



## **Adhesive Tape Analysis**

### **Test No. 22-5471 Summary Report**

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Each sample set consisted of three pairs of known and questioned tape samples for comparison. Participants were requested to compare the items within each set and report their findings. Data were returned from 41 participants and are compiled into the following tables:

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

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

## Manufacturer's Information

Each sample pack consisted of three pairs of known and questioned adhesive tape samples for comparison (K1/Q1, K2/Q2, K3/Q3). Items K1 and Q1 were produced from the same roll of 3M Temflex™ general vinyl black tape. Items K2 and Q2 were produced from the same roll of 3M Scotch™ beige contractor masking tape. Items K3 and Q3 were produced from two different rolls of clear colored packing tape of differing brands; 3M Scotch™ and HDX™. For each item set, participants were requested to examine the adhesive tape samples and determine if both pieces were associated with a single source. Additionally, participants were asked to determine if a physical end match existed between the known item and the questioned item.

### SAMPLE PREPARATION:

Each roll of tape was inspected and any debris removed.

Items K1 and Q1 (3M Temflex™ general vinyl black tape) were produced by cutting each item with scissors from one roll. The items were produced in a manner to eliminate the possibility of a physical end match.

Items K2 and Q2 (3M Scotch™ beige contractor masking tape) were produced by hand-tearing each item from one roll. The paired items were produced in immediate succession to produce an end match.

Items K3 (3M Scotch™ clear packing tape) and Q3 (HDX™ clear packing tape) were produced from two different rolls with the use of a cutting blade from a packaging tape dispenser.

All questioned items were affixed to silicone release paper, and then packed in their respective pre-labeled questioned item envelopes. Each known item was affixed to silicone release paper and then packed in their respective pre-labeled known item envelopes.

### SAMPLE SET ASSEMBLY:

Following the completion of sample production, associated and non-associated items were placed within a pre-labeled sample set envelope and sealed with invisible tape until all sample sets were prepared. Once verification was completed, all sample sets were further sealed with evidence tape and initialed "CTS".

### VERIFICATION:

The expected association and elimination results were confirmed by all predistribution laboratories.

<u>Item</u>	<u>Color</u>	<u>Tape Type</u>	<u>Association</u>	<u>Physical End Match</u>
K1 & Q1	black	3M Temflex™ general vinyl tape	yes	no
K2 & Q2	beige	3M Scotch™ contractor masking tape	yes	yes
K3 & Q3	clear	3M Scotch™ & HDX™ packing tape	no	no

## Summary Comments

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This test was designed to allow participants to assess their proficiency in the examination and comparison of adhesive tape samples. Participants received three pairs of adhesive tape samples, each containing one known sample and one questioned item (K1/Q1, K2/Q2, K3/Q3). Using their laboratory procedures, participants were asked to determine, within each pair, if the questioned item could have originated from the known sample and if a physical end match existed between the two items (Refer to Manufacturer's Information for preparation details).

Items K1 and Q1: There were 38 responding participants (92.7%) that reported an association between the questioned tape sample (Q1) and the known tape sample (K1). Of the remaining three participants, two reported no association, and the other was inconclusive. With regard to a physical end match, 34 participants performed a comparison and of those, 23 participants (67.6%) reported that Item Q1 did not exhibit a physical end match to Item K1, and ten participants reported "inconclusive." A consensus was not achieved concerning the physical end match question, therefore participants that reported "inconclusive" are not highlighted as inconsistent. Two participants mentioned the limited characteristics of the end of the tape.

Items K2 and Q2: All 40 responding participants reported an association between the questioned tape sample (Q2) and the known tape sample (K2). With regard to a physical end match, all 38 participants that performed this examination reported that Item Q2 exhibited a physical end match to Item K2.

Items K3 and Q3: All 40 responding participants reported no association between the questioned tape sample (Q3) and the known tape sample (K3). For the physical end match comparison, 24 participants performed this examination and of those, 23 reported that Item Q3 and K3 did not exhibit a physical end match, and one participant reported "inconclusive."

For examination methods, the most commonly reported methods included Stereo Microscopy, Macroscopic Examinations, and FTIR.

## Examination Results

*For each set of items, is the questioned tape material associated with the submitted known sample and is there a physical end match between the known sample and questioned item?*

<b>TABLE 1 - K1 and Q1</b>							
<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
29RPJP	Yes	Yes	No	CRNW7C	Yes	Yes	No
2FT2EM	No	No		DJNUEK	No	Yes	No
34TRAP	Yes	Yes	No	DLZA9L	Yes	Yes	
3ZRPJN	Yes	Yes	Inc	E3KJBE	Yes	Yes	No
4MNMJR	Yes	Yes	Inc	E6P8NH	Yes	No	
63CFJJ	Yes	Yes	Inc	E7JV7D	Yes	Yes	No
69Y64T	Yes	Yes	No	EEEZZE	Yes	Yes	Inc
6HPQAQ	Yes	Yes	No	GUGGYC	Yes	Yes	No
79U89N	Yes	Yes	No	HFF64D	Yes	No	
8D4NFQ	Yes	N/A		HV6AB8	Yes	Yes	No
8KPGRQ	Yes	Yes	Inc	JTWE6A	Yes	Yes	Inc
8LJ6AL	Yes	Yes	No	KGIV49	Yes	Yes	Inc
8UDCTR	Yes	Yes	Inc	KTCXP7	Yes	Yes	No
8YJ7MM	Inc	Yes	Inc	LTRGA4	Yes	Yes	Inc
9LDA4K	Yes	Yes	No	MACPJ8	Yes	No	
9RK3XG	Yes	Yes	No	MFD469	Yes	Yes	No
AVX3TM	Yes	Yes	No	N828Z2	Yes	Yes	No

<b>TABLE 1 - K1 and Q1</b>							
<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
PBUNPZ	Yes	Yes	No				
RXKRJ4	Yes	Yes	No				
T6L4FZ	Yes	Yes	No				
TFHCY4	Yes	Yes	No				
U3NFCV	Yes	Yes	No				
VPGN83	Yes	No					
XU682W	Yes	No					

<b>K1 &amp; Q1 - Summary Response</b>		<b>Participants: 41</b>	
<u>Association</u>	<u>Physical End Match Comparison</u>		
	<u>Performed</u>	<u>End Match ID</u>	
<b>Yes 38 (92.7%)</b>	<b>Yes 34 (82.9%)</b>	<b>Yes 0 (0.0%)</b>	
<b>No 2 (4.9%)</b>	<b>No 6 (14.6%)</b>	<b>No 23 (67.6%)</b>	
<b>Inc 1 (2.4%)</b>	<b>N/A 1 (2.4%)</b>	<b>Inc 10 (29.4%)</b>	
<b>No Response 0 (0.0%)</b>	<b>No Response 0 (0.0%)</b>		

