



## Paint Analysis Test No. 14-546 Summary Report

This test was sent to 108 participants. Each sample set consisted of two items containing "known" paint samples and a "questioned" paint sample. Participants were requested to compare the items and report their findings. Data were returned from 86 participants (80% response rate) and are compiled into the following tables:

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

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

# Manufacturer's Information

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Each sample set contained three items consisting of automotive paint samples. Items 1 and 2 were known paint samples representative of the damaged area of suspect vehicles #1 and #2, respectively, and Item 3 was a set of questioned paint chips recovered from the clothing of the pedestrian. Participants were requested to examine the questioned paint chips and determine if any could have originated from the damaged area of the suspect's vehicle.

The paint samples in Items 1, 2, and 3 were prepared from three different automotive paint panels obtained from ACT Test Panels. The test panels were described as gray coil coated aluminum substrate panels with varying coating layering systems applied to them. The panels which made up Items 1 and 2 were made with the same primer which differed from the primer used in Item 3. The panels which made up Items 1 and 3 were made with the same clearcoat which differed from the clearcoat used in Item 2. All three panels were made with the same silver basecoat.

## SAMPLE PREPARATION-

The panels used for this test were inspected for defects, and the areas where defects were located were not used.

ITEMS 1 and 2 (KNOWN): For the known Items 1 and 2, the appropriate paint panel was cut into approximately 1/2" x 1/2" wide pieces using tin snips and one piece was packaged into a glassine bag and a pre-labeled coin envelope. Items 1 and 2 were packaged into the sample pack as described below.

ITEM 3 (ELIMINATION): For Item 3, the paint panel was cut into approximately 1/4" x 1/4" wide pieces using the tin snips. Two of these pieces were packaged into a glassine bag and then a pre-labeled Item 3 coin envelope. Item 3 was packaged into the sample pack as described below.

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

## VERIFICATION-

The correct elimination results were confirmed by predistribution laboratories who used the following combined list of techniques: Stereomicroscopy, FTIR, XRS/XRF, and Alternate Light Source Exam.

# **Summary Comments**

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This test was designed to allow participants to assess their proficiency in the examination, comparison and interpretation of multi-layered automotive paint samples. Each test sample set consisted of two known samples (Items 1 and 2) and one questioned sample (Item 3). The paint samples in Items 1, 2, and 3 were each cut from a separate automotive panel. (Refer to Manufacturer's Information for preparation details.)

Of the 86 participants that reported results in Table 1, 80 (93%) reported that the questioned paint chips in Item 3 could not have originated from the same source as the known paint samples in either of Items 1 or 2. Of the remaining six participants, four reported that the questioned paint chips in Item 3 could have originated from the same source as the Item 1 known paint sample, but not the Item 2 known paint sample. One participant reported that the questioned paint chips in Item 3 could have originated from the same source as the known paint chips in both Items 1 and 2. The final participant reported that the questioned paint chips in Item 3 could not have originated from the same source as the Item 1 known paint sample, but could have originated from the Item 2 known paint sample.

# Examination Results

Could the questioned paint chips (Item 3) have originated from the damaged area of either suspect vehicle #1 or #2 as represented by Items 1 and 2, respectively?

