomicroscopy, transmitted light microscopy, polarized light microscopy, fluorescence microscopy, and comparison microscopy of the known fibers and questioned fibers were completed and produced the following: The known fabric from the victim's scarf (Item #1) was determined to be a vegetative fiber, cotton, based on observable characteristics. This was concluded to be the same for the questioned fibers collected from the suspect's leather glove (Item #3). Microscopic comparison and similarities in characteristics observed on Item #1 and Item #3 generated the conclusion that fibers collected from the gloves were characteristically similar to the known fibers detracted from the fabric of the victim's scarf. The known fabric from the torn bottom of the victim's shirt (Item #2) was determined to be a blend of manufactured and vegetable fibers, rayon and cotton, based on the observable characteristics. This was concluded to be the same for the questioned fibers collected from the passenger side seatbelt buckle (Item #4). Microscopic comparison and similarities in characteristics observed on Item #2 and Item #4 generated the conclusion that fibers collected from the seatbelt buckle were characteristically similar to the known fibers detracted from the fabric of the victim's shirt.
CUIWTX	Physical, microscopic and instrumental comparison of the polyester fibers in Item 4, with the polyester fibers in the construction of Item 2, revealed them to be consistent with respect to optical properties, color and fiber type. Therefore, the fibers from Item 4 could have come from Item 2, or another source consistent with these properties. Microscopic comparison of the cotton fibers in Item 3, with the cotton fibers in the construction of Item 1, revealed them to be consistent with respect to color and appearance. Therefore, the fibers in Item 3 could have come from Item 1 or other sources with these properties.
CVR6KD	<b>CONCLUSIONS:</b> The questioned yarns identified as removed from the suspect's leather gloves (Item 3) originated from the victim's scarf (Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. The questioned yarns identified as

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	<p>removed from the passenger side seatbelt buckle (Item 4) originated from the victim's shirt (Item 2) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. RESULTS: Questioned fibers identified as removed from the suspect's leather gloves and the passenger side seatbelt buckle (Items 3 and 4) were examined for the purpose of determining whether or not they are consistent with the known section of fabric from the victim's scarf (Item 1) or the known section of fabric from the victim's shirt (Item 2). Examination of Item 1 reveals the presence of a piece of woven fabric composed of cotton yarns. Examination of Item 2 reveals the presence of a piece of woven fabric composed of cotton and polyester yarns. Examination of Item 3 reveals the presence of 4 yarns. Examination and comparison of the questioned yarns and fibers composing the yarns reveals they are consistent in construction, microscopic, optical, and chemical characteristics with the known yarns composing the fabric identified as from the victim's scarf (Item 1). It is therefore concluded the questioned yarns originated from the scarf or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Examination of Item 4 reveals the presence of 4 yarns. Examination and comparison of the questioned yarns and fibers composing the yarns reveals they are consistent in construction, microscopic, optical, and chemical characteristics with the known yarns composing the fabric identified as from the victim's shirt (Item 2). It is therefore concluded the questioned yarns originated from the shirt or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, fluorescence microscopy, microspectrophotometry, thermal microscopy and Fourier transform infrared microspectroscopy.</p>
D3YDX9	<p>Threads composed of red cotton fibres and red polyester fibres indistinguishable by microscopy and instrumental colour analysis from the red cotton fibres and red polyester fibres which comprised the shirt (Item 2) relating to the victim were found on the seat belt of the suspect's vehicle. In addition, threads composed of red cotton fibres indistinguishable by microscopy and instrumental colour analysis from the red cotton fibres which comprised the scarf (Item 1) were found on the gloves from this vehicle. In my opinion, possible explanations for these findings include: - The red threads found on the seat belt and gloves originate from the shirt and scarf (respectively) relating to the victim. - The red threads found on the seat belt and gloves did not originate from the victim's shirt and scarf but originate from another source(s). In my opinion, the findings provide strong support for the former rather than the latter.</p>
D83RGR	<p>Item 3 consisted of four questioned red yarns which corresponded in yarn construction, fiber type (cotton), microscopic characteristics (PLM), fluorescence, and visible spectra (MSP) to the Item 1 known sample. Therefore, Item 1 could be the source of the Item 3 fibers (Type 3 Association). It should be noted that an individual source cannot be determined since other textile items may have been manufactured that would be indistinguishable from the submitted evidence. Item 4 consisted of four questioned red yarns which corresponded in yarn construction, fiber types (cotton and polyester), microscopic characteristics (PLM), fluorescence, chemical composition (FTIR), and visible spectra (MSP) to the Item 2 known sample. Therefore, Item 2 could be the source of the Item 4 fibers (Type 3 Association). It should be noted that an individual source cannot be determined since other textile items may have been manufactured that would be indistinguishable from the submitted evidence. The yarn construction and fiber types of Items 2 and 3 differ. Therefore, Item 2 is eliminated as a source for Item 3 (Elimination). The yarn construction and fiber types of Items 1 and 4 differ. Therefore, Item 1 is eliminated as a source for Item 4 (Elimination). KEY for instrument acronyms: FTIR- Fourier Transform Infrared Spectroscopy, MSP- Microspectrophotometry, PLM- Polarized Light Microscopy</p>
D9QH74	<p>Microscopical examination of item 1 revealed the presence of one section of red fabric containing red cotton fibers. Microscopical examination of item 2 revealed the presence of one section of red fabric containing red cotton fibers and red polyester fibers. Microscopical examination of item 3 revealed the presence of red threads containing red cotton fibers. Microscopical examination of item 4 revealed the presence of red threads containing red cotton fibers and red polyester fibers. The threads in item 3 are similar in composition and construction to the threads used in the construction of item 1; therefore the threads of red fibers in item 3 could have originated from the red cloth in Item 1. The threads in item 3 are dissimilar in composition and construction to the threads used in the construction of item 2; therefore, the threads of red fibers in item 3 did not originate from the red cloth in item 2. The threads of fibers in item 4 are similar in composition and construction to the threads used in the construction of</p>

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WebCode	Conclusions
	<p>item 2; therefore, the threads of red fibers in item 4 could have originated from the red cloth in item 2. The threads in item 4 are dissimilar in composition and construction of item 1; therefore, the threads of red fibers in item 4 did not originate from the red cloth in item 1.</p>
DEF38X	<p>Examination of Item #1 (Known section of fabric from the victim's scarf) revealed the presence of a piece of red woven fabric. The yarns in this fabric were composed of red cotton fibers. Examination of Item #2 (Known section of fabric from the torn bottom of the victim's shirt) revealed the presence of a piece of red woven fabric. The yarns in this fabric were composed of red cotton and polyester fibers. Examination of Item #3 (Questioned fibers from suspect's leather gloves) revealed the presence of four (4) red yarns. Two of the yarns were found to be macroscopically consistent in color and construction with each other. Additional testing on one of the yarns, which was composed of cotton fibers, found it to be consistent in color, construction and composition with the yarns (running in direction 1) from Item #1 (Known section of fabric from the victim's scarf). Therefore, this yarn could have originated from the same source as Item #1. The remaining two yarns were found to be macroscopically consistent in color and construction with each other. Additional testing on one of the yarns, which was composed of cotton fibers, found it to be consistent in color, construction and composition with the yarns (running in direction 2) from Item #1 (Known section of fabric from the victim's scarf). Therefore, this yarn could have originated from the same source as Item #1. These four yarns were not consistent with the fabric found in Item #2 (Known section of fabric from the torn bottom of the victim's shirt). Examination of Item #4 (Questioned fibers from the passenger side seatbelt buckle) revealed the presence of four (4) red yarns. Two of the yarns were found to be macroscopically consistent in color and construction with each other. Additional testing on one of the yarns, which was composed of cotton and polyester fibers, found it to be consistent in color, construction and composition with the yarns (running in direction 1) from Item #2 (Known section of fabric from the torn bottom of the victim's shirt). Therefore, this yarn could have originated from the same source as Item #2. The remaining two yarns were found to be macroscopically consistent in color and construction with each other. Additional testing on one of the yarns, which was composed of cotton and polyester fibers, found it to be consistent in color, construction and composition with the yarns (running in direction 2) from Item #2 (Known section of fabric from the torn bottom of the victim's shirt). Therefore, this yarn could have originated from the same source as Item #2. These four yarns were not consistent with the fabric found in Item #1 (Known section of fabric from the victim's scarf).</p>
DHG2PH	<p>1A = Item 1, 1B = Item 2, 1C = Item 3, 1D = Item 4. All items were analyzed using stereomicroscopy, polarized light microscopy (PLM) and microspectrophotometry (MSP). Manufactured fibers were identified using Fourier Transform Infrared Spectroscopy (FTIR). Several fibers from item 1A (listed as fabric from victim's scarf) were compared to several fibers from Item 1C (listed as question fibers from gloves). Both items consisted of fiber strands composed of red cotton fibers. Several fibers that were examined from Items 1A and 1C were similar in color and size. Item 1C could have originated from item 1A or from another source of the same fiber type, color, and physical characteristics. Several fibers from Item 1A (listed as fabric from victim's scarf) were compared to several fibers from Item 1D (listed as question fibers from side seatbelt buckle). Both Items consisted of red fiber strands. Several fibers from item 1A were identified as cotton. Several fibers from Item 1D consisted of cotton and polyester. The strand of fibers from Item 1D could not have originated from Item 1A because Item 1A consisted only of cotton. Several fibers from item 1B (listed as fabric from victim's shirt) were compared to several fibers from Item 1C (listed as question fibers from gloves). Item 1B consisted of strands containing cotton and polyester. Item 1C consisted of cotton, Item 1C could not have originated from Item 1B because Item 1B consisted of both cotton and polyester. Several fibers from Item 1B (listed as fabric from victim's shirt) were compared to several fibers from Item 1D (listed as question fibers from side seatbelt buckle). Item 1B consisted of red strands containing cotton and polyester fibers. Item 1D consisted of strands containing cotton and polyester fibers. Several cotton fibers that were examined from 1B and 1D were similar in color and size. Several polyester fibers that were examined from 1B and 1D were similar in color, size, and optical characteristics. Item 1D could have originated from Item 1B or from another source of the same fiber type, color, and physical characteristics.</p>
DJULJD	<p>CONCLUSIONS: The questioned fibers from the suspect's leather gloves (Item 001C, CTS Item 3) originated from the victim's scarf (Item 001A, CTS Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. The</p>

## TABLE 4

WebCode	Conclusions
	<p>questioned fibers from the passenger side seatbelt (Item 001D, CTS Item 4) originated from the victim's shirt (Item 001B, CTS Item 2) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. RESULTS: The questioned fibers from the suspect's leather gloves (Item 001C, CTS Item 3) were examined for the purpose of determining whether or not there are any fibers present that are consistent with the victim's scarf (Item 001A, CTS Item 1) or victim's shirt (Item 001B, CTS Item 2). The composition of the known fibers from the victim's scarf (Item 001A, CTS Item 1) includes red cotton fibers. The composition of the questioned fibers from the suspect's leather gloves (Item 001C, CTS Item 3) includes red cotton fibers. Examination and comparison of questioned fibers from the suspect's leather gloves (Item 001C, CTS Item 3) reveals the presence of numerous fibers that are consistent in microscopic, optical, and chemical characteristics with the known fibers of the victim's scarf (Item 001A, CTS Item 1). It is therefore concluded the questioned fibers (Item 001C, CTS Item 3) originated from the victim's scarf (Item 001A, CTS Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. The questioned fibers from the passenger side seatbelt (Item 001D, CTS Item 4) were examined for the purpose of determining whether or not there are any fibers present that are consistent with the victim's scarf (Item 001A, CTS Item 1) or victim's shirt (Item 001B, CTS Item 2). The composition of the victim's shirt (Item 001B, CTS Item 2) includes red polyester and red cotton fibers. The composition of the questioned fibers from the passenger side seatbelt (Item 001D, CTS Item 4) includes red polyester and red cotton fibers. Examination and comparison of questioned fibers from the passenger side seatbelt (Item 001D, CTS Item 4) reveals the presence of numerous fibers that are consistent in microscopic, optical, and chemical characteristics with the known fibers of the victim's red shirt (Item 001B, CTS Item 2). It is therefore concluded the questioned fibers (Item 001D, CTS Item 4) originated from the red shirt (Item 001B, CTS Item 2) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, fluorescence microscopy, microspectrophotometry and Fourier transform infrared microspectroscopy.</p>
DNLCNH	<p>Result Statements: Items 1, 2, 3, and 4 were examined macroscopically, microscopically, and instrumentally. Item 1 was found to be a piece of fabric consisting of red cotton fibers. Item 2 was found to be a piece of fabric consisting of a mixture of red cotton fibers and red polyester fibers. Item 3 consisted of several red colored fibers that were found to be cotton fibers. Item 4 consisted of several red colored fibers that were found to be a mixture of cotton fibers and polyester fibers. Comparison of the Item 3 fibers to the Item 1 fabric fibers shows that the Item 3 fibers are similar to the fibers from the Item 1 fabric. The Item 3 fibers could have originated from the Item 1 fabric. Comparison of the Item 3 fibers to the Item 2 fabric fibers show that the Item 3 fibers are not similar to the fibers from the Item 2 fabric. The Item 3 fibers could not have originated from the Item 2 fabric. Comparison of the Item 4 fibers to the Item 1 fabric fibers shows that the Item 4 fibers are not similar to the fibers from the Item 1 fabric. The Item 4 fibers could not have originated from the Item 1 fabric. Comparison of the Item 4 fibers to the Item 2 fabric fibers shows that the Item 4 fibers are similar to the fibers from the Item 2 fabric. The Item 4 fibers could have originated from the Item 2 fabric. Notes: 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.</p>
DQR6TV	<p>Examination of Item #1 revealed a red woven fabric comprised of cotton. Examination of Item #3 revealed the presence of four red yarns comprised of cotton. Two of the yarns in Item #3 were consistent in color, construction and composition with the warp yarns in Item #1, while the other two yarns were consistent in color, construction and composition with the fill yarns in Item #1. Therefore, the yarns in Item #3 could have originated from the same source as Item #1. Examination of Item #2 revealed a red woven fabric comprised of cotton and polyester. Examination of Item #4 revealed the presence of four red yarns comprised of cotton and polyester. Two of the yarns in Item #4 were consistent in color, construction and composition with the warp yarns in Item #2, while the other two yarns were consistent in color, construction and composition with the fill yarns in Item #2. Therefore, the yarns in Item #4 could have originated from the same source as Item #2.</p>
DVHPDE	<p>Item 3 (unknown fibers found on the suspect's leather gloves) was found to be a cellulose (likely cotton)</p>