**TABLE 1 - K2 and Q2**

<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
29RPJP	Yes	Yes	Yes	DLZA9L	Yes	Yes	Yes
2FT2EM	Yes	Yes	Yes	E3KJBE	Yes	Yes	Yes
34TRAP	Yes	Yes	Yes	E6P8NH	Yes	No	
3ZRPJN	Yes	Yes	Yes	E7JV7D	Yes	Yes	Yes
4MNMJR	Yes	Yes	Yes	EEZZE	Yes	Yes	Yes
63CFJJ	Yes	Yes	Yes	GUGGYC	Yes	Yes	Yes
69Y64T	Yes	Yes	Yes	HFF64D	Yes	Yes	Yes
6HPQAQ	Yes	Yes	Yes	HV6AB8	Yes	Yes	Yes
79U89N	Yes	Yes	Yes	JTWE6A	Yes	Yes	Yes
8D4NFQ	Yes	Yes	Yes	KGYV49	Yes	Yes	Yes
8KPGRQ	Yes	Yes	Yes	KTCXP7	Yes	Yes	Yes
8LJ6AL	Yes	Yes	Yes	LTRGA4	Yes	Yes	Yes
8UDCTR	Yes	Yes	Yes	MACPJ8	Yes	Yes	Yes
8YJ7MM	Yes	Yes	Yes	MFD469	Yes	Yes	Yes
9LDA4K	Yes	Yes	Yes	N828Z2	Yes	Yes	Yes
9RK3XG	Yes	Yes	Yes	PBUNPZ	Yes	Yes	Yes
AVX3TM	Yes	Yes	Yes	RXKRJ4	Yes	Yes	Yes
CRNW7C	[No results submit for this item.]			T6L4FZ	Yes	Yes	Yes
DJNUEK	Yes	Yes	Yes	TFHCY4	Yes	Yes	Yes

<b>TABLE 1 - K2 and Q2</b>							
<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
U3NFCV	Yes	Yes	Yes				
VPGN83	Yes	Yes	Yes				
XU682W	Yes	No					

<b>K2 &amp; Q2 - Summary Response</b>			<b>Participants: 41</b>		
<u>Association</u>	<u>Physical End Match Comparison</u>				
	<u>Performed</u>	<u>End Match ID</u>			
Yes 40 (97.6%)	Yes 38 (92.7%)	Yes 38 (100.0%)			
No 0 (0.0%)	No 2 (4.9%)	No 0 (0.0%)			
Inc 0 (0.0%)	N/A 0 (0.0%)	Inc 0 (0.0%)			
No Response 1 (2.4%)	No Response 1 (2.4%)				

**TABLE 1 - K3 and Q3**

<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
29RPJP	No	Yes	No	DLZA9L	No	Yes	No
2FT2EM	No	Yes	No	E3KJBE	No	No	
34TRAP	No	No		E6P8NH	No	No	
3ZRPJN	No	Yes	Inc	E7JV7D	No	Yes	No
4MNMJR	No	Yes	No	EEEZZE	No	No	
63CFJJ	No	Yes	No	GUGGYC	No	No	
69Y64T	No	No		HFF64D	No	N/A	
6HPQAQ	No	Yes	No	HV6AB8	No	Yes	No
79U89N	No	Yes	No	JTWE6A	No	No	
8D4NFQ	No	Yes	No	KGYV49	No	Yes	No
8KPGRQ	No	No		KTCXP7	No	No	
8LJ6AL	No	Yes	No	LTRGA4	No	No	
8UDCTR	No	No		MACPJ8	No	Yes	No
8YJ7MM	No	Yes	No	MFD469	No	Yes	No
9LDA4K	No	Yes	No	N828Z2	No	No	
9RK3XG	No	Yes	No	PBUNPZ	No	Yes	No
AVX3TM	No	Yes	No	RXKRJ4	No	Yes	No
CRNW7C	[No results submit for this item.]			T6L4FZ	No	Yes	No
DJNUEK	No	Yes	No	TFHCY4	No	Yes	No

<b>TABLE 1 - K3 and Q3</b>							
<u>WebCode</u>	<u>Physical End Match Comparison</u>			<u>WebCode</u>	<u>Physical End Match Comparison</u>		
	<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>		<u>Association</u>	<u>Performed</u>	<u>End Match ID</u>
U3NFCV	No	No					
VPGN83	No	No					
XU682W	No	No					

<b>K3 &amp; Q3 - Summary Response</b>			<b>Participants: 41</b>		
<u>Association</u>	<u>Physical End Match Comparison</u>		<u>Association</u>	<u>Physical End Match Comparison</u>	
	<u>Performed</u>	<u>End Match ID</u>		<u>Performed</u>	<u>End Match ID</u>
Yes	0 (0.0%)		Yes	24 (58.5%)	0 (0.0%)
No	40 (97.6%)		No	15 (36.6%)	23 (95.8%)
Inc	0 (0.0%)		N/A	1 (2.4%)	1 (4.2%)
No Response	1 (2.4%)		No Response	1 (2.4%)	

# Examination Methods

## TABLE 2 - K1 and Q1

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XPS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC	Other
29RPJP	✓		✓		✓			✓		✓		
2FT2EM	✓		✓		✓			✓				
34TRAP	✓		✓	✓	✓			✓				
3ZRPJN	✓	✓	✓	✓	✓	✓						Raman microscopy
4MNMJR	✓			✓		✓						
63CFJJ	✓	✓	✓	✓	✓	✓						
69Y64T	✓			✓								
6HPQAAQ	✓		✓	✓	✓	✓						Thickness measurement
79U89N	✓			✓		✓						
8D4NFQ	✓		✓	✓		✓	✓	✓				ALS (UV)
8KPGRQ	✓			✓		✓						
8LJ6AL	✓	✓	✓	✓	✓	✓		✓				
8UDCTR	✓		✓									
8YJ7MM	✓	✓		✓	✓	✓	✓	✓				MSP, Raman, Toolscan (a Laser/Computer based Comparison)
9LDA4K	✓			✓		✓		✓				Isotope Ratio Mass Spectrometry, GC-MS/FID, constructional parameters (width, weight per unit area, cross-sectional thickness and visual appearance)
9RK3XG	✓			✓	✓	✓			✓			
AVX3TM	✓		✓	✓		✓			✓			Raman
CRNW7C	✓	✓	✓	✓		✓			✓			
DJNUEK	✓			✓								
DLZA9L	✓		✓	✓	✓	✓	✓	✓				
E3KJBE	✓		✓	✓								
E6P8NH	✓					✓		✓				
E7JV7D	✓	✓		✓		✓		✓				DMRX
EEEZZE	✓	✓		✓	✓	✓			✓			Raman

TABLE 2 - K1 and Q1 - Examination Methods

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC	Other
GUGGYC	✓	✓		✓	✓	✓					✓	
HFF64D	✓	✓	✓	✓	✓	✓			✓			
HV6AB8	✓			✓		✓						
JTWE6A	✓			✓		✓			✓			width and mass per unit area determination
KGYV49	✓		✓	✓	✓	✓						
KTCXP7	✓					✓			✓			
LTRGA4	✓		✓	✓								
MACPJ8	✓			✓		✓					✓	
MFD469	✓	✓	✓	✓	✓	✓		✓	✓			Raman
N828Z2	✓		✓	✓								
PBUNPZ	✓		✓	✓		✓		✓				
RXKRJ4	✓			✓		✓						Toolscan R360
T6L4FZ	✓	✓	✓	✓	✓	✓			✓		✓	
TFHCY4	✓		✓	✓		✓						
U3NFCV			✓									
VPGN83	✓			✓		✓						
XU682W						✓			✓			