TABLE 1

WebCode	Item 1	Item 2	WebCode	Item 1	Item 2
2GLVBH	No	No	EBUR23	No	No
2RN2HD	No	No	F8QJ9C	No	No
2W2UGJ	No	No	FDX3EG	No	No
3LQYQJ	No	No	FQ6XP7	No	No
3ZBJ9R	No	No	G247TA	No	No
47ZB6R	No	No	G8KN2B	No	No
63XRHJ	No	No	G9F87X	No	No
6Y9J8H	No	No	GDA7H8	No	No
7CRMTJ	No	No	GMYRN7	No	No
7URMWD	No	No	GXRZA	No	No
89UDB	No	No	GY73T8	No	No
8KMWRG	No	No	H2CMG8	No	No
8WWMGB	No	No	H7L3NB	No	No
8Y3VY3	Yes	No	JY3U2Y	No	No
9KG3LF	No	No	JZC237	No	No
9R4KBP	No	No	KJ66J8	No	No
9RJ6VM	No	No	KNGAU8	No	No
9WEV3J	No	No	KQAYN2	No	No
A3CU8E	No	No	LBRNBX	No	No
AAGMKH	No	No	LDDEDN	No	Yes
AJGJY6	Yes	Yes	LQJBV6	No	No
APPK9	No	No	LVHNHU	No	No
AQJL9C	No	No	M6KJX6	No	No
BUHZTF	No	No	ME4ZHY	No	No
BXHFVC	No	No	NELBWX	No	No
CRADA9	No	No	NK79M7	No	No
CUFR38	No	No	PPXVK	No	No
DBGUF7	No	No	PRN2DW	No	No
DHC3E4	No	No	PWWDE3	No	No
DTZYG6	Yes	No	Q2MGCY	No	No
EBADB4	No	No	Q7LN24	No	No

TABLE 1

WebCode	Item 1	Item 2	WebCode	Item 1	Item 2
Q9NLCW	No	No			
QGF22Z	No	No			
QYFYFP	No	No			
R27BYV	No	No			
RYWAUN	No	No			
TFFMY	No	No			
TTP7GU	No	No			
UA8E2V	No	No			
UJ99PT	No	No			
URPK6E	Yes	No			
VFB3UM	No	No			
VGMJ6F	Yes	No			
VJCTCW	No	No			
VPGKPZ	No	No			
VR4L9T	No	No			
VZXGMQ	No	No			
W7F6WM	No	No			
WA3YGU	No	No			
WMLTMT	No	No			
WY6X6Q	No	No			
WYGXY	No	No			
WZ83BJ	No	No			
Y467DP	No	No			
ZN7GXJ	No	No			

Response Summary				
		Item 1	Item 2	
<b>Responses</b>	Yes	<b>5</b> (5.8%)	<b>2</b> (2.3%)	
	No	<b>81</b> (94.2%)	<b>84</b> (97.7%)	
	Inc	<b>0</b> (0 %)	<b>0</b> (0 %)	
<b>Participants: 86</b>				

# Examination Methods

TABLE 2

WebCode	Stereomicroscope	Polarized Light	Fluorescence	Pyrolysis GC	FTR	Solubility/Chemical	XRF/XRF	SEM/EDX	Microspectrophotometry	Other
2GLVBH	✓				✓					
2RN2HD	✓				✓	✓				
2W2UGJ	✓									
3LQYQJ	✓									
3ZBJ9R	✓	✓	✓		✓					
47ZB6R	✓		✓		✓					
63XRHJ	✓				✓					
6Y9J8H	✓	✓			✓					
7CRMTJ	✓	✓			✓	✓				
7URMWD	✓				✓					Visual (macroscopic)
89UDDDB	✓				✓			✓		
8KMWRG	✓	✓			✓			✓		
8WWMGB	✓				✓					
8Y3VY3	✓				✓			✓		
9KG3LF	✓		✓		✓					
9R4KBP	✓	✓			✓					
9RJ6VM	✓	✓	✓		✓					
9WEV3J	✓				✓					
A3CU8E	✓				✓					
AAGMKH	✓	✓			✓			✓		
AJGJY6		✓								
APPK9	✓				✓					
AQJL9C	✓	✓			✓			✓		
BUHZTF	✓	✓	✓		✓					
BXHFVC	✓				✓					
CRADA9	✓									
CUFR38	✓				✓		✓			UV

