Collaborative Testing Services, Inc

Forensic Testing Program

Test No. 16-539: Fibers Analysis

This test was sent to 162 participants. Each sample set consisted of a piece of "known" bath rug and two items of "questioned" fibers. Participants were requested to compare the items and report their findings. Data were returned from 133 participants (82% response rate) and are compiled into the following tables:

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

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

Manufacturer's Information

Each sample pack consisted of a known section of the victim's bath rug (Item 1) and two sets of questioned fibers (Items 2 and 3). Items 1 and 3 were from the same blue bath rug labeled as 100% nylon, whereas Item 2 was from a different blue bath rug labeled as 100% cotton. Both bath rugs were purchased from a local housewares store. Participants were requested to examine the fibers, identify the fiber type, and determine if the questioned fibers could have originated from the known bath rug.

SAMPLE PREPARATION-
The outside of the bath rug was rolled with a lint roller to remove any extraneous debris. Item 2 and Items 1/3 were prepared at different times to prevent any possibility of cross-contamination.

ITEM 2 (ELIMINATION): For the questioned fibers (Item 2), a yarn was removed from the bath rug, approximately 15-20 fibers were teased out and packaged into a glassine bag and a pre-labeled Item 2 envelope.

ITEMS 1 AND 3 (ASSOCIATION): For the known section of bath rug (Item 1) and the questioned fibers (Item 3), 0.5" x 0.5" sections were cut from the same bath rug. A section of bath rug was packaged into a glassine bag and a pre-labeled Item 1 envelope. A yarn was removed from one section of the bath rug, approximately 15-20 fibers were teased out and packaged into a glassine bag and a pre-labeled Item 3 envelope. Items 1 and 3 were taken in close spatial proximity to one another, within 3 inches, and were kept together as an identification group and packaged as described below.

SAMPLE PACK ASSEMBLY: For each sample pack, an Item 1, 2, and 3 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 met consensus on association and fiber type results. The following procedures were used to examine the items: stereomicroscopy, comparison microscopy, polarized light microscopy, macroscopic exam, fluorescence microscopy, IR/FTIR, microspectrophotometry, solubility tests, cross-section, melting point, and fluorescence (light box).

Summary Comments

This test was designed to allow participants to assess their proficiency in the examination, identification and comparison of fibers. Participants were provided with a 0.5" x 0.5" section of a bath rug for Item 1, as well as a set of questioned fibers for Items 2 and 3. They were requested to examine the submitted items and determine if either set of questioned fibers could have originated from the known item. Items 1 and 3 were from the same bath rug labeled as 100% nylon, whereas Item 2 was from a different blue bath rug labeled as 100% cotton. (Refer to the Manufacturer's Information for preparation details.)

In Table 1, 131 (98.5%) participants reported that Item 2 could not have originated from Item 1. For the remaining participants, one reported that Item 2 could have originated from Item 1 and one was inconclusive. It was reported by 131 (98.5%) participants that Item 3 could have originated from Item 1. For the remaining participants, two reported that Item 3 could not have originated from Item 1.

It was reported by 111 (83.5%) participants that Item 1 consisted of nylon. Of the remaining participants, 20 (15.0%) reported nylon and at least one additional fiber type, one reported a different generic fiber type, and one participant did not report a generic fiber type. For Item 2, 123 (92.5%) reported that it consisted of cotton fibers. Of the remaining participants, four reported other generic fiber types and six did not report a generic fiber type. For Item 3, 127 (95.5%) reported that it consisted of nylon fibers, four participants reported nylon and an additional generic fiber type, one participant reported a different generic fiber type, and one participant did not report a generic fiber type.

It was reported by several participants that the fibers in the tufts of the bath rug were composed of nylon, a layer of loose fibers was composed of polyester, and a base was composed of olefin. Since a consensus was only reached on the presence of nylon, the other responses were highlighted as inconsistent with the consensus results.

Association Results

Could the questioned fibers from the suspect's shirt (Item 2) and/or pants (Item 3) have originated from the victim's bath rug (Item 1)?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
22MJFY	No	Yes	A6DP9T	No	Yes
23H2G2	No	Yes	ANPBCN	No	Yes
2CNWLR	No	Yes	B77R3N	No	Yes
2DV7NW	No	Yes	BA2RRJ	No	Yes
2E79AV	No	Yes	BR7Y8L	No	Yes
2HRQU2	No	Yes	BWGAWU	No	Yes
2Q3CEP	No	Yes	CVLQVT	No	Yes
2YEB9Z	No	Yes	CWT9UP	No	Yes
2ZBQKX	No	Yes	D23LBM	No	Yes
367NXV	Inconclusive	Yes	D94X8K	No	Yes
3PM8JX	No	Yes	DM7PTP	No	Yes
43QXWP	No	Yes	DNWTHP	No	Yes
49FHZ6	No	Yes	DWCC2P	No	Yes
62WKZP	No	Yes	DX8V4Q	No	Yes
6A6472	No	Yes	E962MG	No	Yes
6URRGT	No	Yes	EMFWPQ	No	Yes
6WWJPU	Yes	No	EW7GVN	No	Yes
6ZU2LZ	No	Yes	EYFFGJ	No	Yes
766E3Y	No	Yes	FAPLHB	No	Yes
78BYTK	No	Yes	FE6WVF	No	Yes
7BFMAV	No	Yes	G2BXHH	No	Yes
7LWC6U	No	Yes	GLEZYJ	No	Yes
7NZ3DV	No	Yes	GTHXTG	No	Yes
8948FU	No	Yes	H263BG	No	Yes
8PQNJQ	No	Yes	H9TKVK	No	Yes
8Q36YP	No	Yes	HU8JYD	No	Yes
926V7J	No	Yes	JHNHRH	No	Yes
93ZE8K	No	Yes	JTAJAD	No	Yes
9MJG3J	No	Yes	JU63CE	No	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
K7D838	No	Yes	R7QAN8	No	Yes
KFFPDA	No	Yes	R84P9Z	No	Yes
KJE4XE	No	Yes	RFCB73	No	Yes
KKUZQE	No	Yes	RPJ9U7	No	Yes
KP6D9D	No	Yes	RQVVE7	No	Yes
KPPRYB	No	Yes	RR7RV4	No	Yes
KT4P4C	No	Yes	RRACJ8	No	Yes
KU76RB	No	Yes	RT8B98	No	Yes
L42PGG	No	Yes	T37FNZ	No	Yes
LFFVHB	No	Yes	T837UC	No	Yes
LGCBU9	No	Yes	T8HCH3	No	Yes
LJF7DB	No	Yes	TG9WNZ	No	Yes
LKBPFC	No	Yes	TR4GD7	No	Yes
LMG8D9	No	Yes	TY8AW2	No	Yes
LUC4BH	No	Yes	U4HMEZ	No	Yes
MK973A	No	Yes	U7EHM2	No	Yes
MLFN26	No	Yes	U8GXAZ	No	Yes
MUV8HJ	No	Yes	UG3FD8	No	Yes
MV7A6H	No	Yes	UGMRH8	No	Yes
NAGAED	No	Yes	UGXYF9	No	Yes
NPF627	No	Yes	VC2MY3	No	Yes
NPZV3D	No	No	W87Z29	No	Yes
P24QK7	No	Yes	WBPAU7	No	Yes
PFN7N6	No	Yes	WDUT4Z	No	Yes
PGJPP7	No	Yes	WL4CAC	No	Yes
PVVCTA	No	Yes	WP6DCU	No	Yes
Q2387H	No	Yes	WXZFE7	No	Yes
QARTBF	No	Yes	X4QXKU	No	Yes
QELQZ7	No	Yes	X6XDRZ	No	Yes
QGERU2	No	Yes	XCFV23	No	Yes
QHABV3	No	Yes	XH3M7A	No	Yes
QND44D	No	Yes	XP6HGV	No	Yes
R3XWE6	No	Yes			

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
Y3NGWW	No	Yes			
Y4ZD3Z	No	Yes			
YA9QAY	No	Yes			
YN4Y38	No	Yes			
YXUK96	No	Yes			
Z2NWM2	No	Yes			
Z9BRKY	No	Yes			
ZEC4FW	No	Yes			
ZEXMBV	No	Yes			
ZU4XQ2	No	Yes			

Response Summary Participants: 133

	Item 2	Item 3
Yes:	1 *(0.8%)*	131 *(98.5%)*
No:	131 *(98.5%)*	2 *(1.5%)*
Inc:	1 *(0.8%)*	0 *(0.0%)*

Fiber Type Determination

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

TABLE 2

WebCode	Item 1	Item 2	Item 3
22MJFY	Nylon, Manufactured	Cotton, Vegetable	Nylon, Manufactured
23H2G2	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
2CNWLR	Manufactured, Nylon	Natural, Cotton	Manufactured, Nylon
2DV7NW	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
2E79AV	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
2HRQU2	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
2Q3CEP	Manufactured, Nylon Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
2YEB9Z	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
2ZBQKX	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
367NXV	Nylon 6-6	Not determined	Nylon 6-6
3PM8JX	Manufactured - Nylon	Vegetable - Cotton	Manufactured - Nylon
43QXWP	Manufactured, Nylon & Polyester and Vegetable, Cotton	Vegetable, Cotton	Manufactured, Nylon and Vegetable, Cotton
49FHZ6	Manufactured, Nylon 6,6	Vegetable, Cotton	Manufactured, Nylon 6,6
62WKZP	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
6A6472	Manufactured, Nylon Manufactured, Polyester Manufactured, Olefin	Vegetable, Cotton	Manufactured, Nylon
6URRGT	Manufactured-Nylon	Vegetable-Cotton	Manufactured-Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
6WWJPU	Manufactured, Nylon and Polyester	Vegetable, Cotton	Manufactured, Nylon
6ZU2LZ	Manufactured, Nylon and Manufactured, Olefin	Vegtable[sic], Cotton	Manufactured, Nylon
766E3Y	Manufactured; Nylon	not applicable	Manufactured; Nylon
78BYTK	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
7BFMAV	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
7LWC6U	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
7NZ3DV	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
8948FU	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
8PQNJQ	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
8Q36YP	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
926V7J	Manufactured: Nylon 6,6	Vegetable: Cotton	Manufactured: Nylon 6,6
93ZE8K	Nylon	Cotton	Nylon
9MJG3J	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
A6DP9T	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
ANPBCN	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
B77R3N	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
BA2RRJ	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
BR7Y8L	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
BWGAWU	Manufactured, Nylon (+ colorless threads : polypropylene ; white coating : polyisoprene)	Vegetable, Cotton	Manufactured, Nylon
CVLQVT	Nylon	Cotton	Nylon
CWT9UP	Manufactued[sic]: Nylon	Vegtable[sic]: Cellulosic	Manufactured: Nylon
D23LBM	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
D94X8K	Manufactured, polyamide (Nylon 6,6)	Vegetable, Cotton	Manufactured, polyamide (Nylon 6,6)
DM7PTP	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
DNWTHP	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
DWCC2P	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
DX8V4Q	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
E962MG	Manufactured: Nylon	Vegetable: Cotton	Manufactured: Nylon
EMFWPQ	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
EW7GVN	Manufactured, Nylon and Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
EYFFGJ	Manufactured, Nylon	Vegetable, Cotton	Manufactured, nulon[sic]
FAPLHB	Manufactured, Nylon	Vegetable, Rayon	Manufactured, Nylon
FE6WVF	Manufactured, Nylon	Vegatable[sic], kozo fibres (mulberry)	Manufactured, Nylon
G2BXHH	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
GLEZYJ	Manufactured, Nylon 6.6	Vegetable, Cotton	Manufactured, Nylon 6.6