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	based thread. The fiber composition, morphology, colour, dye heterogeneity and filaments per yarn are consistent with the thread from the victim's scarf. The scarf is therefore a potential source for the unknown fibers found on the suspect's gloves. Item 4 (unknown fibers found on the passenger seatbelt from the suspect's car) was found to be cellulose (likely cotton) and polyester blend thread. The fiber composition, morphology, colour, dye heterogeneity, and filaments per yarn are consistent with the thread from the victim's shirt. Further, the melting point and enthalpy of melting of the unknown polyester fibers are consistent with that of the polyester from the victim's shirt. The shirt is therefore a potential source for the unknown fibers found on the suspect's passenger side seatbelt.
E6ZJBU	Item 1 was a vegetable fibre (cotton). Item 2 was principally a manufactured (polyester) fibre with a minor component of vegetable (cotton) fibres. Item 3 was a vegetable fibre (cotton). Item 4 was principally a manufactured (polyester) fibre with a minor component of vegetable (cotton) fibres. No measurable differences were found in the physical and chemical characteristics of some of the fibres from Items 3 and fibres from item 1. Some fibres in Item 3 could have originated from the fibres in Item 1. No measurable differences were found in the physical and chemical characteristics of some of the fibres from Items 4 and fibres from item 2. Some fibres in Item 4 could have originated from the fibres in Item 2. The fibres in Item 4 were chemically and physically different to those observed in Item 1 and therefore could not have originated from fibres in Item 1. The fibres in Item 3 were chemically and physically different to those observed in Item 1 and therefore could not have originated from fibres in Item 2.
E8G23K	The fibers from Item 3 are dyed cotton and of the same color and composition as the control fabric from the victim's scarf (Item 1) and probably have a common origin. The fibers from Item 4 are a combination of dyed cotton and dyed-delustered polyester fibers and are identical in composition and color as the fibers from the victim's shirt (Item 2).
E8GJXF	1. Item 1 (fabric from the victim's scarf) is a woven fabric which is constructed of single-ply cotton yarns. 2. Item 2 (fabric from the victim's shirt) is a woven fabric which is constructed of both single-ply and two-ply yarns. The single-ply yarns are composed of cotton and polyester. The two-ply yarns are composed of cotton, polyester, and rayon or cotton and polyester. It should be noted that the relative percent composition of rayon in the two-ply rayon containing yarns is low as compared to the cotton and polyester content of those same yarns. 3. Item 3 (fibers from the suspect's leather gloves) contained four single-ply yarns. These yarns were found to be consistent in their morphological properties, fiber composition, and fiber characteristics as compared to the single-ply yarns of Item 1 (fabric from the victim's scarf). As a result of these findings, the four yarns in Item 3 could have originated from Item 1. In addition, the yarns in Item 3 were found to be dissimilar to the single and two-ply yarns of Item 2 (fabric from the victim's shirt). 4. Item 4 (fibers from the passenger side seat belt buckle) contained four yarns. Two of those are single-ply yarns while the other two yarns are two-ply yarns. These yarns were found to be consistent in their morphological properties, fiber composition, and fiber characteristics as compared to the single and two-ply yarns of Item 2 (fabric from the victim's shirt), respectively. As a result of these findings, the four yarns in Item 4 could have originated from Item 2. In addition, the yarns in Item 4 were found to be dissimilar to the single-ply yarns of Item 1 (fabric from the victim's scarf).
E99YBR	Item 1 could not be excluded as being a possible source of Item 3. Item 2 could not be excluded as being a possible source of Item 4. Item 1 is excluded as being a possible source of Item 4. Item 2 is excluded as being a possible source of Item 3.
EC2V8Q	The fibers found on the leather gloves were indistinguishable from the fibers used in the section of fabric from the scarf. The fibers found on the passenger side seatbelt buckle were indistinguishable from the fibers used in the shirt.
ECJRTY	Item 1: Known section of red (color) fabric from victim's scarf. The fabric is a plain weave (1 x 1), with no selvedge present, comprising single-ply yarns in both the (presumed) warp and fill directions. Analysis of component fibers from representative yarns (from both weave directions) by polarized light microscope (PLM), and subsequently confirmed by solubility (70% H <sub>2</sub> SO <sub>4</sub> ), indicates vegetable fibers, specifically cotton. Item 2: Known section of red (color) fabric from torn bottom of victim's shirt. The fabric is a plain weave (1 x 1), with no selvedge present, comprising single-ply yarns in one direction and double-ply yarns in the other. Analysis of component fibers from representative yarns (from both weave directions) by polarized light microscope (PLM), indicates that yarns are a mixture of a vegetable

TABLE 4

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	<p>fiber, specifically cotton, and a manufactured fiber. The vegetable fiber was subsequently confirmed by solubility (70% H<sub>2</sub>SO<sub>4</sub>). The manufactured fiber was confirmed by Fourier transform infrared (FTIR) spectroscopy as polyester. Item 3: Questioned fibers from the suspect's leather gloves. Note: as received, Item 3 comprises four yarn sections, not loose, individual fibers. Of the four yarn sections comprising Item 3, two (one pair) are of 2-ply construction and the other pair are single ply. Analysis of representative fibers from these yarns by polarized light microscope (PLM), and subsequently confirmed by solubility (70% H<sub>2</sub>SO<sub>4</sub>), indicates vegetable fibers, specifically cotton. Item 4: Questioned fibers from the passenger side seatbelt buckle. Note: as received, Item 4 comprises four yarn sections, not loose, individual fibers. Of the four yarn sections comprising Item 4, two (one pair) are of 2-ply construction and the other pair are single ply. Analysis of representative fibers from these yarns by polarized light microscope (PLM) indicates that yarns are a mixture of a vegetable fiber, specifically cotton; and a manufactured fiber. The vegetable fiber was subsequently confirmed by solubility (70% H<sub>2</sub>SO<sub>4</sub>). The manufactured fiber was confirmed by Fourier transform infrared (FTIR) spectroscopy as polyester. In the context of the question asked at 1, and based on the findings noted, the Item 3 (all cotton) questioned fibers could originate from Item 1, the victim's scarf. Item 4 (cotton/polyester mix) questioned fibers, however, are unlikely to originate from Item 1. Item 3 (all cotton) questioned fibers are unlikely to originate from Item 2, the victim's shirt (cotton/polyester mix). Item 4 (cotton/polyester mix) questioned fibers, however, could originate from Item 2.</p>
EDUTEX	<p>Item 3 contained threads which were consistent in overall color, overall appearance, construction, and fiber color and content with the warp and weft yarns in the fabric in Item 1, and which could have originated from the source represented by Item 1. Item 4 contained threads which were consistent in overall color, overall appearance, construction, and fiber color and content with the warp and weft yarns in the fabric in Item 2, and which could have originated from the source represented by Item 2.</p>
EGBYB8	<p>[No Conclusions Reported].</p>
EXQJ64	<p>The threads marked "Item 3" were found to consist of pinkish-red cotton fibres. They were examined and found to be similar to the pinkish-red cotton fibres constituting the fabric marked "Item 1" (from the victim's scarf). This suggests that the threads marked "Item 3" could have originated from the fabric marked "Item 1", or from other fabrics with similar thread characteristics. The threads marked "Item 4" were found to consist of pinkish-red cotton fibres as well as pinkish-red and light pinkish-red polyester fibres. They were found to be similar to the pinkish-red cotton fibres and the pinkish-red and light pinkish-red polyester fibres constituting the fabric marked "Item 2" (from the victim's shirt). This suggests that the threads marked "Item 4" could have originated from the fabric marked "Item 2", or from other fabrics with similar thread characteristics.</p>
EZMVE4	<p>The fibers from item 3 (questioned fibers from the suspect's leather gloves) have similar fiber content as item 1 (known section of fabric from the victim's scarf). Both consist of vegetable cotton fibers. The fibers from item 4 (questioned fibers from the passenger side seatbelt buckle) have similar fiber content as item 2 (known section of fabric from the torn bottom of the victim's shirt). Both are composed of vegetable cotton and manufactured polyester fibers.</p>
FJN3JF	<p>The examined portions of the questioned fibers from the suspect's leather gloves (Item 1-3) were consistent in color, microscopic appearance, instrumental properties and fiber type with the examined portions of known fibers from the fabric from the victim's scarf (Item 1-1). Accordingly, the questioned fibers recovered from the suspect's leather gloves could have originated from the fabric from the victim's scarf. The examined portions of the questioned fibers from the passenger side seatbelt buckle (Item 1-4) were consistent in color, microscopic appearance, instrumental properties and fiber type with the examined portions of known fibers from the fabric from the torn bottom of the victim's shirt (Item 1-2). Accordingly, the questioned fibers recovered from the passenger side seatbelt buckle could have originated from the fabric from the torn bottom of the victim's shirt.</p>
FM647M	<p>Item 1 consists of a swatch of red fabric approximately 50 mm by 50 mm in size. The fabric is constructed of yarns with a z-twist composed of red cotton fibers. Item 2 consists of a swatch of red fabric approximately 50 mm by 50 mm in size. The fabric is constructed of yarns with both z-twist and s-twist, both of which are composed of a mixture of red cotton fibers and red polyester fibers. Item 3 consists of four red yarns, each approximately 50 mm long. The yarns have a z-twist and are composed</p>

TABLE 4

WebCode	Conclusions
	<p>of red cotton fibers. Item 4 consists of four red yarns, each approximately 50 mm long. Two of the yarns have a z-twist and two of the yarns have an s-twist. Both yarns are composed of a mixture of red cotton fibers and red polyester fibers. The red yarns from Item 3 have similar physical construction as the known yarns from Item 1. The red cotton fibers from Item 3 have similar chemical properties and similar microscopically observed morphology, optical properties, fluorescence, and color characteristics as the known fibers from Item 1. The yarns from Item 3 either originated from the source of the known fabric in Item 1 or from another textile source with similar properties. Red cotton fibers are very common and therefore many other potential sources of the fibers exist. The red yarns from Item 3 could not have originated from the source of the known fabric in Item 2 due to differences in fiber composition. The red yarns from Item 4 have similar physical construction as the known yarns from Item 2. The red cotton fibers from Item 4 have similar chemical properties and similar microscopically observed morphology, optical properties, fluorescence, and color characteristics as the known cotton fibers from Item 2. The red polyester fibers from Item 4 have similar chemical properties and similar microscopically observed morphology, optical properties, fluorescence, and color characteristics as the known polyester fibers from Item 2. The yarns from Item 4 either originated from the source of the known fabric in Item 2 or from another textile source with similar properties. The red yarns from Item 4 could not have originated from the source of the known fabric in Item 1 due to differences in physical construction and fiber composition. The fibers from Items 1-4 were analyzed using stereomicroscopy, polarized light microscopy, fluorescence microscopy, comparison microscopy, and Fourier transform infrared micro-spectrometry.</p>
GATE44	<p>The red fabric from the scarf (Item 1) was found to be composed of cotton. The red cotton fibers from the scarf fabric (Item 1) were found to be similar in color in comparison to the red cotton fibers composing the threads recovered from the leather gloves (Item 3). Additionally, the threads recovered from the leather gloves (Item 3) are similar in construction to the threads composing the red fabric from the scarf (Item 1). The red cotton threads recovered from the gloves (Item 3) could have originated from the red fabric from the scarf (Item 1), or from any other source of red cotton threads with similar color and construction. The red fabric from the shirt (Item 2) was found to be composed of a blend of polyester and cotton. The red cotton fibers from the shirt (Item 2) were found to be similar in color in comparison to the red cotton fibers composing the threads recovered from the seatbelt buckle (Item 4). Also, the red polyester fibers from the shirt (Item 2) were found to be similar in color, microscopic characteristics and chemistry in comparison to the red polyester fibers composing the threads recovered from the seatbelt buckle (Item 4). In addition, the red cotton and polyester threads recovered from the seatbelt buckle (Item 4) are similar in construction to the threads composing the red fabric from the shirt (Item 2). The red cotton and polyester threads recovered from the seatbelt buckle (Item 4) could have originated from the red fabric from the shirt (Item 2), or from any other source of red cotton and polyester threads with similar color and construction. The red cotton threads recovered from the leather gloves (Item 3) could not have originated from the red cotton and polyester fabric from the shirt (Item 2). The red cotton and polyester threads recovered from the seatbelt buckle (Item 4) could not have originated from the red cotton fabric from the scarf (Item 1). Samples collected and analyzed during the examination and analysis of the items in this case (ex. Slides) have been returned to and retained with the original item. Analyses performed includes: Fourier transformed infrared spectroscopy and microspectrophotometry.</p>
GNG98H	<p>Based on visual, colour and chemical examinations, Item 3 showed no significant differences to Item 1. Therefore, fibres recovered from the suspect's leather gloves (Item 3) could have come from the victim's scarf (Item 1), or any other source with the same physical and chemical characteristics. Based on visual, colour and chemical examinations, Item 4 showed no significant differences to Item 2. Therefore, fibres recovered from the passenger side seatbelt buckle (Item 4) could have come from the victim's shirt (Item 2), or any other source with the same physical and chemical characteristics.</p>
GTGQUX	<p>The sample, four individually packaged textile specimens, was received within a brown envelop[sic] labeled "item 1, item 2, item 3 and item 4" respectively. "Item 1" consists of a small piece of woven fabric. It is composed of 100% weight vegetable cotton. "Item 2" consists of a small piece of woven fabric. It is composed of manufactured polyester and vegetable cotton. "Item 3" consists of yarns. It is composed of 100% by weight vegetable cotton. "Item 4" consists of yarns. It is composed of manufactured polyester and vegetable cotton.</p>