TABLE 2

WebCode	Stereomicroscope	Polarized Light	Fluorescence	Pyrolysis GC	FTIR	Solubility/ Chemical	XRF/XRF	SEM/EDX	Microspectrophotometry	Other
DBGUF7	✓				✓					
DHC3E4	✓		✓							
DTZYG6	✓				✓	✓		✓		
EBADB4	✓				✓					
EBUR23	✓	✓	✓			✓				
F8QJ9C	✓				✓		✓			
FDX3EG	✓	✓			✓			✓		
FQ6XP7	✓									
G247TA	✓		✓							
G8KN2B	✓				✓					Alternate light source exam.
G9F87X	✓				✓					
GDA7H8	✓			✓	✓					
GMYRN7	✓	✓	✓		✓					
GXWRZA	✓	✓			✓			✓		Pyrolysis-GC/MS
GY73T8	✓							✓		Pyrolysis GC-MS, FTIR-ATR
H2CMG8	✓				✓					
H7L3NB	✓	✓	✓		✓					
JY3U2Y	✓	✓	✓		✓		✓			Pyrolysis GC/MS
JZC237	✓		✓		✓			✓		
KJ66J8	✓			✓	✓					
KNGAU8	✓				✓	✓				
KQAYN2	✓		✓		✓					
LBRNBX	✓					✓				
LDDEDN	✓				✓			✓		
LQJBV6	✓	✓	✓		✓					
LVHNU	✓				✓					
M6KJX6	✓	✓			✓					
ME4ZHY	✓				✓					

TABLE 2

WebCode	Stereomicroscope	Polarized Light	Fluorescence	Pyrolysis GC	FTR	Solubility/ Chemical	XRS/XRF	SEM/EDX	Microspectrophotometry	Other
NELBWX	✓	✓			✓			✓		Raman spectroscopy
NK79M7	✓				✓			✓		Raman spectroscopy
PPXVK	✓	✓			✓			✓		
PRN2DW	✓									
PWWDE3	✓	✓			✓					
Q2MGCY	✓		✓		✓	✓				
Q7LN24	✓	✓			✓					
Q9NLCW	✓	✓			✓					
QGF22Z	✓		✓		✓					
QYFYFP	✓				✓					
R27BYV	✓				✓					
RYWAUN	✓	✓	✓		✓			✓		
TFFFMY	✓	✓			✓					
TTP7GU	✓				✓			✓		
UA8E2V	✓				✓					
UJ99PT	✓	✓	✓							
URPK6E					✓					
VFB3UM	✓	✓			✓					
VGMJ6F	✓				✓					
VJCTCW	✓									
VPGKPZ	✓				✓			✓		
VR4L9T	✓	✓	✓		✓	✓	✓	✓		
VZXGMQ	✓				✓					
W7F6WM	✓				✓			✓		
WA3YGU	✓				✓	✓				
WMLTMT	✓	✓			✓					
WY6X6Q	✓		✓		✓					
WYGXY	✓				✓			✓		



TABLE 2

WebCode	Stereomicroscope	Polarized Light	Fluorescence	Pyrolysis GC	FTIR	Solubility/ Chemical	XRS/XRF	SEM/EDX	Microspectrophotometry	Other
WZ83BJ	✓				✓					
Y467DP	✓				✓					
ZN7GXJ	✓		✓	✓	✓					

Response Summary										
	Participants	Stereomicroscope	Polarized Light	Fluorescence	Pyrolysis GC	FTIR	Solubility/ Chemical	XRS/XRF	SEM/EDX	Microspectrophotometry
	86	84	29	18	5	73	8	4	18	3
Percent		98%	34%	21%	6%	85%	9%	5%	21%	3%