TABLE 2

WebCode	Item 1	Item 2	Item 3
GTHXTG	Manufactured: Polyester and Nylon	Vegetable: Cotton	Manufactured: Nylon
H263BG	Pile Yarn: Manufactured, Nylon Backing Fabric: Manufactured, PolyOlefin	Vegetable, Cotton	Manufactured, Nylon
H9TKVK	Manufactured, Nylon (Pile Yarns)	Vegetable, Cotton	Manufactured, Nylon
HU8JYD	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
JHNHRH	Nylon	n/a	Nylon
JTAJAD	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
JU63CE	Manufactured, Nylon (66)	Vegetable, Cotton	Manufactured, Nylon (66)
K7D838	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KFFPDA	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KJE4XE	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KKUZQE	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KP6D9D	Manufactured, not identified	Vegetable, Cotton	Manufactured, not identified
KPPRYB	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KT4P4C	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
KU76RB	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
L42PGG	Manufactured- Nylon	n/a	Manufactured- Nylon
LFFVHB	Manufactured, Nylon 6,6 and Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon 6,6 and Manufactured, Polyester
LGCBU9	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
LJF7DB	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
LKBPFC	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
LMG8D9	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
LUC4BH	Manufactured, Nylon and Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
MK973A	Manufactured-Nylon 66	Vegetable-Cotton	Manufactured-Nylon 66
MLFN26	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
MUV8HJ	Synthetic, Nylon	Vegetable, Cotton	Synthetic, Nylon
MV7A6H	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
NAGAED	Manufactured Polyamide	Vegetable Cotton	Manufactured Polyamide
NPF627	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
NPZV3D	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
P24QK7	Nylon, Manufactured	Cotton, Vegetable	Nylon, Manufactured
PFN7N6	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
PGJPP7	Manufactured, Nylon 6,6	Vegetable, Cotton	Manufactured, Nylon 6,6
PVVCTA	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
Q2387H	Nylon, Manufactured	Cotton, Vegetable	Nylon, Manufactured
QARTBF	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
QELQZ7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
QGERU2	Manufactured, Nylon; Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
QHABV3	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
QND44D	Manufactured, Nylon	Vegetable, Cotton	Manufatured[sic], Nylon
R3XWE6	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
R7QAN8	Nylon	Cotton	Nylon
R84P9Z	Manufactured, Nylon (pile); Manufactured, Polyester (base)	Vegetable, Cotton	Manufactured, Nylon
RFCB73	Synthetic Nylon 6.6	Cotton	Synthetic Nylon 6.6
RPJ9U7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
RQVVE7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
RR7RV4	Manufactured-Nylon	Vegetable-Cotton	Manufactured-Nylon
RRACJ8	Manufactured Nylon	Vegetable Cotton	Manufactured Nylon
RT8B98	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
T37FNZ	Nylon	Rayon	Nylon
T837UC	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
T8HCH3	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
TG9WNZ	Carpet pile: Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
TR4GD7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
TY8AW2	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
U4HMEZ	Manufactured, Nylon and Manufactured, Olefin	Vegetable, Cotton	Manufactured, Nylon
U7EHM2	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
U8GXAZ	Manufactured, Nylon, Polyester, and Olefin	Vegetable, Cotton	Manufactured, Nylon
UG3FD8	Manufactured, Nylon	not applicable	Manufactured, Nylon
UGMRH8	Nylon, Manufactured	Cotton, Manufactured	Nylon, Vegetable
UGXYF9	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
VC2MY3	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
W87Z29	Manufactured, Nylon and Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
WBPAU7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
WDUT4Z	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
WL4CAC	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
WP6DCU	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
WXZFE7	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
X4QXKU	Manufactured, Nylon/Manufactured, Polyester	Vegetable, Cotton	Manufactured, Nylon
X6XDRZ	Manufactured, Nylon(tufts), polypropylene (1st backing), Polyester(non-woven)	Vegetable, Cotton	Manufactured, Nylon
XCFV23	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
XH3M7A	Manufactured - Nylon	Vegetable - Cotton	Manufactured - Nylon
XP6HGV	Manufactured, Nylon (carpet tuft)	Vegetable, Cotton	Manufactured, Nylon

TABLE 2

WebCode	Item 1	Item 2	Item 3
Y3NGWW	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
Y4ZD3Z	Manufactured - Nylon	Vegetable - Cotton	Manufactured - Nylon
YA9QAY	Manufactured, Polyester, Nylon, Olefin	Vegetable, Cotton	Manufactured Nylon and Olefin
YN4Y38	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
YXUK96	Manufactured, polyamide, Nylon	Vegetable, Cotton	Manufactured, polyamide, Nylon
Z2NWM2	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
Z9BRKY	Manufacture, synthetic man-made Nylon	Vegetable Cotton	Manufacture, synthetic man-made Nylon
ZEC4FW	Manufactured, Nylon	Vegetable, Cotton	Manufactured, Nylon
ZEXMBV	Manufactured, Nylon	Natural, Cotton	Manufactured, Nylon
ZU4XQ2	Manufactured, Nylon, Polyester	Not applicable	Manufactured, Nylon, Polyester

Response Summary Participants: 133

Item 1			Item 2			Item 3		
Nylon:	111	*(83.5%)*	Cotton:	123	*(92.5%)*	Nylon:	127	*(95.5%)*
Other:	21	*(15.8%)*	Other:	4	*(3.0%)*	Other:	5	*(3.8%)*
Generic type not determined:	1	*(0.8%)*	Generic type not determined:	6	*(4.5%)*	Generic type not determined:	1	*(0.8%)*

Examination Methods

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
22MJFY		✓	✓			✓	✓				
23H2G2	✓	✓	✓		✓	✓	✓		✓		
2CNWLR	✓	✓	✓	✓	✓	✓	✓		✓		
2DV7NW		✓	✓		✓			✓		✓	
2E79AV	✓	✓	✓		✓	✓					
2HRQU2	✓	✓	✓		✓	✓	✓				
2Q3CEP	✓	✓	✓		✓	✓			✓		
2YEB9Z	✓	✓	✓			✓					
2ZBQKX	✓	✓	✓	✓	✓	✓					
367NXV	✓	✓	✓	✓	✓	✓	✓		✓		
3PM8JX	✓	✓	✓	✓	✓	✓	✓		✓		
43QXWP	✓	✓	✓	✓	✓	✓			✓	✓	
49FHZ6	✓	✓	✓	✓	✓	✓			✓		
62WKZP	✓	✓	✓		✓	✓			✓		
6A6472	✓	✓	✓	✓	✓	✓		✓	✓		
6URRGT			✓			✓					
6WWJPU	✓	✓	✓	✓	✓	✓	✓				
6ZU2LZ	✓	✓	✓	✓	✓	✓		✓	✓		
766E3Y	✓	✓	✓	✓		✓	✓				
78BYTK	✓		✓		✓	✓			✓		SEM
7BFMAV	✓	✓	✓	✓		✓	✓	✓	✓		
7LWC6U	✓	✓	✓		✓	✓	✓		✓		
7NZ3DV		✓	✓			✓			✓		ULTRAVIOLET LIGHT SOURCE

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
8948FU	✓	✓	✓	✓		✓		✓			
8PQNJQ	✓	✓	✓	✓	✓	✓	✓	✓			
8Q36YP	✓	✓	✓		✓	✓					
926V7J	✓	✓	✓	✓	✓	✓		✓			
93ZE8K		✓	✓	✓		✓	✓	✓			
9MJG3J	✓		✓		✓	✓	✓				
A6DP9T	✓	✓	✓	✓		✓		✓			
ANPBCN	✓	✓	✓	✓	✓	✓					Dye analysis by HPLC-DAD-MS
B77R3N	✓	✓	✓	✓		✓		✓			
BA2RRJ	✓	✓	✓	✓		✓					
BR7Y8L	✓					✓					
BWGAWU	✓	✓	✓	✓	✓	✓		✓			
CVLQVT	✓	✓	✓		✓	✓					
CWT9UP	✓					✓					
D23LBM	✓	✓	✓		✓	✓					Raman
D94X8K	✓	✓	✓	✓	✓	✓	✓				
DM7PTP	✓	✓	✓	✓	✓	✓	✓	✓			
DNWTHP	✓		✓			✓			✓		GC-FID-PYROLISIS
DWCC2P	✓	✓	✓	✓	✓	✓	✓				
DX8V4Q	✓	✓	✓			✓	✓				
E962MG	✓	✓	✓	✓	✓	✓	✓	✓	✓		
EMFWPQ	✓		✓	✓		✓	✓				
EW7GVN	✓	✓	✓	✓	✓	✓	✓	✓			
EYFFGJ	✓	✓	✓	✓		✓	✓				Raman
FAPLHB	✓	✓				✓		✓			

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
FE6WVF	✓		✓			✓					
G2BXHH	✓		✓	✓	✓	✓					Raman
GLEZYJ	✓	✓	✓		✓	✓				✓	
GTHXTG	✓		✓					✓			Dispersion stainning[sic] objective
H263BG	✓		✓			✓	✓	✓			
H9TKVK	✓	✓	✓	✓	✓	✓			✓		
HU8JYD	✓	✓	✓	✓	✓		✓			✓	
JHNHRH	✓	✓	✓	✓	✓	✓	✓		✓		
JTAJAD	✓		✓		✓	✓					
JU63CE		✓	✓	✓	✓	✓	✓				UVMSP, 1st derivatives
K7D838	✓	✓	✓			✓	✓				
KFFPDA	✓	✓	✓	✓	✓	✓	✓				optical cross-section
KJE4XE	✓	✓	✓		✓	✓	✓		✓		Cross-section was longitudinal
KKUZQE		✓	✓	✓	✓	✓	✓				UV MSP
KP6D9D	✓	✓	✓	✓					✓		
KPPRYB	✓				✓	✓			✓		PY-GC/MS; SEM/EDX
KT4P4C	✓		✓	✓	✓	✓	✓				
KU76RB	✓	✓	✓		✓	✓		✓		✓	
L42PGG	✓	✓	✓	✓	✓	✓	✓				
LFFVHB	✓	✓	✓			✓	✓		✓		
LGCBU9	✓		✓	✓	✓	✓	✓		✓		
LJF7DB	✓	✓	✓	✓	✓	✓	✓		✓		
LKBPFC	✓	✓	✓	✓	✓	✓			✓	✓	
LMG8D9	✓	✓	✓	✓	✓	✓			✓		
LUC4BH	✓	✓	✓	✓	✓	✓	✓		✓	✓	

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
MK973A	✓	✓	✓	✓	✓	✓	✓		✓		
MLFN26	✓	✓	✓			✓					
MUV8HJ	✓		✓		✓	✓					Attempted Microspectrophotometry
MV7A6H	✓		✓	✓		✓	✓		✓		
NAGAED	✓		✓		✓				✓		
NPF627	✓	✓	✓	✓	✓	✓	✓		✓		
NPZV3D	✓		✓	✓	✓	✓	✓	✓	✓		
P24QK7	✓	✓	✓		✓	✓	✓		✓		
PFN7N6	✓	✓	✓	✓		✓	✓		✓	✓	
PGJPP7	✓	✓	✓	✓	✓	✓	✓				
PVVCTA	✓	✓	✓		✓	✓	✓				
Q2387H	✓	✓	✓	✓		✓	✓	✓		✓	
QARTBF	✓	✓				✓					
QELQZ7	✓		✓			✓	✓				
QGERU2	✓	✓	✓	✓	✓	✓	✓				
QHABV3	✓	✓	✓		✓	✓	✓		✓		
QND44D	✓	✓	✓	✓	✓	✓	✓		✓		
R3XWE6	✓	✓	✓	✓	✓	✓	✓				
R7QAN8	✓	✓	✓		✓	✓			✓		
R84P9Z	✓	✓	✓	✓	✓	✓	✓		✓		
RFCB73	✓	✓	✓	✓	✓	✓	✓		✓		
RPJ9U7	✓	✓	✓		✓	✓			✓		
RQVVE7	✓		✓	✓	✓	✓	✓		✓		
RR7RV4	✓					✓					SEM-EDX
RRACJ8			✓								

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
RT8B98	✓	✓		✓		✓	✓	✓			
T37FNZ	✓					✓					
T837UC	✓	✓	✓				✓				Raman spectroscopy and pyrolyse /GC/MS
T8HCH3	✓		✓			✓		✓			
TG9WNZ	✓	✓	✓	✓	✓	✓		✓			
TR4GD7	✓	✓	✓		✓	✓					
TY8AW2	✓	✓	✓	✓		✓		✓			
U4HMEZ	✓	✓	✓	✓	✓	✓	✓				
U7EHM2	✓		✓		✓	✓					
U8GXAZ	✓	✓	✓	✓	✓	✓	✓				
UG3FD8	✓	✓	✓	✓	✓	✓	✓				
UGMRH8	✓	✓	✓		✓	✓	✓				
UGXYF9	✓	✓		✓		✓					SEM
VC2MY3	✓	✓	✓			✓		✓			
W87Z29	✓	✓	✓	✓	✓	✓	✓	✓	✓		
WBPAU7	✓	✓	✓	✓	✓	✓	✓	✓			
WDUT4Z	✓	✓	✓	✓	✓	✓	✓				
WL4CAC	✓	✓	✓		✓	✓	✓	✓			
WP6DCU	✓		✓			✓		✓			
WXZFE7	✓	✓	✓	✓	✓	✓					
X4QXKU	✓	✓	✓	✓		✓	✓				
X6XDRZ	✓	✓	✓	✓	✓	✓	✓	✓			Thin Layer Chromatography
XCFV23	✓	✓	✓	✓	✓	✓	✓	✓			
XH3M7A	✓	✓	✓	✓		✓	✓				ALS - exam
XP6HGV	✓	✓	✓	✓	✓	✓		✓			

TABLE 3

WebCode	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point	Other
Y3NGWW	✓		✓			✓					
Y4ZD3Z	✓	✓	✓		✓	✓			✓		
YA9QAY	✓	✓	✓		✓	✓					
YN4Y38	✓	✓	✓		✓	✓					
YXUK96	✓	✓	✓	✓		✓	✓				Microspectrophotometry Raman
Z2NWM2	✓	✓			✓	✓	✓		✓		
Z9BRKY		✓	✓	✓	✓	✓					
ZEC4FW	✓		✓			✓					
ZEXMBV	✓	✓	✓	✓	✓	✓	✓		✓	✓	
ZU4XQ2	✓	✓	✓	✓		✓	✓		✓		

Response Summary

	Participants	Stereomicroscope	Comparison	Polarized Light	Fluorescence	Macroscopic Exam	IR/FTIR	Microspectrophotometry	Solubility Tests	Cross-Section	Melting Point
	133	124	104	123	75	87	126	70	9	66	13
Percent		*93%*	*78%*	*92%*	*56%*	*65%*	*95%*	*53%*	*7%*	*50%*	*10%*