Exam Methods Response Summary											Participants: 41
	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC
Participants	39	11	19	36	14	34	3	9	13	0	4
Percent	95%	27%	46%	88%	34%	83%	7%	22%	32%	0%	10%

TABLE 2 - K2 and Q2 - Examination Methods

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-IC P-MS	Pyrolysis GC	Other
29RPJP	✓		✓									
2FT2EM	✓		✓									
34TRAP	✓		✓	✓								
3ZRPJN	✓	✓	✓	✓	✓	✓						Raman microscopy
4MNMJR	✓			✓		✓						
63CFJJ	✓	✓	✓	✓	✓	✓						
69Y64T	✓			✓								
6HPQAQ	✓		✓	✓	✓	✓						Thickness measurement
79U89N	✓			✓		✓						
8D4NFQ	✓		✓	✓								
8KPGRQ	✓			✓		✓						
8LJ6AL	✓		✓	✓								
8UDCTR	✓		✓									
8YJ7MM	✓	✓	✓	✓	✓	✓	✓	✓				
9LDA4K	✓	✓		✓								
9RK3XG	✓			✓	✓							
AVX3TM	✓		✓	✓		✓						Raman
CRNW7C												
DJNUEK	✓			✓								
DLZA9L	✓		✓	✓								
E3KJBE	✓			✓								
E6P8NH	✓					✓						
E7JV7D	✓			✓								
EEZZE	✓	✓		✓	✓	✓		✓				Raman
GUGGYC	✓	✓		✓	✓	✓				✓		
HFF64D	✓	✓	✓	✓	✓	✓		✓				Raman
HV6AB8	✓			✓		✓						
JTWE6A	✓			✓								

TABLE 2 - K2 and Q2 - Examination Methods

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC	Other
KGIV49	✓											
KTCXP7	✓											
LTRGA4	✓	✓	✓									
MACPJ8	✓		✓									
MFD469	✓		✓									
N828Z2	✓	✓	✓									
PBUNPZ	✓		✓									
RXKRJ4	✓		✓		✓							Toolscan R360
T6L4FZ	✓		✓									
TFHCY4	✓	✓	✓		✓							
U3NFCV	✓											
VPGN83			✓									
XU682W					✓			✓				
<b>Exam Methods Response Summary</b>											<b>Participants: 41</b>	
	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC	
Participants	38	7	13	34	9	16	1	1	3	0	1	
Percent	93%	17%	32%	83%	22%	39%	2%	2%	7%	0%	2%	

TABLE 2 - K3 and Q3 - Examination Methods

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-IC P-MS	Pyrolysis GC	Other
29RPJP	✓	✓		✓		✓						
2FT2EM	✓	✓	✓	✓		✓			✓			
34TRAP	✓			✓	✓							
3ZRPJN	✓	✓	✓	✓	✓	✓						Raman microscopy
4MNMJR	✓			✓		✓						
63CFJJ	✓	✓	✓	✓	✓	✓						
69Y64T	✓			✓								
6HPQAQ	✓		✓	✓	✓	✓						Thickness measurement
79U89N	✓			✓		✓						
8D4NFQ	✓	✓	✓	✓								ALS (Short Wave UV)
8KPGRQ	✓			✓		✓						
8LJ6AL	✓	✓	✓	✓	✓							
8UDCTR	✓		✓		✓							
8YJ7MM	✓	✓	✓	✓	✓	✓	✓	✓				
9LDA4K	✓			✓		✓						constructional parameters (width)
9RK3XG	✓			✓	✓	✓						
AVX3TM	✓	✓										
CRNW7C												
DJNUEK	✓			✓								
DLZA9L	✓		✓	✓	✓							
E3KJBE	✓			✓								
E6P8NH	✓					✓						
E7JV7D	✓	✓		✓		✓						
EEZZE	✓	✓		✓	✓	✓						Raman
GUGGYC	✓	✓		✓	✓	✓					✓	
HFF64D	✓	✓	✓	✓	✓							
HV6AB8	✓			✓		✓						
JTWE6A	✓					✓						Width determination

TABLE 2 - K3 and Q3 - Examination Methods

WebCode	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC	Other
KGYV49	✓					✓						
KTCXP7	✓					✓						
LTRGA4	✓		✓	✓								
MACPJ8	✓			✓		✓						K3 show fluorescence under short and long wave ultraviolet light. Q3 did not fluoresce under ultraviolet light.
MFD469	✓	✓		✓								
N828Z2	✓		✓	✓	✓							
PBUNPZ	✓	✓	✓	✓		✓						
RXKRJ4	✓			✓		✓						Toolscan R360
T6L4FZ	✓	✓	✓	✓	✓	✓			✓			
TFHCY4	✓		✓	✓		✓						
U3NFCV					✓							Calipers
VPGN83	✓			✓		✓						
XU682W						✓			✓			

Exam Methods Response Summary											Participants: 41
	Stereo Microscope	Polarized Light	Comparison	Macroscopic Exam	Fluorescence	FTIR	XRD	XRS/XRF	SEM/EDX	LA-ICP-MS	Pyrolysis GC
Participants	38	15	15	32	15	26	1	1	3	0	1
Percent	93%	37%	37%	78%	37%	63%	2%	2%	7%	0%	2%