TABLE 4

WebCode	Conclusions
H3KHHH	The victim's scarf (Item 1) may have been the source of the questioned fibers from the suspect's gloves (Item 3). The victim's shirt (Item 2) may have been the source of the questioned fibers from the passenger side seatbelt buckle of the suspect's vehicle (Item 4).
H6W277	<p>Evidence Submitted: Envelope with "Known Section of Fabric from the victim's scarf, Known section of fabric from the torn bottom of the victim's shirt, Questioned fibers from the suspect's leather gloves, Questioned fibers from the passenger side seatbelt buckle" (#1-4): 1.1 Known section of fabric from the victim's scarf; 1-2. Known section of fabric from the torn bottom of the victim's shirt; 1-3. Questioned fibers from the suspect's leather gloves; 1-4. Questioned fibers from the passenger side seatbelt buckle. Examination Method: Samples were examined microscopically and instrumentally for chemical composition via Fourier Transform Infrared Spectroscopy (FTIR) and/or for color composition via Microspectrophotometry. Instrumental results reflect the analysis of the portion of the sample tested. Results of Examination: 1. Submission #1 consisted of the previously listed items. A. Item #1-1 (Known section of fabric from the victim's scarf) consisted of a piece of woven fabric (1-1Z1), measuring approximately 5cm x 5cm. 1. Item #1-1 was examined microscopically and instrumentally for color composition. 2. The threads of the red woven fabric of item #1-1 were determined to be composed of red cotton fibers. B. Item #1-2 (Known section of fabric from the torn bottom of the victim's shirt) consisted of a piece of woven fabric (1-2Z1), measuring approximately 5 cm x 5 cm. 1. Item #1-2 was examined microscopically and instrumentally for chemical composition and color composition. 2. The threads of the red woven fabric of item #1-2 were determined to be composed of red cotton fibers and red polyester fibers. C. Item #1-3 (Questioned fibers from the suspect's leather gloves) consisted of four (4) red threads (1-3Z1), each measuring approximately 5 cm in length. 1. Item #1-3 was examined microscopically and instrumentally for color composition. 2. The threads of item #1-3 were determined to be composed of red cotton fibers. 3. The red cotton fibers of item #1-3 exhibited similar microscopic characteristics as the red cotton fibers located in item #1-1 (Known section of fabric from the victim's scarf). 4. A sample of these red cotton fibers were examined for color. This sample exhibited similar instrumental characteristics as the red cotton fibers located in item #1-1 (Known section of fabric from the victim's scarf). D. Item #1-4 (Questioned fibers from the passenger side seatbelt buckle) consisted of four (4) red threads (1-4Z1), each measuring approximately 5 cm in length. 1. Item #1-4 was examined microscopically and instrumentally for chemical composition and color composition. 2. The threads of item #1-4 were determined to be composed of red cotton fibers and red polyester fibers. 3. The red cotton fibers of item #1-4 exhibited similar microscopic characteristics as the red cotton fibers located in item #1-2 (Known section of fabric from the torn bottom of the victim's shirt). 4. The red polyester fibers of item #1-4 exhibited similar microscopic characteristics as the red polyester fibers located in item #1-2 (Known section of fabric from the torn bottom of the victim's shirt). A. A sample of these red polyester fibers were examined for chemical composition. This sample exhibited similar instrumental characteristics as the red polyester fibers located in item #1-2 (Known section of fabric from the torn bottom of the victim's shirt). B. A sample of these red polyester fibers were examined for color. This sample exhibited similar instrumental characteristics as the red polyester fibers located in item #1-2 (Known section of fabric from the torn bottom of the victim's shirt). 2. Submission #1 will be returned to the Submitting Agency. 3. Items #1-1Z1, #1-2Z1, #1-3Z1 and #1-4Z1 were retained at the Laboratory. *Further analysis upon request. This report reflects the test results, conclusions, interpretations and/or findings of the Analyst and Technical Reviewer as indicated by their signatures below.</p>
H8X4P4	The fibers in Item #3 are consistent with those in Item #1. The fibers in Item #4 are consistent with those in Item #2.
HBTWHY	The suspect fibers from Item 3 were consistent with the fibers from Item 1. The suspect fibers from Item 4 were consistent with the fibers from Item 2.
HT4HRZ	The red fabric in Item 1 is comprised of red cotton fibers. The threads from Item 3 are comprised of red cotton. The fibers from Item 3 are the same color and have a similar color range and microscopic properties as the fibers from Item 1, and could have come from the fabric in Item 1. The red fabric in Item 2 is comprised of threads that are a mixture of cotton and polyester fibers. The fabric appears to have been dyed after it was woven, giving the fibers varying degrees of red color. The threads from Item 4 are comprised of a mixture of polyester and cotton fibers with varying degrees of red color. The polyester fibers from Item 4 have the same chemical composition, color variation, and microscopic

TABLE 4

WebCode	Conclusions
	optical properties as the polyester fibers from Item 2. Additionally, the cotton fibers from Item 2 have the same color variation and microscopic properties as the cotton fibers from Item 4. Therefore, the threads from Item 4 could have come from the fabric in Item 2.
HUDGLX	The red fiber strands in Item #3 have the same physical characteristics and chemical composition as the red fiber strands in Item #1. Therefore, the red fibers strands from #3 could have originated from the piece of red fabric from the scarf in Item #1. The red fiber strands in Item #4 have the same physical characteristics and chemical composition as the red fiber strands from the shirt in Item #2. Therefore, the fibers[sic] strands from #4 could have originated from the piece of red fabric from the shirt in Item #2.
J8798D	1. Exhibit 1 (known section of fabric from the victim's scarf) is composed of red cotton fibers. 2. Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt) is composed of red cotton and red polyester fibers. 3. Red cotton fibers were observed in Exhibit 3 (questioned fibers from suspect's leather gloves). These red cotton fibers are consistent microscopically with the red cotton fibers that compose Exhibit 1; therefore, these fibers could have originated from the red cotton fibers composing Exhibit 1. These questioned fibers were dissimilar to Exhibit 2. 4. Red cotton fibers and red polyester fibers were observed in Exhibit 4 (questioned fibers from passenger side seatbelt buckle). The red cotton fibers are consistent microscopically with the red cotton fibers that compose Exhibit 2; therefore, these fibers could have originated from the red cotton fibers composing Exhibit 2. The red polyester fibers are consistent microscopically and in chemical composition to the red polyester fibers that compose Exhibit 2; therefore, these fibers could have originated from the red polyester fibers composing Exhibit 2. These questioned fibers were dissimilar to Exhibit 1. 5. It should be noted that Exhibits 3 and 4 each contain four separate lengths of thread. Each of the lengths of thread in Exhibits 3 and 4 were randomly sampled for comparison purposes.
J8ZH2A	On examination, I found: i. The questioned fibers from the suspect's leather gloves (Item 3) and the fibers from the victim's scarf (Item 1) to be similar and could have come from the same source. ii. The questioned fibers from the passenger side seatbelt buckle (Item 4) and the fibers from the victim's shirt (Item 2) to be similar and could have come from the same source.
JB3GEM	Item 1 is composed by a single type of red fiber, identified as cotton by optic microscopy. Item 2 is composed of two type of red fibers. One type, manufactured fiber with delustrant, dichroism under polarized light, without fluorescence and cross section of round shape. It's identified as polyester fiber by FTIR. The second type of fiber is identified as cotton by optic microscopy. Item 3 contains the same type of fibers than item 1. Item 4 contains the same type of fibers than item 2.
JGA37Q	The cotton fibers from item 3, the questioned red threads from the suspect's leather gloves, are similar to the cotton fibers from the warp threads and the fill threads of item 1, the known section of red fabric from the victim's scarf. The cotton fibers from item 3, the questioned red threads from the suspect's leather gloves, are not consistent ith[sic] the blend of cotton and polyester fibers from the warp threads or the fill threads of item 2, the known section of red fabric from the victim's shirt. The blend of cotton and polyester fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are not consistent with the cotton fibers from the warp threads or the fill threads of item 1, the known section of red fabric from the victim's scarf. The cotton fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are similar to the cotton fibers from the warp threads and the fill threads of item 2, the known section of red fabric from the victim's shirt. The polyester fibers from item 4, the questioned red threads from the passenger side seatbelt buckle, are consistent with the polyester fibers from the warp threads and the fill threads of item 2, the known section of red fabric from the victim's shirt.
JMJBVZ	Items 1 and 3 are both red cotton with the same visible spectra. There is no difference between them. So item 3 could have originated from item 1. Items 2 and 4 are both composed of cotton and polyester. The visible spectra of cotton are the same and those of polyester are also the same. The density of delustrant of polyester are the same for item 2 and item 4. And the morphology of them are the same. So item 4 could have originated from item 2.
JQ8FWK	1. The questioned fiber (item 3) is similar color as victim's scarf (item 1), and the FT-IR spectrum of item 3 is consistent with that of item 1. 2. The questioned fiber (item 4) is similar color as victim's shirt (item