Conclusions

TABLE 4

WebCode	Conclusions
22MJFY	The submitted items were analyzed by stereomicroscope, comparison polarized light microscopy (PLM) and Fourier Transform Infrared Spectroscopy (FT-IR). Item 1 consisted of light blue nylon fibers. Item 2 consisted of light blue cotton fibers. The light blue nylon fibers found in item 3 were similar in microscopic appearance and characteristics to the light blue nylon fibers found in item 1. Therefore, these fibers cannot be excluded as having originated from the bath mat in item 1.
23H2G2	Item #1 contains fibers that are manufactured of nylon with a trilobal cross-section. Item #2 contains vegetable fibers consistent with cotton. Item #3 contains fibers that are manufactured of nylon with a trilobal cross-section. The nylon fibers of Item #3 are similar in all examined characteristics to the nylon fibers of Item #1 and thus could have originated from Item #1 or another source of similar fibers. The cotton fibers of Item #2 could not have originated from the source of Item #1 as represented by the sample of fibers in Item #1
2CNWLR	Elimination: The cotton fibers from the suspect's shirt in Item 2 could not have originated from the blue nylon rug in Item 1. Level III Association: The nylon fibers from the suspect's pants in Item 3 could have originated from the blue nylon rug in Item 1 or from another nylon fiber source with indistinguishable color, thickness, cross-sectional shape, color characteristics and chemical characteristics.
2DV7NW	1. The sample received as the "Known section of the victim´s bath rug" (item 1) is made by light blue nylon fibers. 2. The sample received as the "Questioned fibers from the suspect´s shirt" (item 2) is made by light blue cotton fibers. 3. The sample received as "Questioned fibers from the suspect's pants" (item 3) is composed by white nylon fibers. 4. According with the physical -properties evaluated, the questioned fibers received as item 3 are indistinguishable from the sample received as item 1.
2E79AV	[No Conclusions Reported].
2HRQU2	Item 2: The questioned fibers recovered from the suspect's shirt are different in optical properties and visual color to known fibers from the victim's bath rug. It is my opinion that the questioned fibers did not originate from the bath rug (Category 5). Item 3: The questioned fibers from the suspect's pants are similar in optical properties, color, and fiber type to known fibers from the victim's bath rug. It is my opinion that the questioned fibers could have come from the bath rug or any other fabric with similar fiber characteristics (Category 2B).
2Q3CEP	The sky blue cotton fibers collected from the suspect's shirt (Item 2) are not similar with the sky blue nylon fibers, the reference fibers from the victim's bath rug (Item 1). The sky blue cotton fibers collected from the suspect's shirt (Item 2) are not similar with the white polyester fibers, the reference fibers from the victim's bath rug (Item 1). The sky blue nylon fibers collected from the suspect's pants (Item 3) are consistent with the sky blue nylon fibers, the reference fibers from the victim's bath rug (Item 1). The sky blue nylon fibers collected from the suspect's pants (Item 3) are not consistent with the white polyester fibers, the reference fibers from the victim's bath rug (Item 1). A conclusion of "not similar", "not consistent", "is eliminated", indicates that the physical, chemical, and/or optical characteristics of the analyzed sample are different from those of the comparison sample or from a unique source. A conclusion of "consistent" indicates that the analyzed sample possesses identical physical, chemical and/or optical characteristics as those detected within a comparison sample. However, the analyzed sample lakes[sic] sufficient individualizing characteristics to identify a unique source.
2YEB9Z	Fibers from the victim's bath rug (Item #1) were found to correspond in color, physical, optical and chemical properties to the questioned fibers from the suspect's pants (Item #3). The fibers from the victim's bath rug (Item #1) or another material with similar fiber characteristics could have been the source to the fibers located on the suspect's pants (Item #3). Fibers from the victim's bath rug (Item #1) were excluded as a possible source to the questioned fibers from the suspect's shirt (Item #2).

TABLE 4

WebCode	Conclusions
	Differences in some physical and optical properties, along with differences in chemical properties, were observed.
2ZBQKX	The victim's bath rug (item 1) comprises colourless (silver grey to the naked eye) nylon fibres which are indistinguishable from the nylon fibres found on the suspect's pants (item 3). The cotton fibres from the suspect's shirt are different from the nylon fibres comprising the bath rug. In terms of the fibres on the suspect's pants matching the component fibres of the bath mat, we have considered two alternative explanations for these findings: the fibres on the suspect's pants came from the victim's bath rug, or the fibres on the suspect's pants did not come from the victim's bath rug, but from another item and happen to match by chance. In our opinion, our findings provide moderately strong support for the first proposition rather than the second, therefore in our view, there is moderately strong support for the assertion that the fibres found on the suspect's pants came from the victim's bath rug rather than from another source and match by chance.
367NXV	No significant differences were detected between the blue-grey, nylon fibres comprising the pile of the bath mat (Item 1) and the blue-grey nylon fibres comprising the small fibre tuft recovered “from the suspect’s pants” (Item 3) with respect to appearance, size, cross-sectional shape, ultra-violet and visible spectra, ultra-violet and violet fluorescence and polymer type. Consequently, it is my opinion that the fibres recovered from the “suspect’s pants” had probably originated from the bath mat (Item 1) or from another textile manufactured using fibres of the same type and processed in the same way. The small fibre tuft recovered from the “suspect’s shirt” (Item 2) was loosely attached to the outside of the opening of the folded paper bag package. The fibre tuft dislodged before it could be secured and could not be found on the prepared examination work space. Consequently, I am unable to ascertain whether these fibres could have originated from the bath mat or from some other source.
3PM8JX	Questioned fibers from Item 3 and known fibers from Item 1 were compared using stereomicroscopy, polarized light microscopy (PLM), fluorescence microscopy, microspectrophotometry (MSP), and infrared spectrometry. The tested questioned nylon fibers from Item 3 were similar in all tests performed to the known nylon fibers from Item 1. The source of the known fibers from Item 1 is a possible source of the questioned fibers from Item 3 (Level 3 - Association). Because similar fibers have been manufactured that would be indistinguishable from the submitted evidence, an individual source cannot be determined. Questioned fibers from Item 2 and known fibers from Item 1 were compared using stereomicroscopy and PLM. The questioned natural fibers characteristic of cotton from Item 2 were not similar to the known nylon fibers from Item 1 and did not originate from that source (Elimination Non-association).
43QXWP	Fibers from the suspect’s shirt (item2) are dissimilar in size, shape, fiber type and microscopic characteristics to the known section of the victim’s bath rug (item1) (distinguishable). The fibers from the suspect’s shirt did not originate from the victim’s bath rug. Fibers from the suspect’s pants (item3) are similar in size, shape, fiber type and microscopic characteristics to the known section of the victim’s bath rug (item1) (Indistinguishable). The fibers from the suspect’s pants could have come from the victim’s bath rug or another source with similar characteristics.
49FHZ6	Item 1 is composed by a single type of blue-grey fiber. It's manufactured fiber, without delustrant, without dichroism under polarized light and without fluorescence. It's identified as nylon 6,6 fiber by FTIR. Item 2 is composed by a single type of blue-grey fiber. It's vegetable fiber, identified as cotton by optic microscopy. Item 3: contains the same type of fiber than item 1.
62WKZP	Item 1 was found to consist of very light blue nylon fibers. Item 2 was found to consist of very light blue cotton fibers. Item 3 was found to consist of very light blue nylon fibers. The fibers from Item 1 were found to be similar to the fibers in Item 3 in microscopic characteristics (color and optical properties) and in chemical composition. The fibers from Item 1 were found to be dissimilar to the fibers in Item 2 in microscopic characteristics and chemical composition.
6A6472	Fibers recovered from Item 3, questioned fibers "from the suspect's pants," were examined and

TABLE 4

WebCode	Conclusions
	compared visually and microscopically to fibers composing Item 1, known section of the victim's bath rug, and were found to be consistent in appearance, generic fiber type, and microscopic characteristics. Therefore, the fibers recovered from Item 3 could have come from Item 1. Fibers recovered from Item 2, questioned fibers "from the suspect's shirt," were examined and compared visually and microscopically to fibers composing Item 1 and were found to be different in appearance, fiber type and microscopic characteristics. Therefore, the fibers recovered from Item 2 did not come from Item 1.
6URRGT	The microscopic characteristics of Item 1 and Item 3 were consistent with that of the nylon fibre. The amide group that was observed in the FTIR spectra of Items 1 and Item 3 confirms this. Item 2 appeared natural due to its rough appearance. The ribbon like structure is consistent with that of cotton. Items 1 and 3 appeared to be of similar coloration and diameter and were thus concluded to be of the same source.
6WWJPU	The light blue nylon fibres found from suspect's pants (item 3) are consistent with the light blue nylon fibers of victim's bath rug (item 1). Item 3 could be originated from item 1. The light blue cotton fibres (item 2) are not consistent with the light blue nylon fibers of victim's bath rug (item 1). Item 2 could not be originated from item 1.
6ZU2LZ	Item 3, questioned fibers "from the suspect's pants," was examined and compared visually and microscopically to fibers composing Item 1, known section of the "victim's bath rug," and was found to be consistent in appearance, generic fiber type and microscopic characteristics. Therefore, Item 3 could have come from Item 1. Item 2,questioned fibers "from suspect's shirt," was examined visually and microscopically for the presence of fibers like those composing Item 1,known section of the "victim's bath rug". None were found.
766E3Y	Very light grey nylon fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the very light grey nylon fibers comprising Item 1; accordingly, these fibers are consistent with originating from the same source as Item 1 or from another source comprised of fibers which exhibit the same microscopic characteristics and optical properties. The fibers in Item 2 are microscopically dissimilar to the fibers comprising Item 1; accordingly, these fibers are not consistent with originating from the same source as the Item 1 fibers. The submitted items were examined using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and Fourier Transform-Infrared Spectroscopy, where appropriate.
78BYTK	The questioned fiber item 3, could have originated from the same source as item 1, victim's bath rug.
7BFMAV	Items 1, 2, and 3 were examined visually and using stereomicroscopy. Fibers in Items 2 and 3 and fibers composing Item 1 were examined using comparison microscopy. Fibers in Item 3 and composing Item 1 were further examined using polarized light microscopy (PLM), fluorescence microscopy, Microspectrophotometry (MSP), Fourier Transform Infrared Spectrophotometry (FTIR), microchemical tests, and microsolubility tests. The dull blue nylon fibers in Item 3 were consistent in physical, chemical and optical properties with the fibers composing the Item 1 rug. It was concluded that the Item 3 dull blue nylon fibers could have originated from the Item 1 rug or another source of fibers with the same physical, chemical and optical properties. The light blue cotton fibers in Item 2 could not be associated with fibers composing the Item 1 rug due to differences in fiber type and physical properties.
7LWC6U	Results of Fiber Analysis Microscopic and instrumental examination of the representative fibers in Item 1 revealed very light gray nylon fibers. Microscopic examination of the representative fibers in Item 2 revealed very light gray cotton fibers. Microscopic and instrumental examination of the representative fibers in Item 3 revealed very light gray nylon fibers. Results of Fiber Comparison: The representative very light gray fibers in Items 1 and 3 were found to be similar in microscopic, optical, chemical, and color properties. They could have come from the same source or any other source with the same properties. The representative very light gray fibers in Items 2 and 3 were found to be dissimilar in microscopic properties and fiber type. They could not have come from the same source.

TABLE 4

WebCode	Conclusions
7NZ3DV	Items 1-3 were examined visually using an ultraviolet light source, microscopically and instrumentally using Fourier Transform Infrared Spectrometry. Items 1 and 3 were consistent with the manufactured fiber, nylon. Item 2 was consistent with the natural fiber, cotton. Item 1 (known fibers from rug) and item 3 (questioned fibers from pants) exhibited similar microscopic, optical and chemical properties. Therefore 1 and 3 may share a common source of origin. Item 2 (questioned fibers from shirt) did not exhibit similar characteristics when compared to item 1.
8948FU	Item 2. The fibers collected from the shirt were not similar to the fibers in item 1 (the bath rug). Item 3. The fibers collected from the pants were similar to the fibers in item 1. The bath rug can not be ruled out as a possible source of the fibers collected from the pants.
8PQNJQ	A population of light blue colored fibers exceeding six (6) in number was observed in a wax envelope containing questioned fibers from the suspect's pants (Item 1.3). Six (6) known fibers removed from the section of the victim's bathroom rug (Item 1.1) were consistent with six (6) of the questioned fibers recovered from the suspect's pants (Item 1.3) based on microscopic observations and spectrophotometric analysis in the visible light region. Of these, three (3) known light blue synthetic nylon fibers from the victim's bathroom rug (Item 1.1) were consistent with three (3) questioned light blue synthetic nylon fibers recovered from the suspect's pants (Item 1.3) based on microscopic observations and spectrophotometric analysis in the visible light region and infrared region. Six (6) known light blue fibers from the section of the victim's bath rug (Item 1.1) were microscopically inconsistent with six (6) questioned light blue fibers removed from the suspect's shirt (Item 1.2). A population of light blue fibers exceeding six (6) in number was observed in an envelope containing a section of the victim's bath rug (Item 1.3[sic]). Three (3) of these known fibers (Item 1.1) were confirmed to be synthetic nylon fibers.
8Q36YP	The fibers in item 1 were similar to the fibers in item 3, but the fibers in item 1 were different from the fibers in item 2. Item 1 and 3 consisted of manufactured nylon fibers, but item 2 consisted of vegetable cotton fibers.
926V7J	The nylon 6,6 fibers identified in Exhibit 3 have the same physical, optical and chemical properties as the nylon 6,6 fibers comprising the bath rug in Exhibit 1. The fibers in Exhibit 3 could have originated from Exhibit 1 or from any other material consisting of nylon fibers with the same physical, optical and chemical properties. The fibers comprising the yarn in Exhibit 2 were identified as cotton. The fibers in Exhibit 2 could not have originated from Exhibit 1.
93ZE8K	The 1.1 fibers are nylon and similar to the 1.3 fibers from the suspect's pants in color, microscopical characteristics and chemical composition. Therefore, the 1.3 fibers could have originated from the 1.1 fiber standard source or any other source of fibers with the same characteristics. The 1.2 fibers are cotton and therefore did not originate from the 1.1 fiber standard source.
9MJG3J	Item 1 is a section from a bath rug; the bath rug is composed of nylon fibers. Item 3 contains 14 nylon fibers. The nylon fibers from Item 3 are similar in color, microscopic characteristics, and chemistry to the nylon fibers from the standard, Item 1. The fibers from Item 3 could have come from Item 1 or from another source consisting of similar nylon fibers. The fibers from Item 2 are cotton fibers and they are not similar in microscopic characteristics to the standard, Item 1. The fibers from Item 2 could not have originated from the bath rug (Item 1). Additionally, loose polyester fibers were found on the standard, Item 1 (bath rug). The polyester fibers are not attached to the rubber backing on the rug and do not compose the tufts of the rug. The polyester fibers are not similar to the fibers from Items 2 and 3.
A6DP9T	Questioned fibers from the suspect's shirt could not have originated from the victim's bath rug. Questioned fibers from the suspect's pants could have originated from the victim's bath rug.
ANPBCN	Item 2: The bath rug (Item 1) is not the source of the fibre traces from the shirt (Item 2). Item 3: The findings of the examination are very much more probable if the fibre traces from the pants (Item 3) originate from the bath rug (Item 1) than if the fibre traces originate from another source.