# Conclusions

TABLE 3

WebCode	Conclusions
29RPJP	<p>Item 1 comprised two brown envelopes marked “K1” and “Q1” respectively. Item K1 comprised a section of black adhesive tape (approx. 95mm length, 20mm width) adhered to paper, with a polyvinyl chloride backing and rubber-type adhesive. Item Q1 comprised a section of black adhesive tape (approx. 79mm length, 20mm width) adhered to paper, with a polyvinyl chloride backing and rubber-type adhesive. A physical fit test was performed with a negative result. The appearance and chemical composition of the tape from Q1 was consistent with the tape from K1. These results support the proposition that the tape from Q1 could have originated from K1, or other indistinguishable sources. Item 2 comprised two brown envelopes marked “K2” and “Q2” respectively. Item K2 comprised a section of beige adhesive tape (approx. 105mm length, 25mm width) adhered to paper with a torn right edge. Item Q2 comprised a section of beige adhesive tape (approx. 67mm length, 25mm width) adhered to paper with torn edges. Edge characteristics from the left edge of Q2 was consistent with the torn edge of K2 suggesting a physical fit. These results strongly support the proposition that Q2 originated from the roll represented by K2. Item 3 comprised two brown envelopes marked “K3” and “Q3” respectively. Item K3 comprised a section of clear adhesive tape (approx. 113mm length, 49mm width) adhered to paper with a serrated right edge, with a polypropylene backing and styrene/isoprene-type adhesive. Item Q3 comprised a section of clear adhesive tape (approx. 65mm length, 49mm width) adhered to paper with serrated edges, with a polypropylene backing and a polyacrylate-type adhesive. The chemical composition of the tape from Q3 was not consistent with the tape from K3. These results do not support the proposition that the tape from Q3 could have originated from K3.</p>
2FT2EM	<p>Item 1.1 One piece of black electrical tape (Item 1.1) submitted as a comparison to Item 1.2. Item 1.2 One piece of black electrical tape found. In the samples analyzed, the unknown black electrical tape (Item 1.2) and the standard black electrical tape (Item 1.1) are not the same in chemical and physical characteristics. The unknown black electrical tape (Item 1.2) could not have originated from the standard (Item 1.1). Item 2.1 One piece of beige/yellow masking tape (Item 2.1) submitted as a comparison to Item 2.2. Item 2.2 One piece of beige/yellow masking tape was found. Items 2.1 and 2.2 were physically fitted together and were, at one time, a portion of a single unit. Item 3.1 One piece of clear colorless packaging tape (Item 3.1) submitted as a comparison to Item 3.2. Item 3.2 One piece of clear colorless packaging pressure sensitive tape was found. Item 3.1 and Item 3.2 could not be physically fitted together. In the samples analyzed, the unknown colorless packaging tape (Item 3.2) and the standard colorless packaging tape (Item 3.1) are not the same in chemical characteristics. The unknown colorless packaging tape (Item 3.2) could not have originated from the standard (Item 3.1).</p>
34TRAP	<p>On the basis of physical, chemical and elemental analysis, the tape backing and adhesive from Q1 could not be differentiated from the tape backing and adhesive comprising K1. Therefore in my opinion the black electrical tape Q1 could have originated from the black electrical tape K1, or any other source with a comparable physical and chemical composition. A physical fit was achieved between Q2 and K2. Therefore in my opinion Q2 and K2 share a common origin. On the basis of an examination of physical characteristics, the tape Q3 was different from the tape K3. Therefore in my opinion the clear tape Q3 could not have originated from the clear tape K3.</p>
3ZRPJN	<p>Tape material analysis: Case 1: Items K1 and Q1 are both plastic tapes. Both tapes have a black surface backing layer and a black lower backing layer and a black adhesive layer. The widths of the tapes are 19 mm. Items K1 and Q1 are indistinguishable regarding colour and other physical properties and the chemical compositions of the backings and adhesive. Therefore, the adhesive tape in item Q1 could have originated from the tape roll represented by item K1 or from tape rolls manufactured in the same manner. Case 2: Items K2 and Q2 are both masking tapes. Both tapes have a yellowish paper backing layer and a yellowish adhesive. The widths of the tapes are 24 mm. Items K2 and Q2 are indistinguishable regarding colour and other physical properties and the chemical compositions of the backing and adhesive. Therefore, the adhesive tape in item Q2 could have originated from the tape roll represented by item K2 or from tape rolls manufactured in the same manner. Case 3: items K3 and Q3 are both packing tapes. Both tapes have a clear surface backing layer and a clear lower backing layer and a clear adhesive layer. The widths of the tapes are 48 mm.</p>

TABLE 3

WebCode	Conclusions
	<p>Items K3 and Q3 are indistinguishable regarding colour and other physical properties and the chemical compositions of the backings but they are inconsistent regarding the chemical compositions of the adhesives. Therefore, the adhesive tape in item Q3 could not have originated from the tape roll represented by item K3. Physical and match analysis: Case 1: In the item Q1 there is an adhesive tape which corresponds in color and in width with the adhesive tape roll represented by item K1. The end of the item Q1 does not correspond in shape with the end of the adhesive tape roll represented by Item K1. However, conclusion whether the adhesive tape in Item Q1 originated from the adhesive tape roll represented by Item K1 is inconclusive. Case 2: In the item Q2 there is an adhesive tape which corresponds in color and in width with the adhesive tape roll represented by item K2. One end of item Q2 corresponds in shape and individual characteristics with tape roll represented by item K2. The adhesive tape in item Q2 originates from the adhesive tape roll represented by the item K2. Case 3: In the item Q3 there is an adhesive tape which corresponds in width with the adhesive tape roll represented by item K3. Both ends of item Q3 are cut with a tape cutter. The end of adhesive tape roll represented by item K3 is as well cut with a tape cutter. Neither end of item Q3 does not correspond in shape with the end of tape roll represented by item K3. Item Q3 and adhesive tape roll represented by item K3 are not cut with the same tape cutter. However, conclusion whether the adhesive tape in Item Q3 originated from the adhesive tape roll represented by item K3 is inconclusive.</p>
4MNMJR	<p>After the studies done we can say that: Items K1 and Q1 may have come from the same source. Items K2 and Q2 may have come from the same source. Items K3 and Q3 cannot come from the same source.</p>
63CFJJ	<p>The questioned electrical tape sample from Case 1 (Item 1) does not physically match the known electrical tape standard from Case 1 (Item 1) due to possessing limited features for comparison, therefore, additional analysis was performed. The questioned electrical tape sample from Case 1 (Item 1) is associated to the known electrical tape standard from Case 1 (Item 1) upon comparison of physical, optical, and chemical properties and either originated from this tape source or from another tape source with the same characteristics (Level IV Association). The analysis is considered limited due to the inability to perform micro X-ray fluorescence at the time of analysis. The questioned masking tape sample from Case 2 (Item 2) physically matches the known masking tape standard from Case 2 (Item 2). The questioned masking tape sample originated from the same roll of tape as the masking tape standard (Level I Association). The questioned packing tape sample from Case 3 (Item 3) does not physically match the known packing tape sample from Case 3 (Item 3), therefore, additional analysis was performed. The questioned packing tape sample from Case 3 (Item 3) is disassociated from the known packing tape standard from Case 3 (Item 3) due to differences in thickness, IR characteristics, and backing microscopic characteristics (Elimination).</p>
69Y64T	<p>Item 1-1 (known tape sample from Case 1) and Item 1-2 (questioned tape sample from Case 1) have the same class characteristics; however, no individual characteristics were noted. Therefore, no physical match could be determined between Items 1-1 and 1-2. Item 1-3 (known tape sample from Case 2) and 1-4 (questioned tape sample from Case 2) constitute a physical match and at one time formed a single object. Item 1-5 (known tape sample from Case 3) can be eliminated as the source of Item 1-6 (questioned tape sample from Case 3).</p>
6HPQAQ	<p>Item 1 : There is no physical match between the ends of Item K1 and Q1. K1 and Q1 are undifferentiated. They can come from the same source (same roll) or from two different rolls with the same characteristics. Item 2 : There is a physical match between the ends of Item K2 and Q2. They come from the same source (same roll). Item 3 : There is no physical match between the ends of Item K3 and Q3. We can observe differences between the items (especially on composition and thickness). K3 and Q3 can't come from the same roll.</p>
79U89N	<p>The results very strongly support the proposition that K-1 and Q-1 are of the same type. We are inconclusive whether K-1 and Q-1 have common origin. The results very strongly support the proposition that K-2 and Q-2 are of the same type. The results strongly support the proposition that there is a physical match between K-2 and Q-2. K-3 and Q-3 are not of the same type.</p>
8D4NFQ	<p>1. Comparison of Q1 and K1: a) Examination of Q1 and K1 disclosed that the edges appear to be cut</p>