TABLE 4

WebCode	Conclusions
	2), and the FT-IR spectrum of item 4 is consistent with that of item 2.
K2YQGW	Analysis and comparison of the questioned fibers of item 3 (fibers from the suspect's leather gloves) and Item 4 (fibers from the passenger side seatbelt buckle) showed they were similar to both known Item 1 (section of fabric from the victim's scarf) and Item 2 (section of fabric from the torn bottom of the victim's shirt) with respect to their color and Microspectrophotometry characteristic. However, with respect to their morphological and IR characteristics, questioned fibers of item 3 were found to be similar to known Item 1 and questioned fibers of Item 4 were found to be similar to known Item 2.
KU22WL	Microscopic and instrumental (MSP) comparison of the questioned fibers from the suspect's leather gloves (Q1, Q2) with the known section of fabric from the victim's scarf (K1) showed them to be similar in their color, optical properties and physical composition. It is the opinion of the undersigned that questioned fibers Q1 and Q2 could have originated from the source represented by K1 or from a similarly manufactured and colored item. Microscopic and instrumental (FTIR, MSP) comparison of the questioned fibers from the passenger side seatbelt buckle (Q3,Q4) with the known section of fabric from the torn bottom of the victim's shirt (K2) showed them to be similar in their color, optical properties, physical and chemical composition. It is the opinion of the undersigned that questioned fibers Q3 and Q4 could have originated from the source represented by K2 or from a similarly manufactured and colored item. Microscopic comparison of the fibers recovered from the suspect's leather glove (Q1, Q2) with the fibers comprising the known section of fabric from the victim's shirt (K2) showed them to be dissimilar in their physical composition. It is the opinion of the undersigned that questioned fibers Q1 and Q2 could not have originated from the source represented by K2. Microscopic comparison of the fibers recovered from the passenger side seatbelt buckle (Q3, Q4) with the fibers comprising the known section of fabric from the victim's scarf (K1) showed them to be dissimilar in their physical composition. It is the opinion of the undersigned that questioned fibers Q3 and Q4 could not have originated from the source represented by K1.
LAFND2	The four red yarns from Item 3, four questioned yarns "from the suspect's leather gloves," were examined and compared visually and microscopically to red yarns composing Item 1, known section of fabric "from the victim's scarf," and were found to be consistent in appearance, construction, fiber type, and microscopic characteristics. Therefore, the four red yarns from Item 3 could have come from Item 1. The four red yarns from Item 4, four questioned yarns "from the passenger side seatbelt buckle," were examined and compared visually and microscopically to red yarns composing Item 2, known section of fabric "from the torn bottom of the victim's shirt," and were found to be consistent in appearance, construction, fiber types, and microscopic characteristics. Therefore, the four red yarns from Item 4 could have come from Item 2. The four red yarns from Item 3 were also examined and compared visually and microscopically to the red yarns composing Item 2 and were found to be different in fiber composition. Therefore, the four red yarns from Item 3 did not come from Item 2. The four red yarns from Item 4 were also examined and compared visually and microscopically to the red yarns composing Item 1 and were found to be different in fiber composition and/or construction. Therefore, the four red yarns from Item 4 did not come from Item 1.
LET6UX	Item: 1 One swatch of red fabric. Item: 1.1 Fibers removed from Item 1 for analysis. RESULTS: Red cotton fiber standard. Item: 2 One swatch of red fabric. Item: 2.1 Fibers removed from Item 2 for analysis. RESULTS: Red cotton and red polyester fiber standards. Item: 3 Four (4) pieces of red yarn. Item: 3.1 Fibers removed from Item 3 for analysis. RESULTS: Four (4) pieces of red yarn composed of red cotton fibers were found. The unknown fibers (Item 3.1) either originated from the fiber standard (Item 1.1) or from another source of fibers possessing the same distinct physical, chemical, and optical characteristics. The unknown fibers (Item 3.1) and the fiber standards (Item 2.1) are not the same in physical, chemical and/or optical characteristics. The unknown fibers (Item 3.1) could not have originated from the standards (Item 2.1). Item: 4 Four (4) pieces of red yarn. Item: 4.1 Fibers removed from Item 4 for analysis. RESULTS: Four (4) pieces of red yarn composed of red cotton fibers and red polyester fibers were found. The unknown fibers (Item 4.1) either originated from the fiber standards (Item 2.1) or from another source of fibers possessing the same distinct physical, chemical, and optical characteristics. The unknown fibers (Item 4.1) and the fiber standard (Item 1.1) are not the same in physical, chemical and/or optical characteristics. The unknown fibers (Item 4.1) could not have originated from the standard (Item 1.1).

TABLE 4

WebCode	Conclusions
LTYKFK	<p>Based on techniques applied: 1) Item 2 (Victim's shirt) was excluded as a possible source of the lengths of thread found on the suspect's gloves (Item 3) based on differences in the composition of fibre types. 2) Item 1 (victim's scarf) was excluded as a possible source of the lengths of thread found on the passenger side seat belt buckle (Item 4) based on differences in the composition of fibre types. 3) Item 3 (Fibres from the suspect's gloves) could not be differentiated from the fibres of Item 1 (Victim's scarf). 4) Item 4 (Fibres from the seat belt buckle) could not be differentiated from the fibres of Item 2 (Victim's shirt). Therefore, I am of the opinion that the results of the fibre comparison performed strongly supports the proposition that: 1) The four lengths of red thread from the suspect's gloves (Item 3) came from the victim's scarf (Item 1) as opposed to another random source. 2) The four lengths of red thread from the passenger side seat belt buckle (Item 4) came from the victim's shirt (Item 2) as opposed to another random source. It should be noted that whilst the questioned fibres could have come from the victim's scarf or shirt as described above, garments are mass produced and the fibres could also have come from other identical garments or different textile products composed of the same fibre types.</p>
LU7GGP	<p>Known fabric from the victim's scarf in item 1 composed of red cotton fibres, with constituent yarns twisted in Z-direction. Known fabric from the victim's torn shirt in item 2 composed of red cotton and red polyester fibres, with thin and thick constituent yarns twisted in S-direction and Z-direction respectively. Questioned fibres, in the form of yarns, recovered from the suspect's leather gloves in item 3 constituted red cotton fibres. The yarns of questioned fibres in item 3 were twisted in Z-direction, agreeing in twist direction with the constituent yarns of the known fabric in item 1. Furthermore, the questioned red cotton fibres in Item 3 were found to agree in colour, fibre type, microscopic appearance under various lighting conditions and dye composition with the red cotton fibres of the known fabric from the victim's scarf in item 1. These findings suggested that the questioned fibres from the suspect's leather gloves in item 3 could have originated from the victim's scarf from which the known fabric in item 1 was taken. Questioned fibres, in the form of thin and thick yarns, recovered from the passenger side seatbelt buckle in item 4 constituted red cotton and polyester fibres. The thin and thick yarns of the questioned fibres in item 4 were twisted in S-direction and Z-direction respectively, agreeing in twist direction with the corresponding constituent yarns of the known fabric in item 2. In addition, the questioned red cotton and polyester fibres in item 4 were found to agree in colour, fibre type, microscopic appearance under various lighting conditions and dye composition with the respective constituent fibres of the known fabric from the victim's torn shirt in item 2. These findings suggested that the questioned fibres from the passenger side seatbelt buckle in item 4 could have originated from the victim's torn shirt from which the known fabric in item 2 was taken.</p>
M432Q6	<p>1. The sample received as the "Known section of fabric from the victim's scarf" (item 1) is made by weave composed yarns made red cotton fibers. 2. The sample received as the "Known section of fabric from the torn bottom of the victim's shirt" (item 2) is made by weave composed by yarns made red cotton-polyester fibers. 3. The sample received as "Questioned fibers from the suspect's leather gloves" (item 3) is composed by yarns made red cotton fibers. 4. The sample received as the "Questioned fibers from the passenger side seatbelt buckle" (item 4) is composed by yarns made red cotton-polyester fibers. 5. According with the physical - chemical properties evaluated, the questioned yarns (fibers) received as item 3 are indistinguishable from the sample received as item 1. Nevertheless it must be considered any other fabric with the same mixture and physical - chemical properties of fibers as a possible source according with the physical - chemical properties evaluated- 6. According with the physical - chemical properties evaluated, the questioned yarns (fibers) received as item 4 are indistinguishable from the sample received as item 2. Nevertheless it must be considered any other fabric with the same mixture and physical - chemical properties of fibers as a possible source according with the physical - chemical properties evaluated. [sic]</p>
M6QGW8	<p>Item 1 is included as a possible source of item 3. Item 2 is included as a possible source of item 4.</p>
M7GC9U	<p>The results of the examination strongly support the hypothesis that the questioned fibres (threads) from the suspect's leather gloves, Item 3, originate from the victim's scarf, Item 1. The results of the examination strongly support the hypothesis that the questioned fibres (threads) from the passenger side seatbelt buckle, Item 4, originated from the victim's shirt, Item 2.</p>
MFHPZU	<p>Items 1-4 were examined visually, microscopically and instrumentally using Fourier Transform Infrared Spectrometry. Threads from items 1 and 3 were consistent with natural cotton fibers. Items 1 and 3</p>

TABLE 4

WebCode	Conclusions
	displayed similar color, macroscopic, microscopic and chemical properties. Therefore, items 1 and 3 may share a common source of origin. Threads from items 2 and 4 were consistent with natural cotton fibers and man-made polyester fibers. Items 2 and 4 displayed similar color, macroscopic, microscopic and chemical properties. Therefore, items 2 and 4 may share a common source of origin.
MT7U9Q	The red cotton textile fibers comprising the yarns in Item 3 demonstrate the same physical characteristics as the red cotton textile fibers comprising Item 1. Accordingly, Item 1 cannot be excluded as a possible source of the yarns in Item 3. The red cotton and polyester textile fibers comprising the yarns in Item 4 demonstrate the same physical characteristics and chemical properties as the red cotton and polyester textile fibers comprising Item 2. Accordingly, Item 2 cannot be excluded as a possible source of the yarns in Item 4. Item 1 is excluded as a possible source of the red cotton and polyester textile yarns in Item 4. Item 2 is excluded as a possible source of the 100% red cotton yarns in Item 3.
NM9Z6X	[No Conclusions Reported].
NT2F8H	Item 3 is similar to Item 1, therefore Item 3 could have originated from the same source as Item 1. Item 3 is dissimilar to Item 2. Item 4 is similar to Item 2, therefore Item 4 could have originated from the same source as Item 2. Item 4 is dissimilar to Item 1.
NW4TXA	Item 1 was found to be similar to Item 3 in color and microscopic characteristics. Item 1 was found to be dissimilar to Item 4 in microscopic characteristics. Item 2 was found to be similar to Item 4 in color, micorscopie[sic] characteristics and chemical composition. Item 2 was found to be dissimilar to Item 3 in microscopic characteristics.
NXW7FF	The red cotton fibers recovered in Item 3 could have originated from Item 1, the victim's scarf. The red cotton and polyester fibers recovered from Item 4 could have originated from Item 2, the victim's shirt.
P3H2KL	The Q1 (Item 3) thread remnants have the same color, construction, and composition as the threads comprising the K1 (Item 1) fabric sample. Accordingly, the threads are consistit[sic] with originating from the source of the K1 fabric sample, or another source comprised of threads wit hthe[sic] same color, construction, and composition. The Q2 (Item 4) thread remnants have the same color, construction, and composition as the threads comprising the K2 (Item 2) fabric sample. Accordingly, the threads are consistent with originating from the source of the K2 fabric sample, or another source comprised of threads with the same color, construction, and composition.
P46DQW	It was determined that the questioned fibers (Item #3) from suspect's leather gloves and known fibers (Item #1) from the victim's scarf share physical, optical, and chemical characteristics. Therefore the fibers from the suspect's leather gloves could have come from the victim's scarf. Questioned fibers (Item #4) from the passenger side seatbelt buckle share physical, optical, and chemical characteristics with the fibers (Item #2) from the victim's shirt. Therefore, the fibers from the buckle could have come from the victim's shirt. The questioned fibers (Item #3) from the suspect's leather gloves do not share physical, optical, and chemical characteristics with known fibers (Item #2) from the bottom of the torn shirt. Item #3 did not come from Item #2. The questioned fibers (Item #4) from the passenger side seatbelt buckle do not share physical, optical, and chemical characteristics with known fibers (Item #1) from the victim's scarf. Item #4 did not come from Item #1.
PJBN8N	1. Exhibit 1 (known section of fabric from the victim's scarf) consists of a woven fabric of yarns composed of red cotton fibers. Exhibit 3 (questioned fibers from the suspect's leather gloves) consists of four red cotton yarns. The yarns of Exhibit 3 are consistent in microscopic characteristics to the red cotton yarns composing the fabric of Exhibit 1. This finding serves as the basis for the conclusion that the red cotton yarns observed in Exhibit 3 could have originated from Exhibit 1. 2. Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt) consists of a woven fabric of yarns composed of red cotton and red polyester fibers blended together within each yarn. Exhibit 4 (questioned fibers from the passenger side seatbelt buckle) consists of four red yarns, each composed of red cotton and red polyester. The red cotton fibers within the yarns of Exhibit 4 are consistent in microscopic characteristics to the red cotton fibers within the yarns composing the fabric of Exhibit 2. The red polyester fibers within the yarns of Exhibit 4 are consistent in microscopic characteristics and organic composition to the red polyester fibers within the yarns composing the fabric of Exhibit 2. This finding serves as the basis for the conclusion that the red cotton and red polyester fibers observed in Exhibit 4