TABLE 4

WebCode	Conclusions
B77R3N	The fibres from the victim's bath rug (item 1) were pale blue, trilobal nylon fibres. The fibres from the suspect's pants (item 3) were also pale blue, trilobal nylon fibres. These fibres from the suspect's pants had the same microscopic appearance, cross-sectional shape and chemical composition as the fibres from the victim's rug. Therefore, the fibres from the suspects' pants could have come from the victim's bath rug or from another source of this type of pale blue, trilobal nylon fibres. The fibres from the suspect's shirt (item 2) were pale blue cotton fibres. Therefore, these fibres are a different type of fibre to the fibres from the victim's bath rug. Therefore, these fibres from the suspect's shirt have not come from the victim's bath rug.
BA2RRJ	The constituent fibres from a known section of the victim’s bath rug (item 1) were identified as pale blue Nylon. The pale blue questioned fibres recovered from the suspect’s pants (item 3) were also identified as Nylon and were indistinguishable from the constituent fibres of the victim’s bath rug (item 1) in microscopic appearance and chemical composition. The pale blue questioned fibres recovered from the suspect’s shirt (item 2) were identified as Cotton. The questioned fibres recovered from the suspect’s pants (item 3) could have come from the victim’s bath rug (item 1) or another textile item containing indistinguishable fibres. The questioned fibres recovered from the suspect’s shirt (item 2) could not have come from the victim’s bath rug (item 1).
BR7Y8L	The fibers were identified on the basis of IR spectra and stereomicroscopic examinations. The known section of the victim's bath rug (Item 1) is made of nylon fibers. The questioned fibers from the suspect's shirt (Item 2) proved to be cotton fibers while the questioned fibers from the suspect's pants (Item 3) were identified as nylon fibers. The questioned fibers from the suspect's pants (Item 3) could have originated from the bath rug (Item 1).
BWGAWU	1 - Questioned fibers from the suspect's shirt (Item 2) are differents[sic] from known section fibers of the victim's bath rug (Item 1). They don't come from the bath rug. 2 - Questioned fibers from the suspect's pants (Item 3) are not differentiated from known section fibers of the victim's bath rug (Item 1). They come from the bath rug (Item 1) or from another textile material made of fibers with the same characteristics.
CVLQVT	It was determined utilizing stereomicroscopic, polarized light microscopic, comparison microscopic and micro-Fourier Transform Infrared Spectroscopy analysis that item 1 and item 3 are comprised of light blue colored, nylon fibers and exhibit consistent optical properties. Therefore, the known fibers from item 1 cannot be eliminated as being the source of the questioned item 3 sample. It was determined utilizing stereomicroscopic, polarized light microscopic, and micro-Fourier Transform Infrared Spectroscopy analysis that item 2 is comprised of white cotton fibers. Therefore, based on fiber composition, the known fibers from item 1 can be eliminated as being the source of the questioned item 3 fibers.
CWT9UP	Item 1 and Item 3 had a similar appearance under examination by stereomicroscope; fibers were of similar thickness, color and smoothness. Item 2 under the stereomicroscope were finer fibers with more irregular form. The FTIR spectra of Item 1 and Item 3 were comparable, both being nylon and characteristic of nylon 6,6. The FTIR spectrum of Item 2 was characteristic of a vegetable/cellulosic fiber.
D23LBM	All item consisted of fibers, namely a blue and white fibers. According to the FT-IR and Raman analysis Item 1 is the same as item 3 (Nylon) and different from Item 2 (Cotton).
D94X8K	In my opinion, the fibres recovered from the suspect's pants (item 3) could have come from the bath mat (Item 1) recovered from the victim's home address. This finding is as I would expect if the suspect had contact with the bath mat, either directly or indirectly. Further interpretation and evaluation may be possible if additional information such as the suspect's account was available.
DM7PTP	The victim's bath rug (Item 1) consists of light blue nylon fibers and was used for comparison purposes. A tuft of light blue fibers was recovered from the suspect's shirt (Item 2). Some of these fibers were

TABLE 4

WebCode	Conclusions
	determined to be light blue and light brown cotton fibers that are dissimilar in fiber type to the known fibers from the victim's bath rug (Item 1). It is our opinion that these fibers did not originate from the victim's bath rug (Item 1). A tuft of light blue fibers was recovered from the suspect's pants. Some of these fibers were determined to be light blue nylon fibers that are similar in size, shape, color, optical properties and fiber type to the known fibers from the victim's bath rug (Item 1). It is our opinion that these fibers could have originated from the victim's rug (Item 1), or any other items of similar construction. The remaining fibers from the tufts of fibers from the suspect's shirt (Item 2) and the suspect's pants (Item 3) were not further analyzed.
DNWTHP	THE FIBERS CONTENT IN THE ITEM 1 ARE CONSISTENT WITH NYLON. THE FIBERS CONTENT IN THE ITEM 2 ARE CONSISTENT WITH COTTON AND THE FIBERS CONTENT IN THE ITEM 3 ARE CONSISTENT WITH NYLON. THE QUESTIONED FIBERS FROM THE ITEM 3 COULD HAVE BEEN ORIGINATED FROM THE ITEM 1 (VICTIM´S BATH RUG). THE QUESTIONED FIBERS FROM THE ITEM 2 (SUSPECT´S SHIRT) COULD HAVE NOT BEEN ORIGINATED FROM THE ITEM 1 (VICTIM´S BATH RUG)
DWCC2P	Blue-gray nylon fibers recovered from Item 3 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. Blue-gray cotton fibers recovered from Item 2 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. No other fibers were recovered from Items 2 and 3. The specimens were examined using the following techniques as appropriate: stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy and Fourier transform-infrared spectroscopy. microscopy, fluorescence microscopy and Fourier transform-infrared spectroscopy.
DX8V4Q	Fiber examinations were performed on the following: Item 1- Known section of the victim's bath rug. Item 2- Questioned fibers from the suspect's shirt. Item 3- Questioned fibers from the suspect's pants. Analysis Result: The fibers from the suspect's pants of Item 3 are similar to the fibers collected from the victim's bath rug (Item 1) in color, microscopical characteristics and chemical composition. Therefore, the fibers from the suspect's pants could have come from the victim's bath rug or another source manufactured in a similar process. The fibers from the suspect's shirt of Item 2 are different in color and microscopical characteristics from the fibers collected from the victim's bath rug (Item 1). Analysis was performed using microscopy, microspectrophotometry and Fourier transform infrared spectroscopy.
E962MG	The fibers (Item 001-3) recovered from the suspect's pants could have come from the victim's bath rug (Item 001-1) or any other textile with the same physical and chemical characteristics. The fibers (Item 001-2) recovered from the suspect's shirt did not come from the victim's bath rug (Item 001-1).
EMFWPQ	Fibers found on the suspect's pants (Item 3) could have come from the bath rug (Item 1) in the victim's home. Fibers found on the suspect's shirt (Item 2) could not have come from the bath rug (Item 1).
EW7GVN	Visual and microscopic examination of Lab Item #1 revealed the following fibers: The carpet tufts were composed of: K1 - Slightly dull, very light blue, trilobal shaped nylon fibers. One K1 fiber, designated K1.1, was cross-sectioned and was analyzed instrumentally (Fourier Transform Infrared Spectroscopy - FTIR) and found to be nylon. Colorless fibers were observed at the Lab Item #1 carpet backing that were: K2 - Slightly dull, colorless, round shaped polyester fibers. One K2 fiber, designated K2.1, was analyzed instrumentally (FTIR) and found to be polyester. Microscopic examination of Lab Item #2 disclosed the following fibers: Q1 - Very light blue cotton fibers. Microscopic examination of Lab Item #3 disclosed the following fibers: Q2 - Slightly dull, very light blue, trilobal shaped nylon fibers. One Q2 fiber, designated Q2.1, was cross-sectioned and was analyzed instrumentally (FTIR) and found to be nylon. Microscopic comparison of the questioned fibers, Q1, with the known fibers, K1 and K2, disclosed that they are different with respect to their physical and optical properties. It is the opinion of the undersigned that the Q1 questioned fibers (Lab Item #2) could not have originated from the source (Lab Item #1) represented by the known fibers, K1 and K2. Microscopic comparison of the questioned

TABLE 4

WebCode	Conclusions
	fibers, Q2, with the known fibers, K2, disclosed that they are different with respect to their physical and optical properties. Microscopic and instrumental (Ultraviolet - Visible Microspectrophotometry - UV-Vis MSP) comparison of the questioned fibers, Q2, and known fibers, K1, disclosed that they are consistent and no discriminating differences were observed with respect to their physical and optical properties. Instrumental (FTIR) comparison of one Q2 fiber (designated Q2.1) with one known K1 fiber (designated K1.1) disclosed that they are also consistent and no discriminating differences were observed with respect to their chemical properties. It is the opinion of the undersigned that the questioned fiber, Q2.1, could have originated from the same source (Lab Item #1) as represented by the known exemplar, K1.1, or from another source exhibiting all of the same analyzed characteristics. No conclusions are reached about the remaining Q2 and K1 fibers. 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, physical, and optical properties.
EYFFGJ	On the basis of microscopic examination, the fibres from Item 2 could be differentiated from Item 1. Therefore the fibres recovered from the suspect's shirt (Item 2) could not have come from the victim's bath rug (Item 1). On the basis of microscopic, colour and chemical analysis, the fibres from Item 3 could not be differentiated from Item 1. Therefore the fibres recovered from the suspect's pants (Item 3) could have come from the victim's bath rug (Item 1).
FAPLHB	Item 1 and Item 3 is similar but Item 2 is different.
FE6WVF	Fibres from Item 3 are comparable with fibres from item 1 regarding the morphology chemical characteristics and generic class. Therefore, item 3 could have originated from the victim's bath rug (item1). Item 2 and item 1 are not comparable.
G2BXHH	According to the microscopy and FT/IR examination results, Item 3 contains grey nylon fibers and Item 1 is interwoven with yarns composed of grey nylon fibers. Item 2 contains cotton fibers. Furthermore, the results of microscopic examination using polarized light and fluorescence, and Raman spectroscopy demonstrate fibers in Item 3 are consistent with those in Item 1 in appearance, micromorphlogical[sic] characteristics and spectroscopic properties, while fibers in Item 2 are not. Therefore, the questioned fibers from the suspect's pants (Item 3) could have originated from the known section of the victim's bath rug (Item 1); while the questioned fibers from the suspect's shirt (Item 2) could not have originated from the known section of the victim's bath rug (Item 1).
GLEZYJ	Physical and microscopic comparison of the Nylon fibers in Item 3 with the nylon fibers in the construction of Item 1, rug, revealed them to be consistent with respect to color, fiber type, melting point and optical properties. Therefore, Item 3 could have originated from Item 1, or another source with these same properties. Microscopic comparison of fibers in Item 2, with Item 1, rug, revealed them to be inconsistent with fiber type.
GTHXTG	One type of fiber from the sample #1 corresponds to sample #3.
H263BG	The questioned fibers of item 3 match with the pile yarn fibers of item 1.
H9TKVK	Examination of Item #1 revealed a small section of a rug which had light blue-grey pile yarns. Examination of Item #3 revealed the presence of a small clump of light blue-grey nylon fibers. The light blue-grey nylon fibers from Item #3 were consistent with the light blue-grey nylon fibers composing the pile yarns of Item #1. Therefore, the light blue-grey nylon fibers from Item #3 could have originated from the same source as Item #1. Examination of Item #2 revealed the presence of a small clump of light blue-grey cotton fibers. The fibers from Item #2 were not consistent with the fibers composing Item #1. Therefore, the fibers from Item #2 could not have originated from Item #1.
HU8JYD	1. Examination of the fibers recovered from Item 2 (questioned fibers from suspect's shirt) did not