TABLE 3

WebCode	Conclusions
	<p>very straight and lack irregularity to perform a physical end match analysis. b) Questioned tape Q1 and known tape K1 are consistent and no exclusionary differences were observed with respect to their construction (color, texture, width, and thickness), chemical type, and elemental composition.</p> <p>2. Comparison of Q2 and K2. a) Examination of Q2 and K2 disclosed that each tape fragment appears to have two torn edges. b) A physical match was found to exist between one of the torn edges of Q2 and one of the torn edges of K2. 3. Comparison of Q3 and K3. a) Examination of Q3 disclosed that both edges of Q3 appear to be cut off with tape dispenser blade (edges are serrated). Examination of K3 disclosed that one edge appears to be cut off with tape dispenser blade (edge is serrated) and another edge appears to be cut straight. Serrated edges of Q3 are different with respect to size/shape from the serrated edge of K3. b) The examinations conducted did not disclose a physical match between the serrated and cut edges of Q3 and K3. c) Examination also disclosed the following: Q3 looks different from K3 when viewed between crossed polarizing filters on the light box. Q3 and K3 have different response to short wave UV light (K3 has light pink fluorescence, Q3 does not).</p> <p>INTERPRETATION OF RESULTS: 1. It is the opinion of the undersigned that: a) Q1 and K1 were not previously joined together as represented by the samples submitted. b) The questioned tape Q1 could have originated from the same source as represented by the known submitted tape k1 or from another source exhibiting all of the same analyzed characteristics. 2. It is the opinion of the undersigned that Q2 and K2 were at one time joined together to be one piece of masking tape. 3. It is the opinion of the undersigned that: a) Q3 and K3 were not previously joined together as represented by the samples submitted. b) Questioned tape Q3 could not have originated from the same source as represented by the known submitted tape K3.</p>
8KPGRQ	<p>Item 1: It is possible that K1 and Q1 originate from the same adhesive tape roll. Item 2: The results allow the conclusion that K2 and Q2 originate from the same adhesive tape roll. Item 3: The results exclude the same origin of K3 and Q3.</p>
8LJ6AL	<p>1. Comparative examinations of the electrical tape in Exhibits 1.1 (known) and 1.2 (questioned) disclosed them to be consistent in their physical, elemental, and chemical characteristics. As a result of these findings, Exhibit 1.2 could have originated from Exhibit 1.1, or another source with the same characteristics. A tape association is not a means of positive identification and number of possible sources for a specific tape is unknown. 2. An agreement of gross class and individual characteristics were observed between the masking tape in Exhibits 2.1 (known) and 2.2 (questioned). These items were once physically connected. No further examinations were conducted. 3. Comparative examinations of the packing tape in Exhibits 3.1 (known) and 3.2 (questioned) disclosed them to be inconsistent in their physical characteristics. As a result of these findings, Exhibit 3.2 could not have originated from Exhibit 3.1.</p>
8UDCTR	<p>While similarities in class characteristics were noted such as color, width and texture, it was inconclusive if Item K1 and Item Q1 constitute a physical match. A physical match was observed between the torn end on Item K2 and one of the torn ends of Item Q2. Items K2 and Q2 at one time formed a single object. Item K3 can be eliminated as the source of Item Q3.</p>
8YJ7MM	<p>Q1 vs K1 (black "electroadhesive tapes"): Macroscopic: For both K1 and Q1, it was found that all edges having been in contact with the substrate looked like they were altered through the content or physical conditions. Both end edges of Q1 and the edge of K1 were scanned by toolscan and compared. No convincing matches were found. a physical match can neither be confirmed nor completely ruled out; inconclusive. Material properties: The adhesive tape backing and the adhesive tape layers of K1 and Q1 cannot be distinguished from each other (FT-IR, MSP, Raman, XRD, XRF). Therefore, it is possible that Q1 originates from the same roll as K1 or from a roll produced together with K1. Q2 vs K2 (painter's tape): Macroscopic: From Q2, potentially only the one tear-off edge comes into question as a counterpart to the tear-off edge of K2. Under UV fluorescence illumination, it can be seen that the paper fibers remain brownish and the overlying colorless protective layer glows light blue, making the torn-off edge structures and individual protruding or missing fibers clearly visible. It seems impossible that there should be other such edges whose paper fibers behave in such a way that they could also complement the counter edge, as in Q2-K2. Thus, a physical match was proved by analysis. Thus Q2 comes from the same roll as K2. Material properties (here only for the sake of form</p>

TABLE 3

WebCode	Conclusions
	<p>and practice): The adhesive tape backing and the adhesive tape layers of K2 and Q2 cannot be distinguished from each other (FT-IR). Also by XRD and XRF no differences between K2 and Q2 could be detected. Q3 vs K3 (colorless package adhesive tapes): Macroscopic: The tear-off angles of K3 and Q3 are different. Thus, a physical match can be excluded. Material properties: The adhesive tape backings and the adhesive tape adhesive layers of K3 and Q3 can each be distinguished from each other (FT-IR). K3 and Q3 can also be distinguished by means of XRD analysis. Thus, it can be excluded that Q3 originates from the same adhesive tape roll as K3.</p>
9LDA4K	<p>Results of examinations were as follows: Known (K1) and Questioned (Q1) tape samples could not be differentiated on the basis of any of the following: appearance (macroscopic and microscopic) of backing or adhesive/tacking sides, physical dimensions (width and thickness), weight per unit area, backing composition, adhesive composition, chemical profile of hexane-extractable components, inorganic components, stable carbon and hydrogen isotopic composition of tape backing. Based upon the above findings, I am of the opinion that Known (K1) and Questioned (Q1) tape samples could have both once formed part of the same roll of tape. I am also unable to exclude the proposition that the Questioned (Q1) tape could share a common origin with another roll of the same tape product from the same manufacturer. Numerous points of fit and correspondence were found between Known (K2) and Questioned (Q2) tape samples. These results provide unequivocal support for the proposition that K2 and Q2 both once formed a single length of tape. Known (K3) and Questioned (Q3) tape samples were found to have different backing and adhesive compositions, by the technique of Fourier Transform Infrared Spectroscopy (FTIR). Based upon these findings, I am of the opinion that Known (K3) and Questioned (Q3) tape samples did not originate from the same roll of tape, and that each originated from different tape products.</p>
9RK3XG	<p>The ends of the tape from Item 1 Q1 were examined to see if either of the ends could be physically matched back to the end of the tape from Item 1 K1. No physical end match was found between the tape ends from Item 1 Q1 and the tape end from Item 1 K1. The black electrical tape from Item 1 Q1 is similar in physical characteristics and chemistry in comparison to the tape from Item 1 K1. The tape from Item 1 Q1 could have come from the same roll of tape as Item 1 K1, or any other source of tape similar in physical characteristics and chemistry. The ends of the tape from Item 2 Q2 were examined to see if either of the ends could be physically matched back to the end of the tape from Item 2 K2. Based on distinct features of the torn edge of one end of the piece of tape from Item 2 Q2 and the free end of Item 2 K2, Item 2 Q2 was observed to physically correspond with the end of Item 2 K2. This provides strong support for the proposition that Item 2 Q2 originated from and was at one time a part of Item 2 K2 as opposed to the proposition that it originated from and was a part of another used roll. The colorless packaging tape from Item 3 Q3 is different in physical characteristics and chemistry in comparison to the packaging tape from Item 3 K3. The tape from Item 3 Q3 could not have come from the same roll of tape as Item 3 K3. All items were examined visually and by using stereomicroscopy and fluorescence. Fourier Transformed Infrared Spectroscopy (FT-IR) was used for examining Item 1 Q1 and K1 and Item 3 Q3 and K3. Scanning Electron Microscopy – Energy Dispersive Spectroscopy (SEM-EDS) was used for examining Item 1 Q1 and K1. Samples collected and analyzed during the examination and analysis of the items in this case have been returned to and retained with the original item.</p>
AVX3TM	<p>1. Based on physical fitting, comparison of physical characteristics (colour, width and surface texture), and chemical compositions of the examined backing and adhesive layers of the masking tapes, the two strips of tape marked "K2" and "Q2" were originally a single strip of tape. 2. Based comparison of physical characteristics (colour, width and surface texture), and chemical composition of the examined backing and adhesive layers of the insulating tapes, the strip of tape marked "Q1" could have originated from the strip of tape marked "K1", or another roll of tape with similar characteristics. 3. Based on the difference in polarising pattern, the strip of clear tape marked "Q3" did not originate from the same roll of tape as the strip of tape marked "K3".</p>
CRNW7C	<p>The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, FTIR, and SEM-EDX. Examination of K1 and Q1 (Item 1-1 and Item 1-2) each revealed a strip of black electrical tape. No physical match was noted between Item 1-1 and Item</p>