TABLE 4

WebCode	Conclusions
	could have originated from Exhibit 2.
PMA6HX	The fibers from the suspect's leather gloves (item 3) cannot be excluded from the fibers of the fabric section from the victim's scarf (item 1) with respect to physical and chemical characteristics. Therefore, the fibers from the suspect's leather gloves could have come from the fabric of the victim's scarf or another source of fibers with the same composition. The fibers from the suspect's leather gloves are not consistent with the fabric section of the victim's shirt (item 2) with respect to physical construction and composition. The fibers from the passenger side seatbelt buckle (item 4) cannot be excluded from the fibers of the fabric section from the victim's shirt (item 2) with respect to physical and chemical characteristics. Therefore, the fibers from the passenger side seatbelt buckle could have come from the fabric of the victim's shirt or another source of fibers with the same composition. The fibers from the passenger side seatbelt buckle are not consistent with the fabric section of the victim's scarf (item 1) with respect to physical construction and composition.
PPKPNL	Examination of Item 3 revealed two different types of red cotton yarns. One type of yarn from Item 3 was consistent in color, construction and composition with the warp yarns of Item 1. The other type of red cotton yarn from Item 3 was consistent in color, construction and composition with the weft yarns of Item 1. Therefore, the red cotton yarns from Item 3 could have originated from Item 1. The red cotton yarns from Item 3 were not consistent with the yarns composing Item 2. Examination of Item 4 revealed two different types of red cotton and polyester yarns. One type of yarn from Item 4 was consistent in color, construction and composition with the warp yarns of Item 2. The other type of red cotton and polyester yarn from Item 4 was consistent in color, construction and composition with the weft yarns of Item 2. Therefore, the red cotton and polyester yarns from Item 4 could have originated from Item 2. The red cotton and polyester yarns from Item 4 were not consistent with the yarns composing Item 1.
QBW3WZ	The red cotton yarns in Item 3 were similar to the red cotton yarns in Item 1 in color, construction, and microscopic characteristics. This means the yarns from the suspect's leather gloves could have come from the victim's scarf. The yarns in Item 3 were different from Item 2. This means the yarns from the suspect's gloves did not come from the victim's shirt. The yarns in Item 2 and Item 4 were comprised of red cotton and red polyester fibers, and were similar in construction. The red cotton fibers in Item 4 were similar to the red cotton fibers in Item 2 in color and microscopic characteristics. The red polyester fibers in Item 4 were identical to the red polyester fibers in Item 2 in color and microscopic characteristics. This means the yarns from the passenger side seatbelt buckle could have come from the victim's shirt. The yarns in Item 4 were different from Item 1. This means the yarns from the passenger side seatbelt buckle did not come from the victim's scarf.
QLQLXZ	QUESTIONED FIBERS OF ITEM 3 EXHIBIT SIMILAR PHYSICAL AND CHEMICAL CHARACTERISTICS AS KNOWN FIBERS OF ITEM 1, WHICH IS CONSISTENT WITH A COMMON ORIGIN. QUESTIONED FIBERS OF ITEM 2 EXHIBIT SIMILAR PHYSICAL AND CHEMICAL CHARACTERISTICS AS KNOWN FIBERS OF ITEM 4, WHICH IS CONSISTENT WITH A COMMON ORIGIN. QUESTIONED FIBERS OF ITEM 3 EXHIBIT DIFFERENT PHYSICAL CHARACTERISTICS AS KNOWN FIBERS OF ITEM 2, THEREFORE THEY DO NOT COME FROM A COMMON ORIGIN. QUESTIONED FIBERS OF ITEM 4 EXHIBIT DIFFERENT PHYSICAL CHARACTERISTICS AS KNOWN FIBERS OF ITEM 1, THEREFORE THEY DO NOT COME FROM A COMMON ORIGIN. [sic]
QNEYFJ	Microscopic examination revealed the known section of fabric from the victim's scarf (Item #1) to be composed of red color Cotton fibers. Microscopic examination and instrumental analysis by FTIR revealed the known section of fabric from the torn bottom of the victim's shirt (Item #2) to be composed of red color Polyester fibers and red color Cotton fibers. Microscopic examination of the questioned fibers from the suspect's leather gloves (Item #3) revealed the presence of 4 yarns, each composed of red color Cotton fibers. Microscopic examination and instrumental analysis by FTIR of the questioned fibers from the passenger side seatbelt buckle (Item #4) revealed the presence of 4 yarns, each composed of red color Polyester fibers and red color Cotton fibers. Microscopic analysis and comparison of the questioned yarns from the suspect's leather gloves (Item #3) to yarns from the known fabric from the victim's scarf (Item #1) revealed them to be the same with respect to color, construction, composition, microscopic characteristics and optical characteristics. Based on these findings, the questioned yarns from the suspect's leather gloves could have originated from the victim's scarf, but not exclusively since other manufactured items in this class might be indistinguishable from the submitted

TABLE 4

WebCode	Conclusions
	evidence. Microscopic and FTIR analysis and comparison of the questioned yarns from the passenger side seatbelt buckle (Item #4) to yarns from the known fabric from the victim's shirt (Item #2) revealed them to be the same with respect to color, construction, composition, microscopic characteristics, optical characteristics and organic chemical composition. Based on these findings, the questioned yarns from the passenger side seatbelt buckle could have originated from the victim's shirt, but not exclusively since other manufactured items in this class might be indistinguishable from the submitted evidence.
QR6XBR	The questioned red cotton fibers in Item 3 (gloves) were visually, microscopically and instrumentally consistent with the known red cotton fibers in Item 1 (scarf). This indicates that the red fibers in Item 3 could have originated from the red scarf fabric in Item 1. The questioned red cotton fibers and red polyester fibers in Item 4 (seatbelt) were visually, microscopically and instrumentally consistent with the known red cotton fibers and red polyester fibers in Item 2 (shirt). This indicates that the red fibers in Item 4 could have originated from the red shirt fabric in Item 2.
QRDFQR	Microscopic Examination and Instrumental Analysis Results: Microscopic examination and instrumental analysis of Item 1 revealed the presence of pink-red cotton fibers (A and B). Microscopic examination and instrumental analysis of Item 2 revealed a blend of pink-red cotton fibers and pink/orange/white polyester fibers (A and B). Microscopic examination and instrumental analysis of Item 3 revealed the presence of pink-red cotton fibers (A and B). Microscopic examination and instrumental analysis of Item 4 revealed a blend of pink-red cotton fibers and pink/orange/white polyester fibers (A and B). Fiber Comparison Results: The pink-red cotton fibers (A and B) in Items 1 and 3 were similar in microscopic and optical properties. They could have come from the same source or any other source with similar properties. The blend of pink-red cotton fibers and pink/orange/white polyester fibers (A and B) in Items 2 and 4 were similar in microscopic, chemical and optical properties. They could have come from the same source or any other source with similar properties. The pink-red cotton fibers (A and B) in Item 1 and the blend of pink-red cotton fibers and pink/orange/white polyester fibers (A and B) in Item 4 were not similar in microscopic properties. They could not have come from the same source. The blend of pink-red cotton fibers and pink/orange/white polyester fibers (A and B) in Item 2 and the pink-red cotton fibers (A and B) in Item 3 were not similar in microscopic properties. They could not have come from the same source.
R33TXA	Red cotton fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the source of Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. Red/pink/peach/off-white cotton and red/pink/peach/off-white polyester fibers found in Item 4 exhibit the same microscopic characteristics as the red/pink/peach/off-white cotton and red/pink/peach/off-white polyester fibers comprising Item 2. Accordingly, these fibers are consistent with originating from the source of Item 2, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The specimens were examined using the following methods as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform-infrared spectroscopy.
R3RQZ3	The red cotton fibres recovered from the suspect's leather gloves (item 3) microscopically matched the red cotton component of the victim's scarf (item 1). A proportion of these recovered fibres were tested further and were also found to have colour components which matched those of the scarf. The red polyester fibres and red cotton fibres recovered from the suspect's seat belt buckle (item 4) microscopically matched the red polyester component fibres and red cotton component fibres of the victim's shirt (item 2). A proportion of both types of recovered fibres were tested further and were also found to have colour components which matched the respective fibres from the shirt. Additionally, a proportion of the recovered polyester fibres were found to have dye components which matched the red polyester fibres of the shirt. In my opinion, taking into account the number and type of fibres found, the findings provide: Strong support for the assertion that the recovered fibres from item 3 originated from the scarf item 1 rather than the fibres matched by chance. These recovered fibres could not have come originated from the shirt. Very strong support for the assertion that the recovered fibres from item 4 originated from the shirt item 2 rather than the fibres matched by chance. The recovered fibres could not have originated from the scarf.
R4BEP2	1. Examination of Exhibits 1 (known section of fabric from the victim's scarf) and 2 (known section of

TABLE 4

WebCode	Conclusions
	<p>fabric from the torn bottom of the victim's shirt) disclosed the following: a. Exhibit 1 is plain woven from yarns that are composed entirely of red cotton fibers. b. Exhibit 2 is plain woven from yarns that are composed of red cotton and red polyester fibers. 2. Examination of Exhibits 3 (questioned fibers from the suspect's leather gloves) and 4 (questioned fibers from the passenger side seatbelt buckle) disclosed the following: a. Exhibit 3 consisted of four individual yarns that are composed entirely of red cotton fibers. These yarns and their individual fibers shared similarities in physical characteristics, microscopic characteristics, and organic composition with the yarns from Exhibit 1. As such, Exhibit 1 could not be excluded as a possible source for the four yarns in Exhibit 3. No association could be established between the questioned and known textile materials in Exhibits 2 and 3. b. Exhibit 4 consisted of four individual yarns that are composed of red cotton and red polyester fibers. These yarns and their individual fibers shared similarities in physical characteristics, microscopic characteristics, and organic composition with the yarns from Exhibit 2. As such, Exhibit 2 could not be excluded as a possible source for the four yarns in Exhibit 4. No association could be established between the questioned and known textile materials in Exhibits 1 and 4.</p>
R6F776	<p>A) The victim's scarf (Item 1) is composed of pink/red cotton fibres. In our opinion, pink/red cotton fibres comprising a yarn recovered from the suspect's leather gloves (Item 3) are indistinguishable from pink/red cotton fibres comprising the victim's scarf in terms of microscopic characteristics and instrumental colour analysis. We have considered two alternative explanations for these findings: 1) the pink/red cottons recovered from the suspect's gloves came from the victim's scarf. Alternatively, 2) the pink/red cottons recovered from the suspect's gloves did not come from the victim's scarf, and instead originate from another item composing pink/red cotton fibres and that the matching fibres are a result of chance. To assess how likely our findings would be if the fibres recovered from the suspect's gloves came from another item, we have considered how common or otherwise such cotton fibres might be. Taking our experience of casework, together with data from published scientific literature relating to fibre frequencies, in our opinion there is moderately strong support that the pink/red cotton fibres recovered from the suspect's gloves (Item 3) came from the victim's scarf (Item 1) rather than any assertion that the fibres came from another item. B) The victim's shirt (Item 2) is composed of pink/red cotton fibres and peach/pink polyester fibres. In our opinion, pink/red cotton fibres comprising a yarn recovered from the seatbelt buckle in the suspect's car (Item 4) are indistinguishable from pink/red cotton fibres comprising the victim's shirt in terms of microscopic characteristics and instrumental colour analysis. In addition[sic], peach/pink polyester fibres which also comprise the yarn recovered from the seatbelt are indistinguishable from peach/pink polyester fibres comprising the victim's shirt in terms of microscopic characteristics, instrumental colour analysis and fibre class. We have considered two alternative explanations for these findings: 1) the pink/red cottons and the peach/pink polyester fibres recovered from the seatbelt buckle in the suspect's car came from the victim's shirt. Alternatively, 2) the pink/red cottons and the peach/pink polyester fibres recovered from the seatbelt buckle in the suspect's car did not come from the victim's scarf, and instead originate from another item composing pink/red cotton fibres and peach/pink polyester fibres and that the matching fibres are a result of chance. To assess how likely our findings would be if the fibres recovered from the suspect's gloves came from another item, we have considered how common or otherwise such cotton fibres and such polyester fibres might be. Taking our experience of casework, together with data from published scientific literature relating to fibre frequencies, in our opinion there is very strong support that the pink/red cotton and peach/pink polyester fibres recovered from the seatbelt in the suspect's car (Item 4) came from the victim's shirt (Item 2) rather than any assertion that the fibres came from another item. Overall, however, given that there appears to be multiple transfers of fibre types from different garments, in our opinion this serves to further increase the level of support that the fibres recovered from within the suspect's car and from his gloves came from the victim's clothing rather than from other items. *The pink/red cotton fibres comprising the victim's scarf are different to the pink/red cotton fibres comprising the victim's shirt.</p>
RDGGRD	<p>The fabric from the victim's scarf (item 1) consisted of woven red single ply cotton yarns. The fabric from the victim's shirt (item 2) consisted of woven 2 ply red cotton/polyester blend yarns. The polyester fibres were found to be round and lightly delustered. The fibres from the suspect's leather gloves (item 3) were found to consist of red single ply cotton yarns, which in relation to colour, appearance and dye type were found to be indistinguishable from the red cotton yarns from the victim's scarf (item 1). These items may therefore share a common origin. The fibres from the seatbelt buckle (item 4) were found to consist of red 2 ply cotton/polyester blend yarns. In relation to appearance, dye composition and chemical</p>