TABLE 4

WebCode	Conclusions
	disclose the presence of fibers that are consistent with the fibers that compose Item 1 (known section of the victim's bath rug). 2. Examination of Item 3 (questioned fibers from suspect's pants) disclosed the presence of numerous blue fibers mutually consistent in microscopic appearance. Further examination and comparison of a representative sample of these fibers with the fibers that compose Item 1 revealed them to be consistent. Therefore, these fibers originated from Item 1 or another source with the same characteristics. 3. Techniques utilized in this examination include stereo microscopy, polarized light microscopy, comparative microscopy, microspectrophotometry, and thermal analysis.
JHNHRH	Light blue nylon fibers recovered from Item 3 exhibit the same microscopic characteristics and optical properties as the light blue nylon fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The fibers recovered from Item 2 are microscopically dissimilar to the light blue nylon fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the source of Item 1.
JTAJAD	Item 1, item 2 and item 3 are white. They can not be distinguished base on color. item 1 and item 3 fiber are nylon. item 2 fiber is cotton because it is twisted.
JU63CE	The fibres recovered from the suspect's pants (Item 3) were indistinguishable from the constituents of the victim's bath rug (Item 1) these fibres could therefore have originated from the rug. Although very pale blue they were distinctive (as they were tri-lobal in cross section)and in my opinion this finding provides moderately strong support for the assertion that the fibres from the suspect's pants originated from the victim's bath rug rather than originating from another source.
K7D838	The questioned fibers from the suspect’s shirt (Item 2) did not correspond with the Item 1 fiber sample (known section of the victim’s bath rug) in diameter, microscopic characteristics and infrared spectra. Therefore, the Item 2 questioned fibers could not have originated from the Item 1 known sample. The questioned fibers from the suspect’s pants (Item 3) were consistent with Item 1 in diameter, microscopic characteristics, fiber type (Nylon) and infrared spectra (FTIR). Therefore, the known sample from the victim’s bath rug could have been the source of the Item 3 questioned fibers.
KFFPDA	The light blue nylon carpet type fibers recovered from Item 2 (Your Item 3) exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 3 (Your Item 1). Accordingly, these fibers are consistent with having originated from Item 3, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The fibers recovered from Item 1 (Your Item 2) are microscopically dissimilar from the fibers comprising Item 3 (Your Item 1). Accordingly, these fibers are not consistent with having originated from Item 3. The specimens were examined visually using stereo-microscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and infrared spectroscopy, where appropriate.
KJE4XE	Microscopical examination of fibers from the piece of rug in Item 1, as well as the fibers in Items 2 and 3, revealed they appeared light gray in color. Microscopical and instrumental analysis via Fourier Transform Infra-Red spectroscopy (FTIR) and Microspectrophotometry (MSP) techniques were used to compare a sampling of the fibers recovered from the clothing in Items 2 and 3 with those comprising the rug in Item 1. Analysis revealed the fibers from the pants (Item 3) and fiber standards from the rug (Item 1) were both nylon and were the same in physical characteristics including color, microscopical characteristics and chemical composition. These samples also exhibited similar absorbance spectra. Based on these findings, the nylon fibers tested from the pants could have originated from the rug, but not exclusively, as other fibers might be indistinguishable from the submitted evidence. The fibers from the shirt (Item 2) were composed of cotton, and therefore, are different in composition from those comprising the rug (Item 1). Based on these findings, these fibers from the shirt are not consistent with originating from the rug.
KKUZQE	Item 1 was a small section of an apparent grey-blue bath mat recovered from the home address of the deceased. It was comprised of very pale blue nylon fibres. Item 2 was a tuft of very pale blue cotton

TABLE 4

WebCode	Conclusions
	fibres recovered from the alleged offender's shirt. These were not examined any further as they were of a different fibre type to those that comprised the bath mat (Item 1). Item 3 was a tuft of very pale blue nylon fibres recovered from the alleged offender's pants. These fibres were found to be indistinguishable by microscopy and instrumental colour analysis from the very pale blue nylon fibres which comprised the bath mat (Item 1). In my opinion, possible explanations for the findings include: The pale blue tuft of fibres recovered from the alleged offender's pants originated from the bath mat. The pale blue tuft of fibres recovered from the alleged offender's pants did not originate from the bath mat and originate from another source. In my opinion, the findings provide moderately strong support for the pale blue tuft of fibres having originated from the bathmat rather than from another item.
KP6D9D	From the 110 fibres found on the suspects T-shirt (item 2), 42 have been mounted and compared to 136 fibres of the victims rug (item 1). The examination showed that the rug can be excluded as the source of the fibres examined (item 2). From the 18 fibres found on the suspects pants(item 3), 7 have been mounted and compared to 136 fibres of the victims rug (item 1). The examined fibres in item 3 could not be differentiated from the fibres of item 1 with the applied methods. Item 1 could be at the source of the fibres on the suspects Pants (item 3).
KPPRYB	According to microscopic exams, FTIR, PY-GC/MS and SEM/EDX result, the composition of Item3 is similar to those of Item1. The Item2 composition is dissmilar[sic] to Item1.
KT4P4C	The questioned fibres in Item 3 are similar in all examined characteristics to fibres in Item 1. Item 3 could have originated from the same source on Item 1 or another source of similar fibres. The questioned fibres in Item 2 are different from the fibres in Item 1 and did not originated[sic] from the same source as represented by Item 1.
KU76RB	The Questioned fibers, Item 2, identified as cotton fibers, did not exhibit the same microscopic and physical characteristics as the Known fibers, Item 1, identified as nylon fibers; and therefore could not have come from Item 1. The Questioned fibers, Item 3, identified as nylon fibers, exhibited the same microscopic and physical characteristics as the Known fibers, Item 1, identified as nylon fibers; and therefore could have come from Item 1.
L42PGG	Light blue nylon fibers found in Item 3 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from Item 1, or another item comprised of fibers with the same microscopic characteristics and optical properties. Light blue cotton fibers found in Item 2 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from Item 1. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, microspectrophotometry, and infrared spectroscopy, where appropriate.
LFFVHB	Item 1 comprised a small portion of bath rug consisting of white backing material and threads with a pale blue-grey overall appearance. The pile threads comprised a single fibre type identified as slightly delustered tri-lobal nylon 6,6. Individual fibres had no discernible colour. The backing included colourless delustered polyester fibres. Item 2 comprised a clump of fibres with no discernible colour. The fibres were identified as cotton. These fibres could not have originated from the bath mat as represented by (Item 1). Item 3 comprised a clump of fibres with no discernible colour. The bulk of these fibres were identified as slightly delustered tri-lobal nylon 6,6. One delustered polyester fibre was also present. The nylon fibres in Item 3 were found to correspond in composition, appearance, colour, dimensions and cross section to the constituent pile fibres from the bath rug (Item 1). The single polyester fibre was found to correspond in composition, appearance, colour and dimensions to the polyester fibres in the backing material from the bath rug (Item 1). The fibres in Item 3 could have originated from the bath rug as represented by Item 1.
LGCBU9	The fibers in the known section of the victim's bath rug (Item 1) and the questioned fibers from the suspect's shirt (Item 2) exhibited significant differences in optical characteristics and chemical composition, therefore the fibers in item 2 could not have originated from item 1. The fibers in the

TABLE 4

WebCode	Conclusions
	known section of the victim's bath rug (Item 1) and the questioned fibers from the suspect's pants (Item 3) exhibited no significant differences in optical characteristics, color and chemical composition, therefore the fibers in item 3 could have originated from the same source as the fibers in item 1 or another source of the light blue nylon fibers.
LJF7DB	Based on the techniques applied: 1) Item 2 (questioned fibres from the suspect's shirt) was determined to be different to the fibres of the victim's bath rug (Item 1) based on differences in fibre type. 2) Item 3 (questioned fibres from the suspect's pants) could not be differentiated from the fibres of the victim's bath rug (Item 1) based on colour, fibre type, microscopic features, fluorescent properties and cross section. Therefore, I am of the opinion that: 1)The questioned fibres from the suspect's shirt (Item 2) could not have come from the victim's bath rug. 2) The results of the fibre comparison performed strongly supports the proposition that the questioned fibres from the suspect's pants (Item 3) came from the victim's bath rug as opposed to another random source. It should be noted that whilst the questioned fibres from the suspect's pants could have come from the victim's bath rug, textile products are mass produced and the fibres could have come from another identical rug or a different textile product composed of the same fibre type.
LKBPFC	The questioned nylon fibers in Item #3 are physically and chemically similar to the known nylon fibers in Item #1. Therefore, the questioned fibers could have originated from the known bath rug. The questioned cotton fibers in Item #2 are physically and chemically distinguishable from the known nylon fibers in Item #1. Therefore, the questioned fibers could not have originated from the known bath rug.
LMG8D9	The questioned fibers from the suspect's shirt (Item 2) and the questioned fibers from the suspect's pants (Item 3) were microscopically examined and compared to Item 1 (the fibers comprising the known sample from the victim's bath rug.) These examinations revealed that the questioned fibers from the suspect's pants (Item 3) were consistent in appearance, fiber type and microscopic characteristics to the fibers comprising the known sample from the victim's bath rug, and therefore, could have originated from that source. Examinations also revealed that the questioned fibers from the suspect's shirt (Item 2) were dissimilar to the fibers comprising the known sample from the victim's bath rug, and therefore, did not originate from that source. Because textile materials are mass produced, it is not possible to state that a fiber originated from a particular source to the exclusion of all other textile materials composed of fibers which exhibit the same physical, optical, and/or chemical properties.
LUC4BH	"Item 1" was found to consist of microscopically colourless nylon and polyester fibres. Microscopically colourless nylon fibres sampled from "Item 3" were found to be similar to the microscopically colourless nylon fibres in "Item 1". This suggests that "Item 3" could have originated from "Item 1", or from other sources containing fibres with similar characteristics. Microscopically colourless cotton fibres sampled from "Item 2" were found to be different from the fibres constituting "Item 1".
MK973A	1. The tuft of light grey-blue nylon fibres, Exhibit 3, originated either from the source of Exhibit 1 or from another textile source containing light grey-blue nylon fibres microscopically and chemically indistinguishable from the light grey-blue nylon fibres of Exhibit 1. (See Remark 1) 2. The tuft of cotton fibres, Exhibit 2, did not originate from the source of Exhibit 1. Remark 1: Nylon fibres are used in the construction of, but are not limited to, carpets, rugs, home furnishings (upholstery, curtains) and apparel (jackets, coats, dresses, socks, shirts).
MLFN26	The submitted items were examined and analyzed by comparison, Polarized light Microscope (PLM) and FT-IR Spectrometer. The Fibers found in Item 1 composed of Nylon. The Fibers found in Item 2 composed of Cotton. The Fibers found in Item 3 composed of Nylon. The Nylon founded in Item 1 exhibit the same microscopic appearance (color and size), the same chemical and characteristic as Item 3. Therefore, These Nylon from the suspect's pants could have originated from the victim's bath rug.
MUV8HJ	The fibers in the known section of the bath rug recovered from the Victim's bath rug (Item 1) and the questioned fibers recovered from the Suspect's shirt (Item 2) exhibited similar physical properties but differences in optical characteristics and chemical compositions. Therefore, the fibers recovered from