# Conclusions

TABLE 3

WebCode	Conclusions
2GLVBH	Microscopic examination of Item 3, questioned paint chips from the clothing of the pedestrian, revealed two glossy, silver paint samples with the following layer structure: Clearcoat layer, silver flake layer, a light grey primer layer, and a dark grey primer layer. Physical, microscopic, and instrumental comparison of these samples with the known paint standards from Item 1 and Item 2 revealed them to be inconsistent with respect to the color and the binder composition of one or more of the layers. Therefore, the paint from the pedestrian's clothing did not originate from the damaged areas of vehicle #1 or vehicle #2.
2RN2HD	1) The known paint sample (suspect vehicle #1) (item 1), the known paint sample (suspect vehicle #2) (item 2), and the questioned paint chips (pedestrian) (item 3) consist of a four layers paint system with the following layer structure: Item 1: 1. Colorless acrylic-melamine enamel clear coat, 2. Silver acrylic-melamine enamel base coat with decorative flakes, 3. Light gray acrylic-melamine enamel primer, and 4. Dark gray isophthalic-polyester- melamine modified enamel primer. Item 2: 1. Colorless urethane-styrene modified acrylic-melamine enamel clear coat, 2. Silver urethane-styrene modified acrylic-melamine enamel base coat, 3. Light gray acrylic-melamine enamel primer, and 4. Dark gray isophthalic-polyester-melamine enamel primer. Item 3: 1. Colorless acrylic-melamine enamel clear coat, 2. Silver acrylic-melamine enamel base coat with decorative flakes, 3. Light gray terephthalic polyester-epoxy modified enamel primer, and 4. Dark gray terephthalic polyester- epoxy modified enamel primer. 2) The four layered paint chips in item 1 and 2 match in the physical properties studied, particularly in color and layer sequence, but don't match regarding the chemical composition of colorless clear coat and silver base coat layers. It was concluded that the paint in these items don't have a common origin. 3) The four layered paint chips in item 1 and 3 match in the physical properties studied, particularly in color and layer sequence, but don't match regarding the chemical composition of light gray and dark gray primers layers. It was concluded that the paint in these items don't have a common origin.
2W2UGJ	Examination of the paint standards in Items 1 and 2 revealed the following layer structure: Clearcoat, Silver decorative flake, Light gray, Dark gray. Examination of the questioned paint in Item 3 revealed the following layer structure: Clearcoat, Silver decorative flake, Medium gray, Dark gray. Comparison of the paint in Item 3 with the paint standards (Items 1 and 2) revealed they were different with respect to tint and texture of the third layer. Therefore, the paint in Item 3 is not consistent with originating from the same source as these paint standards. The evidence is available for pickup.
3LQYQJ	Microscopic examinations of the known paints from vehicle #1 (Item #1) and from vehicle #2 (Item #2) revealed them both to exhibit the following layer sequence: clearcoat layer, silver colorcoat layer with decorative flake, light gray primer layer and a dark gray primer layer on a metal substrate. Microscopic examination of the questioned paint chips from the clothing of the pedestrian (Item #3) revealed them to exhibit the following layer sequence: clearcoat layer, silver colorcoat layer with decorative flake, gray primer layer and a dark gray primer layer on a metal substrate. Microscopic comparison (by stereomicroscope), performed on these questioned paint chips, the known paint from vehicle #1 (Item #1) and the known paint from vehicle #2 (Item #2), revealed them to be different with respect to color and thickness of one of the primer layers. Based on the above findings, these questioned paint samples do not share a common source with the known paint from vehicle #1 or with the known paint from vehicle #2.
3ZBJ9R	The questioned paint chips (Item 3) could not have originated from the damaged area of either suspect vehicle nr. 1 or nr. 2.