TABLE 4

WebCode	Conclusions
	composition the yarns were found to be indistinguishable from the red 2 ply cotton/polyester blend yarn from the victim's shirt (item 2). Additionally the polyester fibres in the yarns were found to be round and lightly delustered and to have an indistinguishable thickness to those recovered from the victim's shirt. These items may therefore share a common origin.
RULD7Y	1 - Questioned fibers from the suspect's leather gloves (item 3) are not differentiated from known fibers of the victim's scarf. Fibers of item 3 come from the victim's scarf (item 1) or from another textile material with the same fibers than item 1. Questioned fibers of item 3 are different[sic] from fibers of victim's shirt (item 2). 2 - Questioned fibers from the passenger side seatbelt buckle (item 4) are not differentiated from known fibers of the bottom of the victim's shirt (item 2). Fibers of item 4 come from the victim's shirt (item 2) or from another textile material with the same fibers than item 2. Questioned fibers from item 4 are different[sic] from fibers of victim's scarf (item 1).
RWN9RN	Fabric of item 1 is made up of warp threads and weft threads the physical structures of which are slightly different but have the same composition which are red mercerized cotton. Item 3 contains 4 red threads. Our procedure reveals that 2 of the 4 threads of item 3 and the warp threads of item 1 are not differentiated. It is the same conclusion with the 2 others threads which are not differentiated from the weft threads of item 1. Therefore the threads of item 3 could have come from the victim's scarf (item 1). Fabric of item 2 is made up of warp threads which are folded yarns and weft threads. All the threads have the same composition: mercerized cotton and polyester (PET type). The colours of the fibres are not homogeneous. Item 4 contains 4 red threads. Our procedure reveals that 2 of the 4 threads of item 4 and the warp threads of item 2 are not differentiated. It is the same conclusion with the 2 others threads which are not differentiated from the weft threads of item 2. Therefore the threads of item 4 could have come from the victim's shirt (item 2).
RZETZJ	Sample 3 could have originated from #1. Sample 4 could have originated from #2.
TMUZFQ	The submitted items were examined and analyzed by stereomicroscope, comparison polarized light and FT-IR spectrometer. The fiber found in Item 1 composed of cotton fibers. The fiber found in Item 2 composed of 2 difference type of fiber which are cotton and polyester. The fibers found in Item 3 composed of cotton. The cotton fiber exhibit the same microscopic appearance and characteristics as Item 1. Therefore, these cotton fibers could have originated from the victim's scarf. The fibers found in Item 4 composed of 2 difference type of fiber which are cotton and polyester. The cotton and polyester exhibit the same microscopic appearance and characteristic as Item 2. Therefore, these cotton and polyester fibers could have originated from the torn bottom of the victim's shirt. [sic]
TP6AW9	Results of examination: Red cotton fibers found in Item #3 exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising Item #1. Accordingly, these fibers are consistent with originating from the source of Item #1 or another item comprised of fibers with the same microscopic characteristics and optical properties. Red cotton and red polyester fibers found in Item #4 exhibit the same microscopic characteristics and optical properties as the red cotton and red polyester fibers comprising Item #2. Accordingly, these fibers are consistent with originating from the source of Item #2 or another item comprised of fibers with the same microscopic characteristics and optical properties. The specimens were examined using stereomicroscopy, comparison microscopy, fluorescence microscopy, microspectrophotometry and Fourier transform-infrared spectroscopy.
TVCXCV	Exhibit 3, four questioned yarns "from the suspect's leather gloves," was examined and compared visually and microscopically to yarns composing Exhibit 1, known section of fabric "from the victim's scarf," and were found to be consistent in appearance, construction, fiber type and microscopic characteristics. Therefore, Exhibit 3 could have come from Exhibit 1. Exhibit 4, four questioned yarns "from the passenger side seatbelt buckle," was examined and compared visually and microscopically to yarns composing Exhibit 2, known section of fabric "from the torn bottom of the victim's shirt," and were found to be consistent in appearance, construction, fiber types and microscopic characteristics. Therefore, Exhibit 4 could have come from Exhibit 2. Exhibit 3 was also examined visually and microscopically for the presence of yarns like those composing Exhibit 2. None were found. Exhibit 4 was also examined visually and microscopically for the presence of yarns like those composing Exhibit 1. None were found.
UAKLRX	Item 3 could have originated from Item 1 while Item 4 could have originated from Item 2.

TABLE 4

WebCode	Conclusions
UJEZWF	The red fiber standards found in item 1 consisted of natural fibers composed of cotton. The red fiber standards found in item 2 consisted of synthetic and natural fibers composed of polyester and cotton. The red fibers found in item 3 consisted of natural fibers composed of cotton. These fibers exhibit similar microscopic appearance and characteristics as item 1. Therefore, these fibers could have originated from the victim's scarf. The red fibers found in item 4 consisted of a blend of synthetic and natural fibers composed of polyester and cotton. These fibers exhibit similar microscopic appearance and characteristics as item 2. Therefore, these fibers could have originated from the victim's shirt.
ULE674	Threads made of cotton & polyester fibres which were indistinguishable from the constituents of the victim's shirt were found on the suspect's car seat buckle. In addition to this, cotton threads recovered from the suspect's gloves were indistinguishable from the constituents[sic] of the victim's scarf. In my opinion the presence of three different types of matching fibres provides very strong support for the assertion that the threads found on items from the car originated from the victim's clothing rather than being chance matches.
ULGAVJ	The questioned items #3 and #4 could have originated from items #1 and #2 respectively or from other sources exhibiting all of the same analyzed characteristics.
UPZUUD	Items 1 and 3 were similar in gross visual appearance and were both comprised of red cotton. Additionally, Items 1 and 3 were found to be similar in all tests performed (polarized light microscopy, fluorescence microscopy and microspectrophotometry) and could have derived from the same source (Level 3 Association - See Association Scale). Because other Items have been manufactured that would be indistinguishable from the submitted evidence, an individual source cannot be determined. Item 1 was also compared to Item 4 and found to differ in gross visual appearance and fiber composition. Item 1 is eliminated as a source of Item 4 (Elimination). Items 2 and 4 were similar in gross visual appearance and both were found to be comprised of a mixture of red cotton and red polyester. Additionally, these two items were found to be similar in all tests performed (polarized light microscopy, fluorescence microscopy, microspectrophotometry and infrared spectroscopy) and could have derived from the same source (Level 3 Association). Because other items have been manufactured that would be indistinguishable from the submitted evidence, an individual source cannot be determined. Item 2 was also compared to Item 3 and found to differ in gross visual appearance and fiber composition. Item 2 is eliminated as a source of Item 3 (Elimination).
UTKM4U	Two (2) distinct red cotton yarns were found in Item 3. These two (2) yarns were similar to the red cotton yarns from the red fabric in Item 1 in color, fiber type, construction, and microscopic characteristics.* The two (2) yarns from Item 3 were different from the red yarns in Item 2.** Two (2) distinct red cotton and polyester yarns were found in Item 4. These two (2) yarns were identical to the red cotton and polyester yarns from the red fabric in Item 2 in color, fiber type, construction, and microscopic characteristics.*** The two (2) yarns from Item 4 were different from the red yarns in Item 1.****. *This means that the red yarns from the suspect's leather gloves could have come from the victim's scarf. **This means that the red yarns from the suspect's leather gloves did not come from the victim's shirt. ***This means that the red yarns from the passenger side seatbelt buckle could have come from the victim's shirt. ****This means that the red yarns from the passenger side seatbelt buckle did not come from the victim's scarf.
VH3D8E	1) There were four yarns comprising of cotton fibres recovered from the suspect's leather gloves found in the suspect's vehicle (Item 3) which either originated from the victim's scarf (source of Item 1) or originated from another source with indistinguishable fibres. 2) There are four yarns comprising of cotton and polyester fibres recovered from the passenger side seatbelt buckle from the suspect's vehicle (Item 4) which either originated from the victim's shirt (source of Item 2) or originated from a different source with indistinguishable fibres.
VYG9QN	The questioned fiber item 3, could have originated from the same source as item 1, victim's scarf. The questioned fiber item 4, could have originated from the same source as item 2, the torn bottom of victim's shirt.
WJD7ML	Items 1 and 2 contained red cloth swatch samples. Items 3 and 4 contained red yarn fiber samples. Microscopic and FTIR analysis determined: Cotton was detected in items 1, 2, 3 and 4. Item 3 is

TABLE 4

WebCode	Conclusions
	<p>consistent in color, texture, appearance, optical and chemical properties with item 1. Item 3 cannot be excluded from item 1. Item 3 is inconsistent in color, texture, appearance, optical and chemical properties with item 2. Item 3 can be excluded from item 2. Item 4 is consistent in color, texture, appearance, optical and chemical properties with item 2. Item 4 cannot be excluded from item 2. Item 4 is inconsistent in color, texture, appearance, optical and chemical properties with item 1. Item 4 can be excluded from item 1.</p>
WLF23P	<p>The 4 yarns recovered from the suspect's leather gloves (item 3) can not be distinguished from the victim's scarf (item 1). The 4 yarns recovered from the passenger side seatbelt buckle (item 4) can not be distinguished from the victim's shirt (item 2). Considering: - that 2 different fabric types are involved, - that 3 different fibre types are involved, - the victim's shirt is torn. We conclude that the fibre findings strongly support the proposition that the recovered yarns from the suspect's car originate from the victim's clothing.</p>
X6FC3D	<p>It was determined utilizing stereomicroscopic, comparison microscopic, polarized light microscopic and Fourier Transform Infrared Spectroscopy examinations that item 1 and item 3 are comprised of red cotton fibers and exhibit consistent physical characteristics. Therefore, item 1 cannot be eliminated as being possible source of the questioned fibers from item 3. It was determined utilizing stereomicroscopic, comparison microscopic, polarized light microscopic and Fourier Transform Infrared Spectroscopy examinations that item 2 and item 4 are comprised of red cotton fibers and red polyester fibers and exhibit consistent physical characteristics. Therefore, item 2 cannot be eliminated as being possible source of the questioned fibers from item 4.</p>
X9P7F4	<p>Exhibit 1 (known section of fabric from the victim's scarf) is composed of woven red yarns. These red yarns are composed of red cotton fibers. Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt) is composed of woven red yarns. These red yarns are composed of a blend of red cotton and red polyester fibers. Exhibit 3 (questioned fibers from the suspect's leather gloves) consists of four red yarns. These yarns are visually similar in physical characteristics to the woven red yarns observed in Exhibit 1 (known section of fabric from victim's scarf). Further examinations of the four red yarns in Exhibit 3 determined that they are composed of red cotton fibers. These red cotton fibers are similar in physical and microscopic characteristics to the red cotton fibers that compose the woven red yarns in Exhibit 1. Therefore, the four red yarns recovered from the suspect's leather gloves could have originated from the victim's scarf. Exhibit 4 (questioned fibers from the passenger side seatbelt buckle) consists of four red yarns. These yarns are visually similar in physical characteristics to the woven yarns observed in Exhibit 2 (known section of fabric from the torn bottom of the victim's shirt). Further examinations of the four red yarns in Exhibit 4 determined that they are composed of red cotton and red polyester fibers. The red cotton fibers are similar in physical and microscopic characteristics to the red cotton fibers that partially compose the woven red yarns in Exhibit 2. The red polyester fibers are similar in physical, microscopic, and organic characteristics to the red polyester fibers that partially compose the woven red yarns in Exhibit 2. Therefore, the four red yarns recovered from the passenger side seatbelt buckle could have originated from the victim's shirt.</p>
XHQBKA	<p>Examination of Item # 1 (Known section of fabric from the victim's scarf) revealed the presence of one (1) piece of red, woven fabric. The yarns, designated direction A and direction B, were composed of red cotton fibers. Examination of Item # 3 (Questioned fibers from the suspect's leather gloves) revealed the presence of four (4) yarns. Two (2) of these yarns were designated yarns 1 and 2 and were found to be microscopically consistent with each other. Item # 3 (yarns[sic] 1 and 2) were found to be consistent in color, construction and composition with the yarns from Item # 1 (direction A). Therefore, Item # 3 (yarns 1 and 2) could have originated from the same source as Item # 1 (direction A). The remaining two (2) yarns were designated yarns 3 and 4 and were found to be microscopically consistent with each other. Item # 3 (yarns[sic] 3 and 4) were found to be consistent in color, construction and composition with the yarns from Item # 1 (direction B). Therefore, Item # 3 (yarns 3 and 4) could have originated from the same source as Item # 1 (direction B). Item # 3 (Questioned fibers from the suspect's leather gloves) is not consistent with Item # 2 (Known section of fabric from the torn bottom of the victim's shirt). Examination of Item # 2 (Known section of fabric from the torn bottom of the victim's shirt) revealed the presence of one (1) piece of red, woven fabric. The yarns, designated direction A and direction B, were composed of red cotton and polyester fibers. Examination of Item # 4 (Questioned fibers from the passenger side seatbelt buckle) revealed the presence of four (4) yarns. Two (2) of these yarns were</p>