TABLE 4

WebCode	Conclusions
	the Suspect's shirt (Item 2) could not have originated from the same source as the fibers recovered from the Victim's bath rug (Item 1). The fibers in the known section of the bath rug recovered from the Victim's bath rug (Item 1) and the questioned fibers recovered from the Suspect's pants (Item 3) exhibited similar physical properties, optical characteristics, and chemical compositions. Therefore, the fibers recovered from the Suspect's pants (Item 3) could have originated from the same source as the fibers recovered from the Victim's bath rug (Item 1) or from another source consisting of fibers with the same physical, optical and chemical composition.
MV7A6H	Fibres recovered from the pants match in morphology, fluorescence, VIS-spektra[sic] and chemical composition with fibres from the bath rug at the crime scene. It is possible, that the fibres found on the suspect's pants could have come from the bath rug in the victims home.
NAGAED	It is the opinion of the laboratory that the fibers isolated from Item 3 have been identified as a multi lobal polyamide and compare favorably to the control carpet fibers, item 1. the fibers isolated in item 2 have been identified as cotton and therefore could not originate from the carpet fibers in item 1.
NPF627	The questioned fibers in Item 3 (from the suspect's shirt) corresponded in microscopic characteristics (PLM), cross-section (trilobal), color (pale blue), type (nylon), fluorescence, visible spectra (MSP) and chemical composition (FTIR) to the known fibers in Item 1 (from the victim's bath rug). 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 2 (from the suspect's shirt) were a different type (cotton) than the known fibers from Item 1 (nylon). Therefore Item 1 can be eliminated as being the source of the Item 2 fibers (Elimination). KEY for instrument acronyms: FTIR – Fourier Transform Infrared Spectroscopy, MSP - Microspectrophotometry, PLM – Polarized Light Microscopy.
NPZV3D	Item 1: Light blue nylon fiber standard. Item 2: Several white cotton fibers were found. In the sample analyzed, the unknown fibers from the suspect's shirt and the fiber standard (Item #1) from the victim's bath rug are not the same in physical, chemical, and optical characteristics. The unknown fibers from the suspect's shirt could not have originated from the standard. Item 3: Several light blue nylon fibers were found. In the sample analyzed, the unknown fibers from the suspect's pants and the fiber standard (Item #1) from the victim's bath rug are not the same in chemical characteristic. The unknown fibers from the suspect's shirt[sic] could not have originated from the standard.
P24QK7	The blue fibers from the rug in Item 1 and the blue fibers in Item 3 were found to be alike in all measured characteristics. Therefore, the fibers in Item 3 and the fibers in Item 1 may have originated from the same source.
PFN7N6	Fibers recovered from the suspect's pants could have originated from the victim's bath rug, or another source comprised of fibers that exhibit the same physical, chemical, microscopic, and optical properties. Light blue nylon fibers from item 3 exhibit the same physical, chemical, microscopic, and optical properties as fibers found in item 1. Fibers recovered from the suspect's shirt did not originate from the victim's bath rug. Item 2 was identified as containing cotton fibers; cotton was not detected in samples from item 1.
PGJPP7	Examination of Exhibit 3 (suspect's pants) disclosed the presence of nylon fibers that are consistent with the fibers that compose Exhibit 1 (bath rug). Therefore, these fibers originated from Exhibit 1 or another source with the same characteristics. Techniques utilized in this examination include polarized light microscopy, comparison microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform infrared spectroscopy. Examination of Exhibit 2 (suspect's shirt) disclosed the presence of cotton fibers. Examination of Exhibit 2 did not disclose the presence of fibers that are consistent with the fibers that compose Exhibit 1. Techniques utilized in this examination include polarized light microscopy.
PVVCTA	The nylon fibers from item 3 were similar in all examined characteristics to the nylon fibers from item 1. Therefore, the fibers recovered from the suspect's pants could have originated from the bath rug from

TABLE 4

WebCode	Conclusions
	the victim's house or another rug or textile product with similar fiber manufacture. The fibers from item 2 were cotton. Therefore, the fibers recovered from the suspect's shirt could not originated from the bath rug as represented by the sample from item 3.
Q2387H	The fiber traces from the suspects pants (item 3) could have originated from the tuft from the victims bath rug.
QARTBF	On examination, I found: i) The questioned fibers from the suspect's pants (Item 3) to be similar with the known section of the victim's bath rug (Item 1). ii) The questioned fibers from the suspect's shirt (Item 2) to be dissimilar with the known section of the victim's bath rug (Item 1). Therefore, I am of the opinion that: i) The questioned fibers from the suspect's pants (Item 3) could have come from the victim's bath rug (Item 1). ii) The questioned fibers from the suspect's shirt (Item 2) did not come from the victim's bath rug (Item 1).
QELQZ7	The fibers in item 1 were different from item 2 and similar to item 3. Item 1 and 3 consisted of manufactured nylon fibers. Item 2 consisted of vegetable cotton fibers.
QGERU2	Item 1 contained light blue nylon fibers and colorless polyester fibers. Light blue cotton fibers found in Item 2 were different from the light blue nylon fibers found in Item 1. This means that the questioned fibers from the suspect’s shirt could not have come from the victim’s bath rug. Light blue nylon fibers found in Item 3 were identical to the light blue nylon fibers found in Item 1 in color, general fiber type, and microscopic characteristics. This means that the questioned fibers from the suspect’s pants could have come from the victim’s bath rug.
QHABV3	Item 1 (Known - victim's bath rug) is comprised of very light blue nylon fibers. Item 2 (Questioned - suspect's shirt) consists of very faint blue gray apparent cotton fibers. Item 3 (Questioned - suspect's pants) consists of very light blue nylon fibers. CONCLUSIONS: The fibers from item 1 (K-rug) and the fibers from item 2 (Q-shirt) were found to be visually and microscopically (PLM) dissimilar in appearance and color. The fibers from item 1 (K-rug) and the fibers from item 3 (Q-pants) were found to be similar in microscopic characteristics (PLM), apparent color (Comparison Microscopy), and chemical composition (FTIR).
QND44D	The questioned greyish blue fibers from the suspect's shirt (Item 2) are dissimilar in fiber type or color to the colorless and greyish blue fibers from the known section of the victim's bath rug (Item 1). It is my opinion that the questioned greyish blue fibers from the suspect's shirt did not originate from the known section of the victim's bath rug (Item 1). The questioned greyish blue fibers from the suspect's pants (Item 3) are similar in color, size, shape and fiber type to the greyish blue fibers from the known section of the victim's bath rug (Item 1). It is my opinion that these greyish blue questioned fibers from the suspect's pants (Item 3) could have originated from the known section of the victim's bath rug (Item 1) or any other source with similar characteristics.
R3XWE6	1. Exhibit 001 (known section of victim's bath rug) consists of a section of rug containing numerous yarns that are composed of light grey nylon fibers. Techniques utilized in this examination include stereomicroscopy, polarized light microscopy, and Fourier transform infrared spectroscopy. 2. Exhibit 002 (questioned fibers from the suspect's shirt) consists of a bundle of cotton fibers. The cotton fibers in Exhibit 002 are not consistent with the nylon fibers that compose Exhibit 001 and therefore could not have originated from Exhibit 001. Techniques utilized in this examination include stereomicroscopy, polarized light microscopy, and comparison microscopy. 3. Exhibit 003 (questioned fibers from the suspect's pants) consists of a bundle of nylon fibers. The nylon fibers in Exhibit 003 are consistent with the nylon fibers that compose Exhibit 001 and therefore could have originated from Exhibit 001 or another source with the same characteristics. Techniques utilized in this examination include stereomicroscopy, polarized light microscopy, comparison microscopy, microspectrophotometry, and Fourier transform infrared spectroscopy.
R7QAN8	Microscopic examination (Stereo Microscope & PLM) and instrumental analysis by FTIR of the known

TABLE 4

WebCode	Conclusions
	section of the victim's bath rug (Item #1) revealed it to be composed of light blue color Nylon fibers. Microscopic examination (Stereo Microscope & PLM) of the questioned fibers from the suspect's shirt (Item #2) revealed the presence of numerous light blue color Cotton fibers. These questioned cotton fibers are different from the known section of the victim's bath rug (Item #1) with respect to fiber type. This finding confirms these questioned fibers could not have originated from the known section of bath rug. Microscopic examination (Stereo Microscope & PLM) and instrumental analysis by FTIR of the questioned fibers from the suspect's pants (Item #3) revealed the presence of numerous light blue color Nylon fibers. Comparisons by Stereo Microscope, PLM, Comparison Microscope & FTIR of the questioned fibers from the suspect's pants (Item #3) to the known section of the victim's bath rug (Item #1) revealed them to be the same with respect to color, physical characteristics, optical characteristics and organic chemical composition. Based on these findings, these questioned fibers could have originated from the known section of bath rug, but not exclusively since other manufactured fibers in this class might be indistinguishable from the submitted evidence.
R84P9Z	The light steel-blue nylon fibers in Item 3 were identical to the light steel-blue nylon fibers in Item 1 in color and microscopic characteristics. This means the fibers found on the suspect's pants could have come from the victim's bath rug. The light blue cotton fibers in Item 2 were different from the fiber standard in Item 1. This means the fibers found on the suspect's shirt did not come from the victim's bath rug.
RFCB73	The fibres recovered from the pants (item 3) are indistinguishable in colour and microscopic appearance from the reference rug fibres taken from item 1. Selected fibres were tested further and found to be indistinguishable in chemical composition. The dye constituents from a bulk group of matching fibres in item 3 were found to be indistinguishable from a corresponding bulk group of reference fibres taken from item 1. In my opinion, the findings provide strong support for the assertion that the clump of fibres found on the pants (item 3) has originated from the bathmat (item 1).
RPJ9U7	Item 3 (questioned fibers from suspect's pants) were consistent to Item 1 (known fibers from victim's bath rug) in microscopic characteristics, fiber type (Nylon) and cross-sectional shape. Therefore, the fibers from the victim's bath rug could be the source of the fibers in item 3. Item 2 (questioned fibers from suspect's shirt) are not consistent to Item 1 (known fiber type) in microscopic characteristics or fiber type. Therefore, the bath rug could not be the source of the fibers in Item 2.
RQVVE7	The known section of the victim's bath rug in item 1 comprised pale blue nylon fibres which were used as control fibres for comparing against items 2 & 3. Questioned fibres from the suspect's pants in item 3, comprising pale blue nylon fibres, were found to agree in fibre type, colour, cross-sectional shape and microscopic appearance under various lighting conditions with the control pale blue nylon fibres from item 1. The findings indicated that the questioned fibres from the suspect's pants in item 3 could have originated from the victim's bath rug from which the known sample item 1 was collected. Questioned fibres from the suspect's shirt in item 2, comprising pale blue cotton fibres, differed in fibre type from the control pale blue nylon fibres from item 1, indicating that they did not originate from the same source.
RR7RV4	It was faund that Item 3 could have originated from Item 1, Item 2 culd not have originated from Item 1. [sic]
RRACJ8	The sample, CTS Forensic Fiber Analysis, consist of Item 1, a known section of the victim's rug. Item 2, questioned fibers recovered from the suspect's shirt; and Item 3, questioned fibers recovered from the suspect's pants. The fibers recovered from the suspect's pants (Item 3) could have originated from the victim's bath rug (Item 1).
RT8B98	The results of the examination extremely strongly support that the questioned fibers from the suspect´s shirt (Item 2) do not originate from the victim´s bath rug (Item 1) (Level -4). The results of the examination strongly support that the questioned fibers from the suspect´s pants (Item 3) originate from the victim´s bath rug (Item 1) (Level +3).

TABLE 4

WebCode	Conclusions
T37FNZ	Firstly fibers were analyzed with stereomicroscope. stereomicroscope was showed the cover of the fibers which thickness and shape. after this comparasion, fibers were analyzed with FTIR. all of the analyzed conclusion was showed us item1 and item3 fibers are identically. Item 2 fiber is differently. [sic]
T837UC	The fibers of Item-1 and Item-3 have the same caracteristics[sic]. Thus the fibres found on the suspect's pants (Item-3) come from the victim's bath rug (Item-1) or from another textile item of indisguishable[sic] fibers. The fibers of Item-2 were inconsistent with Item-1 and could not have the same source.
T8HCH3	Found fibers, Item #2 and Item #3, were examined and compared to known fibers from the victim's bath rug, Item #1. The found fibers from Item #3 exhibit the same microscopic and physical characteristics and the same chemical composition as fibers from Item #1. Items #1 and #3 consist of manufactured nylon fibers. Therefore, the fibers from Item #3 could have originated from the same source as Item #1. The found fibers, Item #2, exhibit different microscopic and physical characteristics and different chemical composition than fibers from Item #1. Item #2 consists of natural cotton fibers. Therefore, the fibers from Item #2 could not have originated from the same source as Item #1.
TG9WNZ	Examination of Item 1 (Known section of victim's bath rug) revealed the presence of a cutting from a bath rug composed of light blue nylon pile fibers. Examination of Item 3 (Questioned fibers from the suspect's pants) revealed the presence of a small clump of light blue nylon fibers. These fibers were found to be consistent with the light blue nylon pile fibers in Item 1. Therefore, the fibers in Item 3 could have originated from the same source as Item 1. Examination of Item 2 (Questioned fibers from the suspect's shirt) revealed the presence of a small clump of light blue cotton fibers. These fibers were not consistent with the fibers in Item 1. Therefore, the fibers in Item 2 could not have originated from the same source as Item 1.
TR4GD7	Item 2 cannot have originated from Item 1. Item 3 could have originated from Item 1.
TY8AW2	The light blue fibers reportedly collected from the suspect's pants (Item 3) and the light blue fibers comprising the victim's bath rug (Item 1) were identified as nylon trilobal carpet fibers. The fibers on the pants were visually and chemically similar to the fibers composing the bath rug and could have originated from the bath rug. The fibers on the victim's shirt (Item 2) appear to be cotton and could not have originated from the bath rug (Item 1).
U4HMEZ	CONCLUSIONS: Questioned fibers identified as from the suspect's pants (CTS Item 3) originated from the bath rug (CTS Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Questioned fibers identified as from the suspect's shirt (CTS Item 2) did not originate from the bath rug (CTS Item 1). RESULTS: The questioned fibers (CTS Items 2 and 3) were examined to determine whether or not there are any fibers present that are consistent with the rug (CTS Item 1). The rug (CTS Item 1) is primarily composed of light blue nylon fibers. The questioned fibers identified as from the suspect's shirt (CTS Item 2) are light blue cotton fibers. The questioned fibers identified as from the suspect's pants (CTS Item 3) are light blue nylon fibers. Examination and comparison of questioned fibers identified as from the suspect's pants (CTS Item 3) reveals the presence of numerous nylon fibers that are consistent in microscopic, optical, and chemical characteristics with the known fibers of the rug (CTS Item 1). It is therefore concluded the questioned fibers originated from the rug (CTS Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Examination and comparison of questioned fibers removed from the suspect's shirt (CTS Item 2) with known fibers of the rug (CTS Item 1) reveals they are inconsistent in microscopic and optical characteristics. It is therefore concluded the questioned fibers did not originate from the rug (CTS Item 1). METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, fluorescence microscopy, microspectrophotometry, and Fourier transform infrared microspectroscopy.