TABLE 3

WebCode	Conclusions
	1-2. However, Item 1-2 was found to be consistent in color, construction and composition with Item 1-1. Therefore, Item 1-2 could have originated from the same source as Item 1-1. The remaining items were not examined.
DJNUEK	Item# Q-1 is dissimilar to Item# K-1. Item# Q-2 and Item# K-2 constitute a physical match and at one time formed a single object. Item# Q-3 does not physically fit with Item# K-3.
DLZA9L	It is the opinion of the undersigned that Q1 could have originated from the source as represented by K1, or from another source exhibiting all of the same analyzed characteristics. It is the opinion of the undersigned that Q2 and K2 were at one time joined together to be (1) length of masking tape. It is the opinion of the undersigned that Q3 and K3 were not previously joined together as represented by the samples submitted, and that Q3 could not have originated from the same source as represented by K3.
E3KJBE	Similarities in class characteristics were noted between the unknown piece of tape in Item #1 (Q1) and the known piece of tape in Item #1 (K1); however, Items #1 (Q1) and #1 (K1) do not constitute a physical match. Items #2 (Q2) and #2 (K2) constitute a physical match and at one time formed a single object. Item #3 (K3) can be eliminated as the source of Item #3 (Q3).
E6P8NH	K1, Q1: Both tapes were adhesive tapes, there were no differences neither in adhesive layers nor in backing materials. The widths were equal to 19mm. In both backing materials chlorine was detected. So the backing material of sample K1 and Q1 probably are made of a polymer on basis of poly-vinyl-chloride (PVC). So the questioned tape Q1 could have originated from the tape roll K1. K2, Q2: Both tapes were adhesive tapes, there were no differences neither in adhesive layers nor in backing materials. The widths were equal to 24mm. Both backing materials are made of Cellulose. K3, Q3: Both tapes were adhesive tapes. The backing material of both tapes were made of a polymer on Basis of polypropylene (PP). The widths were equal to 48mm. The tapes had different adhesive layers. So the questioned tape Q3 could not have originated from the tape roll K3.
E7JV7D	1. Comparative examinations of Exhibit 1.1 (known piece of electrical tape) with Exhibit 1.2 (questioned piece of electrical tape) disclosed them to be consistent in their physical, chemical, and elemental characteristics. As a result of these findings, the questioned piece of electrical tape (Exhibit 1.2) could have originated from the known piece of electrical tape (Exhibit 1.1), or another source with the same characteristics. A tape association is not a means of positive identification and the number of possible sources for a specific tape is unknown. 2. Sufficient agreement of individual characteristics were observed between the end of Exhibit 2.1 (known piece of masking tape) and the end of Exhibit 2.2 (questioned piece of masking tape) to conclude that Exhibits 2.1 and 2.2 were once physically connected. As a result of these findings, no further comparisons of the physical, chemical, or elemental characteristics were conducted between Exhibits 2.1 and 2.2. 3. Comparative examinations of Exhibit 3.1 (known piece of packing tape) and Exhibit 3.2 (questioned piece of packing tape) disclosed them to be inconsistent in their physical characteristics. As a result of these findings, the questioned piece of tape (Exhibit 3.2) could not have originated from the same source as the known piece of tape (Exhibit 3.1).
EEEZZE	We found no differences in chemistry composition for samples Q1 and K1. There is a possibility that adhesive tape Q1 originate from the adhesive tape K1. We cannot determine physical match between two samples. We found no differences in chemistry composition for samples Q2 and K2. Adhesive tape Q2 could originate from the adhesive tape K2. Since we observed physical match between two samples, two tapes could originate from the same role. We found some differences in chemistry composition of glue for samples Q3 and K3. Adhesive tape Q3 does not originate from the adhesive tape K3.
GUGGYC	Item K1 and Item Q1 are similar in chemical composition, but do not constitute a physical match. Item K2 and Item Q2 are similar in chemical composition, constitute a physical match and at one time formed a single object. Item K1 and Item Q1 are different in chemical composition.
HFF64D	1. The adhesive tape in Item Q1 agreed with the adhesive tape originated from the adhesive tape roll represented by Item K1 with regard to the examined characteristics. 2. The adhesive tape in Item Q2

TABLE 3

WebCode	Conclusions
	agreed with the adhesive tape originated from the adhesive tape roll represented by Item K2 with regard to the examined characteristics. One end of the adhesive tape in Item Q2 physically match with the end of the adhesive tape roll represented by Item K2. 3. The adhesive tape in Item Q3 was different from the adhesive tape originated from the adhesive tape roll represented by Item K3.
HV6AB8	Item 1: The morphology and the width of K1 and Q1 is the same. There isn't a physical end match between samples K1 and Q1. The composition of the adhesive and backing of both tapes are indistinguishable with the techniques employed. Therefore, K1 and Q1 could have the same origin. Item 2: The morphology and the width of K2 and Q2 is the same. There is a physical end match between samples K2 and Q2. The composition of the adhesive and backing of both tapes are indistinguishable with the techniques employed. Therefore, K2 and Q2 have the same origin. Item 3: The morphology and the width of K3 and Q3 are slightly different. There is not a physical end match between samples K3 and Q3. The composition of the backing of both tapes are indistinguishable with the techniques employed, but there are differences in the composition of the adhesive. According to these results, K3 and Q3 have different origins.
JTWE6A	The known (K1) and questioned (Q1) pieces of tape from case 1 were found to be indistinguishable in relation to appearance, colour, width, chemical composition, mass per unit area and thickness. Therefore these pieces of tape may share a common origin. A physical fit was found between one end of the known (K2) and one end of the questioned (Q2) pieces of tape and were therefore at one time one continuous piece. The chemical composition of the known (K3) and questioned (K2) pieces of tape were found to be different and therefore could not share a common origin.
KGYV49	In my opinion the piece of tape Q1 could have originated from the same roll as item K1 or any other roll of similar manufacture. I am unable to evaluate these findings further. In my opinion the findings in this case demonstrate conclusively that the piece of tape Q2 has been torn from the piece of tape K2 representing the end of the recovered roll and hence in my opinion has been torn directly from the roll. Item Q3 is of a different type of tape from that in item K1 and hence these two pieces of tape cannot have originated from the same roll.
KTCXP7	Re K1 and Q1: There is a Level 3 association between the two tape samples. Q1 may have originated from K1, but may also have originated from another tape source of the same type. Re K2 and Q2: There is a Level 1 association between the two tape samples - there is physical fit of one end of each tape, demonstrating that they were once a single continuous section of tape. Re K3 and Q3: Due to chemical differences in the backing and adhesive, K3 is eliminated as being the source of Q3. Levels of Association have seven interpretations: Level 1 (highest) to Level 5 (lowest), Inconclusive, and Elimination.
LTRGA4	Similarities in class characteristics were noted between Item #1-1 (K1) and Item #1-2 (Q1); however, no physical match could be found between Item #1-1 (K1) and Item #1-2 (Q1). Item #2-1 (K2) and Item #2-2 (Q2) constitute a physical match and at one time formed a single object. Item #3-2 (Q3) could not have come from Item #3-1 (K3).
MACPJ8	Through examination and comparative analysis performed on the pieces of evidence, it was determined that: The pieces of adhesive tape K1 (known) and Q1 (unknown) have physical characteristics (color, texture, width, appearance) and chemical characteristics (UV light, IR spectra and gas chromatography) similar to each other, so it is consistent with a common origin. The pieces of adhesive tape K2 (known) and one end of the piece of tape Q2 (unknown) are physically matching corresponding parts, indicative of a common origin. The pieces of adhesive tape K3 (known) and Q3 (unknown) have physical characteristics (color, texture, width, appearance) similar to each other and chemical characteristics (UV light, IR spectra) different from each other. They do not come from a common origin.
MFD469	Item Q1 was compared to item K1 using a variety of analytical techniques including width and thickness measurements (full thickness including the adhesive and backing thickness only), PLM of both the backing and the adhesive, comparison microscopy of both the backing and the adhesive, fluorescence microscopy of both the backing and the adhesive, micro-FTIR of the backing, the adhesive, and a chloroform extract of the backing, EDS of both the backing and the adhesive,