TABLE 4

WebCode	Conclusions
	designated yarns 1 and 2 and were found to be microscopically consistent with each other. Item # 4 (yarns[sic] 1 and 2) were found to be consistent in color, construction and composition with the yarns from Item # 2 (direction B). Therefore, Item # 4 (yarns 1 and 2) could have originated from the same source as Item # 2 (direction B). The remaining two (2) yarns were designated yarns 3 and 4 and were found to be microscopically consistent with each other. Item # 4 (yarns 3 and 4) were found to be consistent in color, construction and composition with the yarns from Item # 2 (direction A). Therefore, Item # 4 (yarns 3 and 4) could have originated from the same source as Item # 2 (direction A). Item # 4 (Questioned fibers from the passenger side seatbelt buckle) is not consistent with Item # 1 (Known section of fabric from the victim's scarf).
XLUD69	The item 1 victim's scarf is composed of red cotton fibers which are similar in color and microscopical characteristics to the item 3 fibers from suspect's gloves and different from the item 4 fibers from the seatbelt; therefore, the victim's scarf could be the source of the fibers from suspect's gloves but can be eliminated as the source of the fibers from the seatbelt. The item 2 victim's shirt fabric and item 4 fibers from the seatbelt are both composed of a blend of red cotton and red polyester fibers. These blends are similar to each other in color, microscopical characteristics and chemical composition; therefore, the victim's shirt could be the source of the fibers from the seatbelt but can be eliminated as the source of the fibers from suspect's gloves.
XRKLVU	If the threads/fibres found on the gloves, (or seatbelt buckle), came from either the victim's scarf or shirt, I expect that these fibres will match. If the threads/fibres found on the gloves, (or seatbelt buckle), came from some other source than the scarf I have a low expectation that these fibres will match. If the threads/fibres found on the gloves, (or seatbelt buckle), came from some other source than the shirt I have a very low expectation that these fibres will match. Re Gloves: The finding of threads made of red cotton fibres on the gloves, that match the constituent threads/fibres of the victim's scarf, provides moderately strong support for the view that these threads/fibres came from the victim's scarf rather than some other source. Re Passenger side seatbelt buckle: The finding of threads made of a mixture of red cotton fibres and red polyester fibres on the seatbelt buckle, that match the constituent threads/fibres of the victim's shirt, provides very strong support for the view that these fibres came from the victim's shirt rather than some other source. Re Suspect's car: The above findings on the gloves and the seatbelt buckle provide extremely strong support for the view that these threads/fibres came from the victim's scarf and shirt rather than some other source. I have chosen the above phrases from the following scale: weak support, moderate support, moderately strong support, strong support, very strong support, extremely strong support.
XRUXUY	According to above mentioned analysis it was found that item 3 could have originated from item 1, but item 3 could not have originated from item 2 and item 4, due their physical and chemical structures. According to above mentioned analysis it was found that item 4 could have originated from item 2, but item 4 could not have originated from item 1 and item 3, due their physical and chemical structures.
XXLXRQ	The known fabric from item 1 is composed of red cotton. Questioned red cotton fibers from the suspect's leather gloves, item 3, couldhav[sic] originated from the red fabric in item 1, the victim's scarf. The known fabric from item 2 is composed of red cotton and orange-red polyester. Questioned red cotton and orange-red polyester fibers from the passenger side seatbelt buckle, item 4, are similar to the fibers from the known fabric from the victim's shirt, and could have originated from it.
Y3GGHB	The red cotton fibers from item 3, the questioned fibers from the suspect's leather gloves, are similar to the red cotton warp fibers and the red cotton fill fibers from item 1, the known section of fabric from the victim's scarf. The red cotton fibers from item 3, the questioned fibers from the suspect's leather gloves, are not consistent in construction to the warp and fill fibers from item 2, the known section of fabric from the torn bottom of the victim's shirt. The red cotton fibers from item 4, the questioned fibers from the passenger side seatbelt buckle, are similar to the red cotton warp fibers and the red cotton fill fibers from item 2, the known section of fabric from the torn bottom of the victim's shirt. The red polyester fibers from item 4, the questioned fibers from the passenger side seatbelt buckle, are consistent with the red polyester warp fibers and the red polyester fill fibers from item 2, the known section of fabric from the torn bottom of the victim's shirt. The red polyester fibers and the red cotton fibers from item 4, the questioned fibers from the passenger side seatbelt buckle, are not consistent in construction to the warp and fill fibers from item 1, the known section of fabric from the victim's scarf.

TABLE 4

WebCode	Conclusions
YF2QRE	Based on microscopic and instrumental analyses: Item 1 could not be excluded as a possible source of item 3. Item 2 could not be excluded as a possible source of item 4. Item 1 was excluded as a possible source of item 4. Item 2 was excluded as a possible source of item 3.
YG2JXY	<p>1. Item 3 (questioned fibers from leather gloves) contained 4 red yarns. Further examination and comparison of these questioned yarns and the fibers composing these yarns with the known yarns and fibers of Item 1 (known fabric from victim's scarf) revealed them to be consistent in microscopic characteristics. Therefore, the yarns/fibers from Item 3 could have originated from the fabric of Item 1.</p> <p>2. Item 4 (questioned fibers from seatbelt buckle) contained 4 red yarns. Further examination and comparison of these questioned yarns and the fibers composing these yarns with the known yarns and fibers of Item 2 (known fabric from victim's shirt) revealed them to be consistent in microscopic characteristics and organic composition. Therefore, the yarns/fibers from Item 4 could have originated from the fabric of Item 2.</p>
YJT6YA	The red cotton fibers found in specimen Q1 (Item #3) exhibit the same microscopic characteristics and optical properties as the red cotton fibers comprising specimen K1 (Item #1). Accordingly, these fibers are consistent with having originated from the fabric specimen K1 (Item #1) represents, or another source comprised of fibers that exhibit the same microscopic characteristics and optical properties. The white to pink cotton and white to red polyester fibers found in specimen Q2 (Item #4) exhibit the same microscopic characteristics and optical properties as the white to pink cotton and white to red polyester fibers comprising specimen K2 (Item #2). Accordingly, these fibers are consistent with having originated from the fabric specimen K2 (Item #2) represents, or another source comprised of fibers that exhibit the same microscopic characteristics and optical properties. The specimens were examined visually using stereo-microscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and infrared spectroscopy, where appropriate.
YKR6CE	Item 1 was identified as cotton fiber. Item 2 was identified as cotton and polyester fiber. Item 3 was identified as cotton fiber. It was concluded that Item 3 could have originated from Item 1 or another source composed of fibers with the same color, physical, and optical properties. Item 4 was identified as cotton and polyester fiber. It was concluded that Item 4 could have originated from Item 2 or another source composed of fibers with the same color, physical, chemical, and optical properties.
YM3VUW	<p>1. Examinations of Items 1 (known section of fabric from the victim's scarf), 2 (known section of fabric from the torn bottom of the victim's shirt), 3 (questioned yarns/fibers from the suspect's leather gloves), and 4 (questioned yarns/fibers from the passenger side seatbelt buckle) disclosed the following: a. Item 1 was constructed with red warp and red weft yarns. Both the warp and weft yarns were composed of red cotton fibers. The fibers composing the warp and weft yarns were consistent to each other in their microscopic and color characteristics. B. Item 2 was constructed with red warp and red weft yarns. Both the warp and weft yarns were composed of a mixture of red cotton fibers and red polyester fibers. The fibers composing the warp and weft yarns were consistent to each other in their microscopic and color characteristics. C. Item 3 contained four pieces of red yarns. All of the four pieces of yarns were composed of red cotton fibers. The fibers composing the four yarns were consistent to each other in their microscopic and color characteristics. D. Item 4 contained four pieces of red yarns. All of the four pieces of yarns were composed of a mixture of red cotton fibers and red polyester fibers. The fibers composing the four yarns were consistent to each other in their microscopic and color characteristics. 2. Comparative examinations of the yarns in Item 3 with the yarns in Item 1 disclosed two of the four pieces of yarns in Item 3 were similar to the warp yarns in Item 1 in their physical appearance. The remaining two pieces of the yarns in Item 3 were similar to the weft yarns in Item 1 in their physical appearance. Further comparative examinations of the red cotton fibers composing the yarns in Item 3 with the red cotton fibers composing the warp and the weft yarns in Item 1 disclosed them to be consistent in their microscopic and color characteristics. As a result of these findings, the red yarns or fibers in Item 3 could have originated from the known fabric sample as represented by Item 1. 3. Comparative examinations of the yarns in Item 4 with the yarns in Item 2 disclosed two of the four pieces of yarns in Item 4 were similar to the warp yarns in Item 2 in their physical appearance. The remaining two pieces of the yarns in Item 4 were similar to the weft yarns in Item 2 in their physical appearance. Further comparative examinations of the red cotton and the red polyester fibers composing the yarns in Item 4 with the red cotton and the red polyester fibers composing the warp and the weft yarns in Item 2, respectively, disclosed them to be consistent in their microscopic and color</p>

TABLE 4

WebCode	Conclusions
	characteristics. Additionally, the red polyester fibers in Items 2 and 4 were found to be consistent in their organic composition. As a result of these findings, the red yarns or fibers in Item 4 could have originated from the known fabric sample as represented by Item 2.
YQTKNH	The fabric in Exhibit 1 is a red, plain weave fabric comprised of cotton fiber yarns of two different diameters. The questioned fibers from Exhibit 3 consist of red cotton fiber yarns of two different diameters. Analysis of the yarns from the known fabric, Exhibit 1, showed that it was consistent in color and fiber type with the yarns in Exhibit 3. Therefore the yarns recovered in Exhibit 3 could have come from Exhibit 1 or any other fabric with the same color and fiber composition. The fabric in Exhibit 2 is a red, plain weave fabric comprised of two cotton/polyester fiber yarns, a one ply and a two ply. The questioned fibers from Exhibit 4 consist of two cotton/polyester fiber yarns, a one ply and a two ply. Analysis of the yarns from the known fabric, Exhibit 2, showed that they were consistent in color and fiber type with the yarns in Exhibit 4. Therefore the yarns recovered in Exhibit 4 could have come from Exhibit 2 or any other fabric with the same color and fiber composition.
Z4KTF3	The evidence 1 matches in its physical properties, chemical composition and color (MSP) with the properties presented in the evidence 3. Both evidences are composed of a single fiber (1 and 3). The evidence 2 matches in its physical properties, chemical composition and color (MSP) with the properties presented in evidence 4. Both evidences (2 and 4) are composed of two types of different fibers.
Z9HCG2	Item 3 could have originated from the victim's scarf (Item 1). Item 4 could not have originated from the victim's scarf (Item 1). Item 4 could have originated from the victim's shirt (Item 2). Item 3 could not have originated from the victim's shirt (Item 2).
ZD9QZF	The fibers of Item-3 and Item-1 have the same characteristics. Thus the fibres found on the suspect's leather gloves come from the victim's scarf (item 1) or from another textile item of indistinguishable fibers. The fibers of Item-3 were inconsistent with item-2 and could not have the same source. The fibers of Item-4 et[sic] Item-2, have the same characteristics[sic]. Thus the fibres found on the passenger side seatbelt buckle come from the victim's shirt (item 2) or from another textile of indistinguishable fibers. The fibers of Item-4 were inconsistent with item-1 and could not have the same source.
ZL43MB	Items 1, 2, 3, and 4 were analyzed by stereomicroscopy, polarized light microscopy, fluorescence microscopy and microspectrophotometry. Items 2 and 4 were also analyzed by infrared spectroscopy. The fibers in Item 1 (known) and Item 3 (questioned) consisted of ribbon shaped natural fibers characteristic of cotton. The red colored questioned cotton fibers from item 3 were similar in all areas tested to the red colored known cotton fibers in item 1 and could have originated from that source (Level 3 Association). The red colored questioned cotton fibers from Item 3 were not similar in physical properties (color) to the red and white (clear) colored known cotton fibers in Item 2 and are eliminated as being from that source (Elimination). The braided, red/clear colored, cotton, questioned fibers and the non-braided red/clear colored, cotton fibers from Item 4 were similar in all areas tested to the known braided, red/clear colored, cotton fibers and the known non-braided red/clear colored, cotton fibers from Item 2 and could have originated from that source (Level 3 Association). The braided, red/clear colored, polyester, questioned fibers and the non-braided red/clear colored, polyester fibers from Item 4 were similar in all areas tested to the known braided, red/clear colored, polyester fibers and the known non-braided red/clear colored, polyester fibers from Item 2 and could have originated from that source (Level 3 Association). The questioned strands of fibers from Item 4 are not similar in manufacture construction to the known strands of fibers in Item 1. The questioned fibers from Item 4 are not similar in color and/or type to the known fibers in Item 1 and did not originate from that source (Elimination).
ZMLWFY	Item 1 consisted of Red cotton like fibres. The suspect fibres Item 3 were indistinguishable to the fibres in Item 1 with respect to the testing performed. Item 2 consisted of red cotton like fibres and polyester fibres. The fibres from item 4 were indistinguishable to these fibres. The respective questioned fibres therefore could have originated from the known fabrics.
ZNXQYB	Item #1 was examined and found to be an approximately 5 cm by 5 cm piece of red woven fabric. The fabric consisted of yarns composed of cotton fibers. Item #2 was examined and found to be an approximately 5 cm by 5 cm piece of red woven fabric. The fabric consisted of yarns composed of both cotton and polyester fibers. Item #3 was examined and found to be four (4) red yarns. These yarns were

TABLE 4

WebCode	Conclusions
	<p>composed of cotton fibers. Item #4 was examined and found to be four (4) red yarns. These yarns were composed of cotton and polyester fibers. Microscopic examination of the questioned yarns submitted as Item #3 revealed them to be the same in color, composition, and construction with known yarns from Item #1. Based on the above findings, these samples could have originated from the same source, but not exclusively since other manufactured items in this class might be indistinguishable from the submitted evidence. Microscopic and instrumental analysis (FTIR) examination of the questioned yarns submitted as Item #4 revealed them to be the same in color, composition, construction, and with regards to the polyester fibers, chemical composition with known yarns from Item #2. Based on the above findings, these samples could have originated from the same source, but not exclusively since other manufactured items in this class might be indistinguishable from the submitted evidence.</p>
ZZKPJA	<p>The 4 threads (2x warp, 2x weft) from item 3 could have originated from the fabric item 1. The 4 threads (2x warp, 2x weft) from item 4 could have originated from the fabric item 2.</p>