TABLE 4

WebCode	Conclusions
U7EHM2	The fibers from the suspect's pants, Item 3, could have originated from Item 1, victim's bath rug. The fibers from the suspect's shirt, Item 2, could not have originated from Item 1.
U8GXAZ	CONCLUSIONS: Questioned fibers identified as from the suspect's pants (Item 3) originated from the rug (Item 1) or another source of textile material possessing fibers with the same distinct microscopic, optical, and chemical characteristics. Questioned fibers identified as from the suspect's shirt (Item 2) did not originate from the rug (Item 1). RESULTS: Questioned fibers identified as from the suspect's shirt and pants (Items 2 and 3) were examined to determine whether or not there are any fibers present that are consistent with known fibers of the rug (Item 1). The rug (Item 1) is composed of tufted light blue nylon fibers, a layer of colorless polyester fibers, an olefin primary backing and a non-fibrous secondary backing. Examination of questioned fibers identified as removed from the suspect's shirt (Item 2) reveals the presence of numerous cotton fibers. Further examination and comparison of these fibers with known fibers of the rug (Item 1) reveals they are inconsistent in microscopic characteristics. It is therefore concluded the questioned fibers did not originate from the rug. Examination and comparison of questioned fibers identified as removed from the suspect's pants (Item 3) reveals the presence of numerous light blue nylon fibers that are consistent in microscopic, optical, and chemical characteristics with the known fibers of the rug (Item 1). It is therefore concluded the questioned fibers originated from the rug 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.
UG3FD8	Numerous light blue Nylon fibers were recovered from Item 3. These fibers exhibit the same microscopic characteristics and optical properties as the 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. No other fibers were recovered from Item 3. Textile fibers were recovered from Item 2. These fibers are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the same source as Item 1. These fibers have been preserved for future comparison purposes. No hairs were recovered from Items 2 and 3. The specimens were examined visually using stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence light microscopy, microspectrophotometry and fourier transform infrared spectroscopy.
UGMRH8	The light blue fiber standards found in item 1 consisted of synthetic fibers composed of Nylon. The light blue fibers found in item 2 consisted of natural fibers composed of cotton. These fibers exhibit different microscopic appearance and characteristics from item 1. Therefore, these fibers could not have originated from the victim's bath rug. The light blue fibers found in item 3 consisted of synthetic fibers composed of nylon. These fibers exhibit similar microscopic appearance and characteristics as item 1. Therefore, these fibers could have originated from the victim's bath rug.
UGXYF9	Item-1 and Item-3 are composed of blue-silver nylon fibers. Item-2 consists of white/silver fibers composed of cotton. Item-2 does not share a common origin with Item 1. Analysis indicates that Item-1 and Item-3 shared all the class characters observed, therefore Item-3 cannot be excluded from sharing a common provenance with Item-1.
VC2MY3	The light blue nylon fibers analyzed in Item 3 exhibit the same microscopic characteristics as the known light blue nylon fibers in Item 1. Therefore, the questioned light blue nylon fibers in Item 3 could have originated from the same source as the known light blue fibers in Item 1. Item 2 does not exhibit the same microscopic characteristics as the known light blue nylon fibers in Item 1. Item 2 is cotton fibers.
W87Z29	Item 1 was found to consist of microscopically colourless nylon and polyester fibres. Microscopically colourless nylon fibres sampled from Item 3 were found to be similar to the microscopically colourless nylon fibres in Item 1. This suggests that Item 3 could have originated from Item 1, or from other sources containing fibres with similar characteristics. Microscopically colourless cotton fibres sampled from Item 2 were found to be different from the fibres constituting Item 1.

TABLE 4

WebCode	Conclusions
WBPAU7	The light blue nylon fibers recovered from the suspect's pants (Item 3) are similar in optical properties, fiber type, color, size, and shape to known nylon fibers from the victim's bath rug (Item 1). It is my opinion that the fibers recovered from the suspect's pants (Item 3) could have originated from the victim's bath rug (Item 1) or any other source with similar fibers. The light blue cotton fibers recovered from the suspect's shirt (Item 2) are dissimilar in fiber type to the known nylon fibers from the victim's bath rug (Item 1). It is my opinion the recovered cotton fibers from the suspect' shirt (Item 2) did not originate from the victim's bath rug (Item 1).
WDUT4Z	1. Examination of Exhibit 001 (known section of the victim's bath rug) disclosed the presence of blue-gray nylon fibers. Techniques utilized in this examination include stereomicroscopy, polarized light microscopy, and Fourier-transform infrared spectroscopy-attenuated total reflectance. 2. Examination of Exhibit 002 (questioned fibers from the subject's shirt) disclosed the presence of blue-gray cotton fibers. The fibers of Exhibit 002 were excluded as originating from Exhibit 001. Techniques utilized in this examination include stereomicroscopy and polarized light microscopy. 3. Examination of Exhibit 003 (questioned fibers from the subject's pants) disclosed the presence of blue-gray nylon fibers that are consistent with the fibers that compose Exhibit 001. Therefore, these fibers originated from Exhibit 001 or another source with the same characteristics. Techniques utilized in this examination include stereomicroscopy, polarized light microscopy, comparison microscopy, microspectrophotometry, and Fourier-transform infrared spectroscopy.
WL4CAC	Item 2 could not have originated from the source represented by Item 1. Item 3 could have originated from Item 1 as represented by the known submitted exemplar or from another source exhibiting all of the same analyzed/measured characteristics. 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 materials composed of fibers which exhibit the same optical and chemical properties.
WP6DCU	The fibers recovered from the suspect's pants are consistent with the fibers used in the victim's bathroom rug.
WXZFE7	The cotton fibers labeled “questioned fibers from the suspect’s shirt,” (item 2), display differences in physical characteristics and chemical composition as compared to the nylon fibers labeled “known section of the victim’s bath rug,” (item 1). Elimination. The nylon fibers labeled “questioned fibers from the suspect’s pants,” (item 3), are consistent in physical characteristics and chemical composition as compared to the nylon fibers labeled “known section of the victim’s bath rug,” (item 1). Level III association.
X4QXKU	Light bluish-gray nylon fibers and colorless/white polyester fibers were found in Item 1. Item 3 contained light bluish-gray nylon fibers which were identical to the light bluish-gray nylon fibers in Item 1 in color, general fiber type, and microscopic characteristics. This means that the questioned fibers from the suspect’s pants could have come from the victim’s bath rug. Item 2 contained light bluish-gray cotton fibers which were different from the fibers in Item 1. This means that the questioned fibers from the suspect’s shirt did not come from the victim’s bath rug.
X6XDRZ	Item 3 consisted of a clump of light blue nylon fibres, which were indistinguishable in microscopic appearance, composition and colour from the fibres comprising the tufts of the complainant's bath rug (Item 1). There were numerous light blue nylon fibres collected from the suspect's pants (Item 3), which either originated from the complainant's bath rug (Item 1) or originated from another item with indistinguishable fibres.
XCFV23	The known fibers (Item 1) identified as having come from the victim's bath rug were compared to the questioned fibers reportedly recovered from the suspect's shirt (Item 2) and the suspect's pants (Item 3). The questioned fibers from the suspect's pants and the known fibers from the victim's bath rug were similar in all tests performed (polarized light microscopy, fluorescence microscopy, cross-section, and microspectrophotometry). Additionally, infrared spectroscopy showed both the questioned and known

TABLE 4

WebCode	Conclusions
	fibers to be similar in chemical composition (nylon). The victim's bath rug is a possible source of the questioned fibers from the suspect's pants (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. The questioned fibers from the suspect's shirt differed in microscopical properties and fiber type from the victim's bath rug. The victim's bath rug is eliminated as a possible source of the questioned fibers (Elimination).
XH3M7A	Based on comparison to item #1, item #2 could not have originated from the source represented by item #1. The questioned sample (item #3) could have originated from item #1 as represented by the known exemplar or from another source exhibiting all the same analyzed characteristics.
XP6HGV	Examination of Item #1 (Known section of victim's bath rug) revealed the presence of a small piece of light blue nylon tufted carpet. Examination of Item #2 (Questioned fibers from the suspect's shirt) revealed the presence of light blue cotton fibers. The cotton fibers in Item #2 were not consistent with any fibers comprising Item #1. Therefore, the fibers in Item #2 could not have originated from the carpet in Item #1. Examination of Item #3 (Questioned fibers from the suspect's pants) revealed the presence of light blue nylon fibers. The nylon fibers in Item #3 were consistent with the light blue carpet tuft fibers in Item #1. Therefore, the fibers in Item #3 could have originated from the carpet in Item #1.
Y3NGWW	The fibres from item 3 are comparable to the fibres from item 1 regarding the morphology, chemical class characteristics and generic class and therefore item 3 could have originated from item 1. Fibres from item 2 and fibres from item 1 are not comparable.
Y4ZD3Z	Microscopic and instrumental (FTIR) examination and comparison of the light blue rug fibers in Item #1 to the questioned fibers in Items #2 and #3 were conducted. The questioned fibers in Item #3 were found to be the same as the known fibers in Item #1 with respect to color, physical characteristics, microscopic characteristics, and organic chemical composition. Both of these fibers are made from nylon. Based on these findings, the questioned fibers in Item #3 could have come from the rug in Item #1, but not exclusively, since other fibers may be indistinguishable from the submitted evidence. The questioned fibers in Item #2 were found to be cotton, which is a distinctly different composition than the known nylon fibers in Item #1. Based on these findings, the fibers from Item #1 and Item #2 do not share a common source.
YA9QAY	The two types of synthetic fiber from the suspect's pants (Item 3) are similar in color, diameter, cross-section, and optical properties to one type of the synthetic fibers and to the plastic weave from the victim's bath rug (Item 1) and could share a common source. The fibers from the suspect's shirt (Item 2) are dissimilar in composition to the fibers from the victim's bath rug (Item 1).
YN4Y38	Items 1, 2, and 3 were examined macroscopically, microscopically, and instrumentally. Item 1 was found to be a piece of carpeting consisting of light blue nylon fibers. Item 2 consisted of several fibers that were found to be light blue cotton fibers. Item 3 consisted of several fibers that were found to be light blue nylon fibers. Comparison of the Item 1 carpet fibers to the Item 2 fibers shows that the Item 2 fibers are not similar to the Item 1 carpet fibers. The Item 2 fibers could not have originated from the Item 1 carpet. Comparison of the Item 1 carpet fibers to the Item 3 fibers shows that the Item 3 fibers are similar to the Item 1 carpet fibers. The Item 3 fibers could have originated from the Item 1 carpet. 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.
YXUK96	The questioned fibres recovered from the pants could come from the victim's bath rug because Item 1 (victim's bath rug) and Item 3 (fibres recovered from the suspect's pants) have the same morphological characteristics, the same chemical composition and the same colour. Item 2 doesn't match item 1 because they have different morphological characteristics and different chemical composition.
Z2NWM2	The light blue nylon textile fibers comprising Item 1 demonstrate the same physical characteristics and

TABLE 4

WebCode	Conclusions
	chemical properties as those light blue nylon textile fibers in Item 3. Accordingly, Item 1 (or another source with the same physical characteristics and chemical properties) cannot be excluded as the source of the light blue nylon textile fibers in Item 3. No textile fibers like those comprising Item 1 were noted in Item 2. Accordingly, Item 1 is excluded as the source of the light blue cotton textile fibers in Item 2.
Z9BRKY	The sample, three individually packaged textile specimens was received within a brown envelope labeled 'item 1 to 3' respectively. Item 1 is 100% by weight nylon. Item 2 is 100% by weight cotton. Item 3 is 100% by weight nylon. Item 3 could have originated from the victim's (Item 1) bath rug since they are both of nylon fiber. [Agency] methods: 50-01R4 (AATCC 20), 50-10R3 (ASTM E1252)
ZEC4FW	The source of item 1 is included as a possible source of item 3, based on class characteristics. The source of item 1 is excluded as a possible source of item 2, based on class characteristics.
ZEXMBV	1. Examination of Exhibit 1 (known section of the victim's bath rug) disclosed the presence of light blue nylon fibers. Examination of Exhibit 2 (questioned fibers from the suspect's shirt) disclosed the presence of light blue cotton fibers. Examination of Exhibit 3 (questioned fibers from the suspect's pants) disclosed the presence of light blue nylon fibers. 2. Examination of Exhibit 3 disclosed the presence of light blue nylon fibers that are consistent with the fibers that compose Exhibit 1. Therefore, these fibers originated from Exhibit 1 or another source with the same characteristics. 3. Techniques utilized in these examinations include stereomicroscopy, polarized light microscopy, comparison microscopy, fluorescence microscopy, microspectrophotometry, Fourier-transform infrared spectroscopy, and thermal analysis.
ZU4XQ2	Light blue nylon fibers and white polyester fibers recovered from Item 3 exhibit the same microscopic characteristics and optical properties as the fibers comprising Item 1. Accordingly, these fibers are consistent with originating from the source of Item 1, or another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. The fibers in Item 2 are microscopically dissimilar to the fibers comprising Item 1. Accordingly, these fibers are not consistent with originating from the source of Item 1.