TABLE 3

WebCode	Conclusions
	<p>micro-XRF of both the backing and the adhesive, micro-Raman of both the backing and the adhesive, and oblique lighting and SEM to visualize the backing surface texture. Item Q1 was not distinguished from item K1 using any of these techniques and therefore Q1 either originated from the same roll of tape as represented by K1 or another roll with the characteristics described in this report. It is not known how many other rolls of tape would have these characteristics. Item Q2 was compared to item K2 using the unaided eye and a stereomicroscope. A physical fit between the irregular contour of an edge of item Q2 corresponds to the irregular contour of an edge of item K2. This demonstrates that items Q2 and K2 were originally joined together as a single piece. Item Q3 was compared to item K3 using the unaided eye, stereomicroscopy, and polarized light. Item Q3 has a different thickness than item K3 based on its interference colors and therefore, item Q3 did not originate from the roll of tape represented by item K3.</p>
N828Z2	<p>Similarities in class characteristics were noted between the adhesive tape in Item 1-Q1 and the adhesive tape in Item 1-K1; Items 1-Q1 and 1-K1 do not constitute a physical match and did not at one time form a single object. Items 1-K2 and 1-Q2 constitute a physical match and at one time formed a single object. The adhesive tape in Item 1-Q3 is dissimilar in UV Fluorescence to the adhesive tape in Item 1-K3; Item 1-Q3 could not have come from Item 1-K3.</p>
PBUNPZ	<p>Q1 and K1 could have originated from the same source. Although another source of similar manufacturing cannot be ruled out, the shared atypical characteristic of the spacing of the lengthwise striations on each tape item makes another source of similar manufacturing improbable. Q2 and K2 physically fit together and were at one time part of the same object. Q3 and K3 exhibit differences and did not originate from the same source as represented by the known sample, K3.</p>
RXKRJ4	<p>Based on the physical characteristic evaluation, identification of chemical composition and physical end match examinations, therefore, in my professional opinion; a) Item Q1 could have originated from the section of adhesive tape represented by Item K1 or another source with the same characteristics. b) Item Q2 was originated from the section of adhesive tape represented by Item K2. c) Item Q3 could not have originated from the section of adhesive tape represented by Item K3.</p>
T6L4FZ	<p>I started the examination of the submitted evidence items on May 9, 2022. CASE 1: I compared the section of known tape sample (Item 001-K1) to the questioned tape sample (Item 001-Q1). I used stereo microscopy, polarized light microscopy, infrared microspectrophotometry, scanning electron microscopy with energy dispersive spectrometry, and pyrolysis gas chromatography mass spectrometry in this comparison. Both the known tape sample (Item 001-K1) and the questioned tape sample (Item 001-Q1) are sections of black electrical tape of similar size and appearance with cut ends. I compared the cut ends of these tapes to each other to determine if they physically fit together. The ends are cut with a straight edge cutter and lack sufficient features to determine if they fit together as sequential pieces of tape from the same roll. I further compared the known tape sample (Item 001-K1) to the question tape sample (Item 001-Q1) to determine if they could have come from a different section of the same roll or from a similarly manufactured masking tape. I found that these two tape sections are indistinguishable in physical features (such as size, color, and construction), as well as similar in microscopical properties. In addition, the manufacturing process left striated marks in the tape backing that continue across one end from Item 001-Q1 and match up to similar striated marks on the tape backing of Item 001-K1. These sections of tape are also similar in chemical properties. These two tape samples (Items 001-K1 and 001-Q1) could have come from the same roll of black electrical tape or another similarly manufactured black electrical tape. CASE 2: I compared the section of known tape sample (Item 001-K2) to the questioned tape sample (Item 001-Q2). I used stereo microscopy in this examination. The questioned tape (Item 001-Q2) exhibited the same physical features (such as size, color, and construction) as the known tape (Item 001-K2). Item 001-Q2 had two torn ends. Item 001-K2 had one torn end and one cut end. I compared the torn ends of these tapes to each other to determine if they physically fit together. I found that one torn end of Item 001-Q2 physically fit to the torn end of Item 001-K2. This physical fit was sufficient to conclude that the questioned tape sample (Item 001-Q2) and the known tape sample (Item 001-K2) were once sequential parts of the same section of tape. CASE 3: I compared the section of known clear tape (Item 001-K3) to the questioned clear tape (Item 001-Q3). I used stereo microscopy, polarized light microscopy, infrared</p>