# Additional Comments

TABLE 5

WebCode	Additional Comments
28KU2X	Item 1 (cotton) is dyed with a mixture of reactive dyes, including Reactive orange 122 and Reactive red 195. Item 3 (cotton) is dyed with a mixture of reactive dyes, including Reactive orange 122 and Reactive red 195. Item 3 (polyester) is dyed with a mixture of disperse dyes, including Disperse red 74 and Disperse red 167.
2WK2VR	Remarks: It should be noted that fibers do not possess a sufficient number of unique individual microscopic characteristics to be positively identified as having originated from a particular source to the exclusion of all others.
67VYQX	Notes: Because textile fibers are mass produced, it is not possible to state that a fiber originated from a particular textile source to the exclusion of all other materials composed of fibers which exhibit the same chemical and optical properties. FTIR = Fourier transform infrared spectroscopy. MSP = microspectrophotometry.
69RQHJ	(1) Determination of any differences due to colour was not possible due to lack of MSP or comparison/fluorescence. (2) Proper diamond cell slide not available for specific fibre use on FTIR.
6DFVUM	The lighter red cotton fibers are very similar colours to eachother[sic] in both garments (Item 1 and 2).
8JNDML	The conclusion is derived from consideration of the likelihood of the findings given two competing propositions: (1) The recovered fibres have originated from the victim's clothing. (2) The recovered fibres have originated from a source other than the victim's clothing, and any correspondence is purely coincidental.
9HZ3TX	It should be noted that our laboratory does not possess a microspectrophotometer for dye comparison purposes. No dye could be extracted from any of the cotton fibres in any of Items 1-4, inclusive.
BXLQZT	It cannot be assumed that the two different yarns in item 3 came from one source.
CUYWTX	The microspectrophotometer was unavailable for testing in this case. We typically do not report on just natural fiber evidence.
D3YDX9	The interpretation is based on the assumption that the victim's scarf and shirt (damage) sheds threads of fibres.
D9QH74	It is noted that this lab does not currently conduct fiber color comparisons using UV-Visible microspectrophotometry. Fiber color comparisons were conducted using the comparison microscope.
E99YBR	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. The structure of this proficiency was ambiguous. The questioned samples (3 and 4) were described as fibers yet the samples themselves were yarns. With some of the samples being blends, what is an examiner to do when the questioned sample is a blend but is different from the known blend? When treated as a yarn, the two yarns would be different and the examination would be complete. However, since the questioned samples were to be considered fibers, the blend becomes irrelevant. Therefore, an examiner had to compare individual components of different yarns to determine if portions may be similar. That additional work was a frustrating use of resources.
ECJRTY	Additional characteristics, not directly addressed in the proficiency questions, were noted during examination of the four samples provided. As already noted Items 1 and 2 (the "knowns") are sections of whole fabric and Items 3 and 4 are yarn segments, not loose fibers. Under examination by low power microscope, yarns from Item 2 and Item 4 exhibit characteristics of having been piece-dyed (whole cloth dyed after weaving) as opposed to yarn dyed (yarns dyed, then woven). That is, at regular intervals, at the intersections where warp and fill yarns cross and occlude segments of each other, there are un- or pale colored (un- or minimally dyed) segments, strongly suggesting that the fabric was formed prior to dyeing. Conversely, in a fabric woven from already-dyed yarns, one would expect to see no areas of un- or minimally-dyed yarn, regardless of the yarn's position in the fabric structure. With respect to yarn structure, Item 1 (fabric) comprises single-ply yarns in both directions. Item 2 (fabric) and Items 3 and 4



TABLE 5

WebCode	Additional Comments
	(yarns) comprise a mix of single- and double-ply yarns. Had this proficiency asked additional questions pertaining to fabric and yarn characteristics, the responses presented would have been modified based on this additional information.
EXQJ64	Subtle differences were noted in the colour and fluorescence of the cotton fibres in "Item 1" and "Item 2" even though they were known sections of fabrics from matching apparel. The pinkish-red cotton fibres constituting the threads marked "Item 3" could not have originated from the fabric marked "Item 2" even though "Item 2" contains pinkish-red cotton fibres. This is because the threads making up the construction of the fabric marked "Item 2" is a combination of intertwined cotton and polyester fibres. The converse also applies since "Item 2" could not have deposited such threads as "Item 3". Similarly, the pinkish-red cotton fibres constituting the threads marked "Item 4" could not have originated from the fabric marked "Item 1" since the threads marked "Item 4" is a combination of intertwined cotton and polyester fibres and the threads making up the construction of the fabric marked "Item 1" consisted of only pinkish-red cotton fibres. The converse also applies since "Item 1" could not have deposited such threads as "Item 4".
EZMVE4	The fibers from the suspect's leather gloves have similar fiber content as known section of fabric from the victim's scarf and could have originated from item 1. The fibers from the passenger side seatbelt buckle have similar fiber content as known section of fabric from the torn bottom of the victim's shirt and could have originated from item 2.
JMJBVZ	The cotton of items 1 and 2 have a little bit different visible spectra. Their dye may be different.
LAFND2	Due to the fact that textile materials are mass produced, it is not possible to state that the questioned yarns and their constituent fibers in this case originated from a particular source to the exclusion of all other textile materials composed of yarns and constituent fibers which exhibit the same physical, optical, and/or chemical properties.
M432Q6	For item 4, the control sample is not forthcoming it is assumed that the material of the seat belt is different from the questioned samples collected.
MFHPZU	Testing is limited to available laboratory techniques.
P3H2KL	If the intent is to perform only a fiber exam, it would be more straightforward if only fibers were provided rather than actual threads from the fabric.
R6F776	Given that the recovered items were provided as yarns and not individual fibres, if this were casework, we would be examining the victim's shirt for damage which sheds yarns (the information provided mentions damage to the victim's shirt) and the victim's scarf for its construction/damage to determine its ability to shed gross yarns.
RWN9RN	Items 1 and 3: MSP spectra are identical. No extraction was possible also no TLC was performed. Items 2 and 4: polyester fibres are slightly delustered and have a round cross-section. The average diameter is about 11.8 $\mu\text{m}$ . MSP spectra of polyester are identical. MSP spectra of cotton are identical. 4 elution solutions was tested and for each of them the results between item 2 and item 4 are the same. We observe 3 to 5 spots according to the elution solutions.
TVCXCV	Due to the fact that textile materials are mass produced, it is not possible to state that a fiber originated from a particular source to the exclusion of all other textile materials composed of fibers which exhibit the same physical optical and/or chemical properties. The submitted exhibits should be picked up at your earliest convenience. If this is not feasible, please contact the Evidence Section at [Number] to make other arrangements. Standard cuttings and slides from Exhibits 1 and 2 are being returned to your agency. Slides with questioned fibers from Exhibits 3 and 4 are being returned to your agency.
ULE674	Would need to assess the condition of the items to see if threads would be shed and retained rather than fibres. Need to check clothing for damage.
UPZUUD	This proficiency test was prohibitively time consuming due to the number of comparisons. An Association Scale is normally added to the reports.
WJD7ML	Item 2 warp and weft twists; examples of cotton such as muslin. Item 1 weft more twist, warp slight

TABLE 5

WebCode	Additional Comments
	examples of cotton such as organic.
XRKLVU	The constituent fibres of the victim's scarf and shirt were different and could be distinguished. The scarf was made of evenly dyed red cotton fibres. The shirt was made of a mixture of unevenly dyed red cotton and red polyester fibres. The fibres of the shirt are unusual due to the uneven dyeing of these fibres. In a case, the items would be examined fully, e.g. the condition of the fabrics, the damaged area and its location, to assess these are appropriate to the findings. In this case the findings indicate the garments shed threads. The findings were evaluated at source level rather than activity level due to the lack of background information to assess transfer and persistence. The scale used in the interpretation is a vital part of understanding the conclusion and therefore needs to be included.
YF2QRE	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.
Z9HCG2	In the "Appendix: Manufactured Fibers - Names & Definitions" the naming of polyester fiber type has been miswritten as "polyster". We used the correct denomination in our answers (see 2.)
ZZKPJA	The threads in item 1 and item 3 contain a very very small amount of rayon fibers (not found in every thread). We found the rayon fibers in item 4 and item 2 only in the threads from one direction (probably warp).

# Appendix: Data Sheet

Collaborative Testing Services ~ Forensic Testing Program

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## **Test No. 14-539: Fibers Analysis**

DATA MUST BE RECEIVED BY March 17, 2014 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

### **Accreditation Release Statement**

CTS submits external proficiency test data directly to ASCLD/LAB and ANSI-ASQ NAB/FQS. 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 and/or ANSI-ASQ NAB/FQS. (Accreditation Release section on the last page must be completed and submitted.)

This participant's data is NOT intended for submission to ASCLD/LAB or ANSI-ASQ NAB/FQS.

### **New Online Data Entry Feature!**

Report results with ease! Enter your results directly into our new data entry portal. Visit [www.cts-portal.com](http://www.cts-portal.com) to access this new feature. Here you will find a detailed "Help" section to guide you through completing your proficiency test online. If you have any questions please do not hesitate to contact CTS.

#### Scenario:

Police are investigating the abduction and murder of a teenage girl. She was last seen walking home from her friend's house and her body was discovered the following day in a ditch on the side of the road. The victim was wearing a red scarf and a matching red shirt the bottom of which appeared torn. Witnesses report that she was seen getting into a green sports car with an unknown man. A suspect, whose car matched the description provided by witnesses, was apprehended and his car searched. Fibers were recovered from a pair of leather gloves sitting in the inner console and from the passenger side seatbelt buckle. Police are requesting you to examine the fibers, report their identification(s), and determine if the fibers found on either the gloves or the seatbelt buckle could have come from the scarf or the shirt worn by the victim.

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

#### Items Submitted (Sample Pack FIBR):

- 1: Known section of fabric from the victim's scarf
- 2: Known section of fabric from the torn bottom of the victim's shirt
- 3: Questioned fibers from the suspect's leather gloves
- 4: Questioned fibers from the passenger side seatbelt buckle

**Please return all pages of this data sheet.**

Page 1 of 4

**1.) Could the questioned fibers (Items 3 and 4) have originated from either the victim's scarf (Item 1) or the victim's shirt (Item 2)?**

*Item 1 (Known fabric from the victim's scarf)*

*Item 2 (Known fabric from the victim's torn shirt)*

**Item 3:** Yes  No  Inc

**Item 3:** Yes  No  Inc

**Item 4:** Yes  No  Inc

**Item 4:** Yes  No  Inc

**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** \_\_\_\_\_

**Item 4** \_\_\_\_\_

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

*Microscopic Exams:*  Stereomicroscope  Comparison

Polarized Light  Fluorescence

Macroscopic Exam  IR/FTIR  Microspectrophotometry

Solubility Tests  Cross-Section  Melting Point

Other (specify): \_\_\_\_\_

Participant Code:

WebCode:

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

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**5.) Additional Comments**

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**Return Instructions**

Participant Code:

**Data Sheets can be mailed or faxed (please include a cover sheet) and must be received by *March 17, 2014* to be included in the report.**

MAIL: Collaborative Testing Services, Inc.  
Forensic Testing Program  
P.O. Box 650820  
Sterling, VA 20165-0820 USA

FAX: +1-571-434-1937  
or Toll-Free (U.S. only): 1-866-FAX-2CTS (329-2287)  
TEL: +1-571-434-1925 (8 am - 4:30 pm EST)  
EMAIL: [forensics@cts-interlab.com](mailto:forensics@cts-interlab.com)  
[www.ctsforensics.com](http://www.ctsforensics.com)

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## RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **14-539: Fibers Analysis**

This release page must be completed and received by **March 17, 2014** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

### **ASCLD/LAB RELEASE**

If your lab has been accredited by ASCLD/LAB and you are submitting this data as part of their external proficiency test requirements, have the laboratory's designated individual complete the following.

**The information below must be completed in its entirety for the results to be submitted to ASCLD/LAB.**

ASCLD/LAB Legacy Certificate No. \_\_\_\_\_ ASCLD/LAB International Certificate No. \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

Laboratory Name \_\_\_\_\_

Location (City/State) \_\_\_\_\_

### **ANSI-ASQ NAB/FQS RELEASE**

If your laboratory maintains its accreditation through ANSI-ASQ NAB/FQS, please complete the following form in its entirety to have your results forwarded.

ANSI-ASQ NAB/FQS Certificate No. \_\_\_\_\_

Signature and Title: \_\_\_\_\_ Date \_\_\_\_\_

Laboratory Name \_\_\_\_\_

Location (City/State) \_\_\_\_\_

### Accreditation Release

#### **Return Instructions**

*Please submit the completed Accreditation Release at the same time as your full data sheet. See Data Sheet Return Instructions on the previous page.*

*Questions? Contact us 8 am-4:30 pm EST  
Telephone: +1-571-434-1925  
email: forensics@cts-interlab.com*

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## 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) **Nytril**

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

(i) **Nylon**

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

(j) **Rubber**

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

fiber-forming substance is composed of chloroprene units.

(k) **Spandex**

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

(l) **Vinal**

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

(m) **Olefin**

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

(n) **Vinyon**

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

(o) **Metallic**

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

(p) **Glass**

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

(q) **Anidex**

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

(r) **Novoloid**

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

(s) **Aramid**

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

(t) **Sulfar**

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

(u) **PBI**

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

(v) **Elastoester**

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

(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 fluorocarbon monomers.

(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.