Additional Comments

TABLE 5

WebCode	Additional Comments
22MJFY	Dark blue cotton fibers were found in items 1 and 2.
2CNWLR	Comparison Terminology Definitions: Physical Match: Associated items physically fit and/or align one another by way of corresponding surface characteristics. The associated items were once joined together to form a single item. Indistinguishable: The questioned sample is the same distinct type of material as the known standard based upon observed and measured physical properties and/or chemical composition. In other words, one could not discern a questioned sample if it were to be mixed with an indistinguishable known standard. Similar: The questioned sample is the same distinct type of material as the known standard based upon a limited analysis. Alternatively, one or more variations existed between the questioned sample and the known standard due to factors such as sample heterogeneity, contamination of the sample(s), or having a sample of insufficient size to adequately assess homogeneity of the entity from which it was derived. Dissimilar: Differences in observed and/or measured characteristics were detected. Inconclusive: No conclusion could be reached regarding an association/elimination. Elimination: The items were dissimilar in observed and/or measured characteristics, indicating that they did not originate from the same source. Association Level Definitions: Level I Association: A physical match; items physically fit and/or align one another by way of corresponding surface characteristics. The associated items were once joined together to form a single item. Level II Association: Items correspond in all observed and measured physical properties and/or chemical composition and share atypical characteristic(s) that would not be expected to be readily available in the population of this evidence type. Level III Association: Items correspond in all observed and measured physical properties and/or chemical composition and, therefore, could have originated from the same source. Other items have been manufactured and/or are naturally occurring that would also correspond to the submitted evidence. Level IV Association: Items correspond in all observed and measured physical properties and/or chemical composition and, therefore, could have originated from the same source. The items share typical characteristics expected to be readily available in the population of this evidence type. Alternatively, an association between items could be categorized as a Level IV Association if a limited analysis is performed. The extent of limited analysis varies. Methodology: A stereomicroscope is utilized in the general examination of evidence. A polarized light microscope is utilized to examine the optical properties of trace evidence materials. A comparison microscope with transmitted light and polarized light capabilities is used to compare the physical and optical characteristics of trace evidence materials side-by-side in the same optical field up to 400 times magnification. A CRAIC Technologies QDI 2010 microspectrophotometer (MSP) is utilized to measure the relative intensities of visible and UV light that is transmitted, reflected, or fluoresced by a sample. A Perkin Elmer Spectrum 100 infrared spectrometer (FTIR) with Spotlight 200 microscope accessory is utilized to analyze the chemical characteristics of materials. Images were captured with a Diagnostics Instruments, Inc. SPOT Insight digital camera. Images are stored within the laboratory.
2DV7NW	The small amount of sample received at the item 3 does not allow clearly see the color of the fibers.
2Q3CEP	Item 1: The reference fibers from the victim's bath rug were examined by stereo-microscope, polarized light microscope, comparison microscope and fourier transform infra-red spectroscopy. Item 2: The questioned fibers from the suspect's shirt were examined by stereo-microscope, polarized light microscope, comparison microscope and fourier transform infra-red spectroscopy. Item 3: The questioned fibers from the suspect's pants were examined by stereo-microscope, polarized light microscope, comparison microscope and fourier transform infra-red spectroscopy.
367NXV	In relation to the fibres in Item 2: On removing the waxed paper bag from the small, white envelope and unfolding it (folded in half, top to bottom, then in half again, side to side), the bag appeared to be empty. A tuft of fibres were observed loosely adhering to the serrated edge of the bag opening (that is, to the exterior of the bag). Before the fibre tuft could be secured using forceps, the fibres dislodged and could not be found on the work station/examination bench (close visual examination followed by adhesive taping of the work station surface. The fibre tuft (Item 2) appeared to be lighter or paler than the fibre tuft in Item 3. Note that this observation was made briefly before the fibre tuft in Item 2 was

TABLE 5

WebCode	Additional Comments
	lost and was not made directly against the fibre tuft in Item 3: that is, it was my impression at the time.
43QXWP	The microspectrophotometry technique was not carried out in this case because the microscopic color of the fibers of the three (03) items is transparent (clear).
6A6472	Due to the fact that textile materials are mass produced, it is not possible to state that the questioned fibers in this case 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.
6URRGT	No colour tests (such as TLC, MSP) were available to ensure the colour characteristic. No comparison microscope available either. Therefore, the colours of Item 1 and 3 were based purely on observation.
6ZU2LZ	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.
7BFMAV	It would be helpful if electronic data sheets were available, regardless of the the[sic] ability to submit electronically.
7NZ3DV	Testing is limited to visual examinations with an alternate light source, microscopes, and FTIR. No validated test methods are currently in use at this laboratory for dyes/ colorants.
ANPBCN	It is assumed that sample Item 1 is representative of the bath rug.
BA2RRJ	No colour analysis was performed because this laboratory does not have a microspectrophometer[sic].
CWT9UP	A melting temperature for samples Items 1 and 2 would be useful to further characterize the materials.
DNWTHP	WE COULD NOT USE THE GC-FID BECAUSE THE EQUIPMENT IS NOT WORKING PROPERLY.
EMFWPQ	Nylon fibers found in Item 1 and Item 3 are made of polyamide 6.6.
EW7GVN	I would recommend packaging the lightly colored loose fibers differently.
EYFFGJ	One lobe of trilobal fibre observed to be have different physical characteristics to remaining lobes. Due to fine diameter of fibres, physically separating these lobes was attempted however could not be successfully performed. Whole fibres were therefore analysed on FTIR and Raman.
H263BG	Item 1 has two types of fibers. Pile yarn: Manufactured, Nylon Backing Fabric: Manufactured, Polyolefin. Item 1: It is a tufted construction, where pile yarn passes under the backing fabric, and they both are held in place by bonding layer in back.
HU8JYD	Items 1 and 3 are Nylon 66
JU63CE	Much of the strength of fibres evidence is provided by the colour of the fibres. If the fibres being compared are very pale or colourless then there is less information on which to base a comparison. The evidential strength will therefore tend to be weaker for pale fibres than for strongly dyed fibres of the same type.
KP6D9D	The cross- section of the examined fibres in item 1 an[sic] 3 is trilobal .
L42PGG	Methods: Microscopic examination of fibers is accomplished by using one or more analytical techniques including stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier transform-infrared spectroscopy. The microscopic characteristics and optical properties determined by these techniques are used for the examination and comparison of fibers. Interpretation: Fibers can differ as to type (e.g., rayon, cotton), color, shape, size, microscopic features (e.g., delustrant, voids) and optical properties (e.g., refractive index, sign of elongation). These are characteristics that may

TABLE 5

WebCode	Additional Comments
	associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods. The characteristics and optical properties of the fiber(s) are used as comparison criteria. When the characteristics and optical properties of a recovered fiber(s) are the same as a known sample, the recovered fibers are consistent with originating from the source of the known sample, or from another item comprised of fibers that exhibit the same microscopic characteristics and optical properties. A fiber association is not a means of positive identification and the number of possible sources for a specific fiber is unknown. However, due to the variability in manufacturing, dyeing, and consumer use, one would not expect to encounter a fiber selected at random to be consistent with a particular item. The inability to associate persons/items through a microscopic hair/fiber examination does not necessarily mean the persons/items of interest had no contact. A number of factors can produce this result, including: 1) Hair/fiber evidence may not have transferred. 2) Hairs/fibers that did transfer may have been lost prior to submission to the laboratory. 3) The hairs/fibers transferred or the known sample submitted may not be representative of the source. 4) The hairs/fibers may be from a different source.
LKBPFC	Some fibers were found in the backing of Item #1. These fibers were analyzed and identified as polyester. Since it is uncertain as to whether these polyester fibers were meant to be included as part of the Known sample, polyester was not identified as being part of Item #1.
MUV8HJ	Our Standard Operating Procedures include analysis by microspectrophotometry but due to the light color of the fibers and the spectra presenting above 80% Transmission, no conclusions can be drawn from MSP Analysis (SWGMAT)
NAGAED	very few fibers were provided in the packet, made it difficult for recovery but more closely represents real world.
NPF627	We would inclue[sic] the following Interpretation portion within the body of the report: Interpretation: The following descriptions are meant to provide context to the opinions reached in this report. Every type of conclusion may not be applicable in every case or for every material type. Type 1 Association: Identification An association in which items share individual characteristics and/or physically fit together that demonstrate the items were once from the same source. Type 2 Association: Highly likely An association in which items correspond in all measured physical properties, chemical composition and/or microscopic characteristics and share distinctive characteristic(s) that would not be expected to be found in the population of this evidence type. The distinctive characteristics were not sufficient for a Type 1 Association. Type 3 Association: Could have An association in which items correspond in all measured physical properties, chemical composition and/or microscopic characteristics and could have originated from the same source. Because it is possible for another sample to be indistinguishable from the submitted evidence, an individual source cannot be determined. Type 4 Association: Cannot eliminate An association in which items correspond in some but possibly not all measured physical properties, chemical composition and/or microscopic characteristics and cannot be eliminated as coming from the same source. This type of evidence may be commonly encountered in the environment, may have limited comparative value and/or there may be factor(s) limiting the comparison. Inconclusive: No conclusion could be reached regarding an association between the items. Elimination: Items exhibit dissimilarities in one or more of the following: physical properties, chemical composition or microscopic characteristics and, therefore, conclusively did not originate from the same source. Non-Association: Items exhibit dissimilarities but certain details or features are not sufficient for an Elimination.
Q2387H	We did not analyze the base fabric from the bath rug (item 1).
R84P9Z	The wide, flat fibers comprising the woven base of the rug in Item 1 were not analyzed for composition.
RPJ9U7	FTIR needed to be serviced-extension given of 1 wk. Also, Item 2 contained one pink colored manufactured fiber. This is believed to be a contaminant.
XCFV23	An Association Scale would be attached to the report.

TABLE 5

WebCode	Additional Comments
XP6HGV	Fibers from the carpet tuft in Item #1 were compared to the fibers in Items #2 and #3. No further analysis was performed on the carpet backing.
ZU4XQ2	Item 1 carpet is comprised of two fiber types. The pile is comprised of light blue nylon. The carpet backing was partially comprised of loosely held white polyester fibers. Numerous light blue nylon fibers and several white polyester fibers were recovered from Item 3.

Appendix: Data Sheet

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Collaborative Testing Services ~ Forensic Testing Program

Test No. 16-539: Fibers Analysis

DATA MUST BE RECEIVED BY ***March 14, 2016*** TO BE INCLUDED IN THE REPORT

Participant Code: WebCode:

Accreditation Release Statement

CTS submits external proficiency test data directly to ASCLD/LAB and ANAB. 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 ANAB.
(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 ANAB.

Scenario:

Police are investigating the murder of a man in his home. The victim's body was found on the bathroom floor next to a bath rug, where there were signs of a struggle. An eye witness description from a neighbor led police to his ex-wife. That evening police were able to search the woman's home and collect the clothes she was wearing. Fibers were recovered from the suspect's shirt and pants. Police are requesting you to examine the fibers, report their identification(s), and determine if the fibers found on the suspect's shirt and/or pants could have come from the bath rug in the victim's home.

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

Items Submitted (Sample Pack FIBR):

Item 1: Known section of the victim's bath rug

Item 2: Questioned fibers from the suspect's shirt

Item 3: Questioned fibers from the suspect's pants

Please return all pages of this data sheet.

Participant Code:
WebCode:

1.) Could the questioned fibers from the suspect's shirt (Item 2) and/or pants (Item 3) have originated from the victim's bath rug (Item 1)?

Item 2:	Yes ☐	No ☐	Inconclusive ☐
Item 3:	Yes ☐	No ☐	Inconclusive ☐

2.) Fiber Type Determination.

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

Item 1 _____

Item 2 _____

Item 3 _____

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

Microscopic Exams:

☐ Stereomicroscope ☐ Comparison

☐ Polarized Light ☐ Fluorescence

☐ Macroscopic Exam ☐ IR/FTIR ☐ Microspectrophotometry

☐ Solubility Tests ☐ Cross-Section ☐ Melting Point

☐ Other (specify): _____

Please return all pages of this data sheet.

Participant Code:
WebCode:

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

5.) Additional Comments

Return Instructions: Data must be received via online data entry, fax (please include a cover sheet), or mail by ***March 14, 2016*** to be included in the report. Emailed data sheets are not accepted.

QUESTIONS?
TEL: +1-571-434-1925 (8 am - 4:30 pm EST)
EMAIL: forensics@cts-interlab.com
www.ctsforensics.com

Participant Code:

ONLINE DATA ENTRY: www.cts-portal.com

FAX: +1-571-434-1937

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

Please return all pages of this data sheet.

Collaborative Testing Services ~ Forensic Testing Program

RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code: WebCode:

for Test No. **16-539: Fibers Analysis**

This release page must be completed and received by ***March 14, 2016*** 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) _____

ANAB RELEASE

If your laboratory maintains its accreditation through ANAB, please complete the following form in its entirety to have your results forwarded.

ANAB Certificate No. _____

Signature and Title _____ Date _____

Laboratory Name _____

Location (City/State) _____

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Appendix: Manufactured Fibers - Names & Definitions

Federal Trade Commision

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: 2010(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(c).

(w) **Melamine**

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

(x) **Fluoropolymer**

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