TABLE 3

WebCode	Conclusions
	<p>microspectrophotometry, and scanning electron microscopy with energy dispersive spectrometry in this comparison. I found that the questioned tape (Item 001-Q3) exhibits similar physical properties (such as size, color, and construction) as the known tape (Item 001-K3). The known tape section was cut on one end with a serrated cutter such as found in a tape dispenser and was cut on the other end with a straight edge cutter. The questioned tape (Item 001-Q3) was cut on both ends with a serrated cutter. I compared the serrated ends and found that the serrated end of Item 001-K3 did not match either serrated end of the questioned tape (Item 001-Q3) in appearance. I also found that the adhesive had different chemical properties. These tapes did not originate from the same roll. CONCLUSIONS: CASE 1: The questioned section of black electrical tape (Item 001-Q1) and the known black electrical tape section (Item 001-K1) could have come from the same roll of electrical tape or another roll of electrical tape with the same physical and chemical properties. CASE 2: The torn end of the questioned section of masking tape (Item 001-Q2) physically fits to the torn end of the known masking tape (Item 001-K2). Therefore, Item 001-Q2 was torn from the end of Item 001-K2. CASE 3: The questioned section of clear tape (Item 001-Q3) and the known section of clear tape (Item 001-K3) did not come from the same roll of tape.</p>
TFHCY4	<p>Item 1: The tape Q1 could originate from K1. However, the ends of Q1 and K1 do not match. Item 2: The tape Q2 originates from K2. The corresponding ends are matching. Item 3: The tape Q3 does not originate from K3.</p>
U3NFCV	<p>Items 1-1 (K1) and 1-2 (Q1) do not constitute a physical match and were not at one time joined to form a single object. Item 1-3 (K2) and Item 1-4 (Q2) constitute a physical match and were at one time joined to form a single object. Items 1-5 (K3) and 1-6 (Q3) could not have originated from the same source due to significant differences in class and individual characteristics.</p>
VPGN83	<p>Item 1: The submitted piece of tape in Q1 was examined and compared to the piece of tape received in item K1 using microscopy and fourier transform infrared spectroscopy (FTIR). Q1 and K1 are consistent in color, width, microscopic properties, and chemical properties. Thus, Q1 could have come from K1 or another piece of tape exhibiting the same analyzed characteristics. Item 2: One of the fractured edges of Q2 was examined and compared for a physical match to the fractured edge of K2. Q2 fits uniquely to K2 such that it can be concluded that Q2 and K2 were at one time joined together to form a single object. Item 3: Q3 was examined and compared to K3 using microscopy and fourier transform infrared spectroscopy (FTIR). The FTIR results reveal differences between Q3 and K3. Thus, Q3 could not have come from K3.</p>
XU682W	<p>1. K1 and Q1 are similar based on FT_IR and SEM/EDX results. 2. K2 and Q2 are similar based on FT_IR and SEM/EDX results. 3. K3 and Q3 are different based on FT_IR results of adhesive sides.</p>

# Additional Comments

TABLE 4

WebCode	Additional Comments
34TRAP	Pyrolysis GC not routinely conducted in our laboratory as casework samples are most often not suitable for analysis with this technique
8KPGRQ	The physical match comparison is done by a separate group in our lab and therefore would normally result in a separate report regarding the physical match. In this case the physical match was verified by this other group and the reports were combined.
CRNW7C	No analysis performed on K2, Q2, K3, Q3 (not opened or examined), therefore no conclusions rendered.
DJNUEK	This is not one case, but 3 separate cases requiring 3 separate report conclusions. Each conclusion provided above (#4) reflects a conclusion for the respective analysis and comparison.
KGYV49	Physical match comparison between Q1 and K1 reported as inconclusive due to lack of characteristics to ends of tape. It was not possible in my view possible, due to the lack of character, to establish a match or an exclusion and hence the findings in this respect have been reported in this way.

-End of Report-  
(Appendix may follow)

Collaborative Testing Services ~ Forensic Testing Program

**Test No. 22-5471: Adhesive Tape Analysis**

DATA MUST BE SUBMITTED BY **July 5, 2022, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: FBQLB6

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

**Scenario:**

In three unrelated cases, adhesive tape material was collected and submitted for analysis. Each Item (1-3) below represents a separate, independent case.

*A Hole Punch located at one end of the silicone release paper housing a known item indicates the end of tape which was removed from the roll and is not intended for physical end match analysis.*

**Items Submitted (Sample Pack TAPE):**

Item 1- (K1, Q1): A known and a questioned sample from Case 1.

Item 2- (K2, Q2): A known and a questioned sample from Case 2.

Item 3- (K3, Q3): A known and a questioned sample from Case 3.

**Item 1:**

**1.1) Could the adhesive tape in Item Q1 have originated from the section of adhesive tape represented by Item K1?**

- Yes
- No
- Inconclusive

**1.2) Was a physical match comparison performed?**

- Yes
- No
- N/A

**1.3) If a Physical match comparison was performed, does either end of the adhesive tape in Item Q1 physically match with the end of the section of adhesive tape represented by Item K1?**

- Yes
- No
- Inconclusive

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

Please check all that apply.

<b>Microscopic Exams:</b>	<input type="checkbox"/> Stereo	<input type="checkbox"/> Comparison
	<input type="checkbox"/> Polarized Light	
<input type="checkbox"/> Macroscopic Exam	<input type="checkbox"/> Fluorescence	<input type="checkbox"/> FTIR
<input type="checkbox"/> XRD	<input type="checkbox"/> XRS/XRF	<input type="checkbox"/> SEM/EDX
<input type="checkbox"/> LA-ICP-MS	<input type="checkbox"/> Pyrolysis GC	
Other (specify): <input style="width: 50px;" type="text"/>		

**Item 2:**

**2.1) Could the adhesive tape in Item Q2 have originated from the section of adhesive tape represented by Item K2?**

- Yes
- No
- Inconclusive

**2.2) Was a physical match comparison performed?**

- Yes
- No
- N/A

**2.3) If a Physical match comparison was performed, does either end of the adhesive tape in Item Q2 physically match with the end of the section of adhesive tape represented by Item K2?**

- Yes
- No
- Inconclusive

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

Please check all that apply.

<b>Microscopic Exams:</b>	<input type="checkbox"/> Stereo	<input type="checkbox"/> Comparison
	<input type="checkbox"/> Polarized Light	
<input type="checkbox"/> Macroscopic Exam	<input type="checkbox"/> Fluorescence	<input type="checkbox"/> FTIR
<input type="checkbox"/> XRD	<input type="checkbox"/> XRS/XRF	<input type="checkbox"/> SEM/EDX
<input type="checkbox"/> LA-ICP-MS	<input type="checkbox"/> Pyrolysis GC	
Other (specify): <input style="width: 50px;" type="text"/>		

**Item 3:**

**3.1) Could the adhesive tape in Item Q3 have originated from the section of adhesive tape represented by Item K3?**

- Yes
- No
- Inconclusive

**3.2) Was a physical match comparison performed?**

- Yes
- No
- N/A

**3.3) If a Physical match comparison was performed, does either end of the adhesive tape in Item Q3 physically match with the end of the section of adhesive tape represented by Item K3?**

- Yes
- No
- Inconclusive

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

Please check all that apply.

<b>Microscopic Exams:</b>	<input type="checkbox"/> Stereo	<input type="checkbox"/> Comparison
	<input type="checkbox"/> Polarized Light	
<input type="checkbox"/> Macroscopic Exam	<input type="checkbox"/> Fluorescence	<input type="checkbox"/> FTIR
<input type="checkbox"/> XRD	<input type="checkbox"/> XRS/XRF	<input type="checkbox"/> SEM/EDX
<input type="checkbox"/> LA-ICP-MS	<input type="checkbox"/> Pyrolysis GC	
Other (specify): <input style="width: 50px;" type="text"/>		

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

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

**5.) Additional Comments**

## RELEASE OF DATA TO ACCREDITATION BODIES

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

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- This participant's data is **not** intended for submission to ASCLD/LAB, ANAB, and/or A2LA.

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

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(Include ASCLD/LAB Certificate here)

A2LA Certificate No.

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

Authorized Contact Person and Title

Laboratory Name

Location (City/State)