TABLE 3

WebCode	Conclusions
47ZB6R	Given the differences observed by microscopy and chemical analysis, the flakes of paint recovered from the clothing of the pedestrian (represented by Item 3) could not have originated from the sampled area of vehicle 1 or of vehicle 2 as represented by Item 1 and Item 2 respectively.
63XRHJ	The paint chips, items 001-1 and 001-2, consist of a clear coat/color coat layer over a grey primer over a darker grey primer on a metallic substrate. The paint chips, item 001-3, consist of a clear coat/color coat layer over a grey primer over a dark grey primer on a metallic substrate. The grey primer of item 001-3 is visually darker in color than the same layer of grey primer in items 001-1 and 001-2. I analyzed the clear coat top paint layer and the grey primer layer with infrared microspectrophotometry. The grey primer layer of item 001-3 is different in chemical composition than the grey primer layer of both items 001-1 and 001-2. In addition, the clear coat layer of item 001-3 is different in chemical composition than the clear coat layer of item 001-2, but similar to the clear coat layer of item 001-1. Conclusion: The questioned paint chip, item 001-3, did not originate from the sources of paint as represented by the known paint chips, items 001-1 and 001-2.
6Y9J8H	Item 3 did not originate from the same source as either Item 1 or Item 2.
7CRMJTJ	Item 1 contained a known automotive[sic] paint standard. The paint standard consisted of the following layers - clear coat, silver colored base coat, gray upper primer, and a dark gray lower primer. Item 2 contained a known automotive[sic] paint standard. The paint standard consisted of the following layers - clear coat, silver colored base coat, gray upper primer, and a dark gray lower primer. Item 3 contained paint chips which were reportedly recovered from the pedestrian's clothing. The chips were visually similar. Only one chip was analyzed at this time. The questioned paint consisted of the following layers - clear coat, silver colored base coat, gray upper primer, and a dark gray lower primer. Significant differences were discovered in the chemical and elemental compositions of the known paint standard in item 1 and the questioned paint chip in item 3. Therefore, the paint chip in item 3 did not come from the same source as the known paint standard in item 1. This is an Elimination. Significant differences were discovered in the chemical and elemental compositions of the known paint standard in item 2 and the questioned paint chip in item 3. Therefore, the paint chip in item 3 did not come from the same source as the known paint standard in item 2. This is an Elimination.
7URMWD	Exhibit 3 did not originate from the same source as Exhibit 1 or Exhibit 2.
89UDDDB	Comparative examination of the paint layers of Item 3 and Item 2 found chemical and visual differences in the upper paint layer. Item 3 could not have originated from Item 2. Comparative examination of the paint layers of Item 3 and Item 1 found differences in the thickness and composition of the paint layers. Item 3 could not have originated from Item 1.
8KMWRG	1. Microscopic Examination - Item1, Item2 and Item3 are indistinguishable in their appearance; They all have four layers of clear coat, metallic base coat, gray primer surfacer and black primer. 2. Microspectrophotometry - Gray and black layers of Item1, Item2 and Item3 show similar absorption spectrum respectively. 3. FT-IR Analysis - All layers of Item1 and Item2 are not same as those of Item3 in their chemical composition.
8WWMGGB	Exhibit P2, Item 1 consisted of a metallic silver paint chip with the following layers: Clear coat / metallic silver base coat / light gray primer / dark gray primer. Exhibit P2, Item 2 consisted of a metallic silver paint chip with the following layers: Clear coat / metallic silver base coat / light gray primer / dark gray primer. Exhibit P2, Item 3 consisted of two metallic silver paint chips with the following layers: Clear coat / metallic silver base coat / light gray primer / dark gray primer. Analysis of Item 3 demonstrated slightly different physical characteristics and a significantly different chemical composition than the paint samples in Item 1 and Item 2.

TABLE 3

WebCode	Conclusions
	Accordingly, Item 3 could not have originated from the same source as Item 1 or Item 2.
8Y3VY3	Visual and microscopic examinations All three paint chips, Item 1-3 could not show any differences in term of their paint layers. However, Micro-FTIR Spectroscopy analysis of Item 3 (questioned) showed chemically consistent to Item 1, but not to Item 2. Therefore it is to be conclude that questioned paint chips (item 3) could come from the suspect vehicle #1 (Item 1)
9KG3LF	Top layer og[sic] item 3 is similar with item 1, not item 2 by FT-IR spectroscopy. However, gray layer of item 3 is different with item 1.
9R4KBP	The silver paint chips from the clothing of the pedestrian (Item 3) were dissimilar to the silver paint samples from the damaged areas of suspect vehicle #1 (Item 1) and suspect vehicle #2 (Item 2) in chemical composition. Samples were examined by stereomicroscopy, polarized light microscopy, and Fourier transform infrared spectroscopy.
9RJ6VM	The results of the examination extremely strongly support that the paint chips Item 3 doesn't originate from the damaged area of the suspect vehicle #1 (Item 1) (level-4). The results of the examination extremely strongly support that the paint chips Item 3 doesn't originate from the damaged area of the suspect vehicle #2 (Item 2) (level-4).
9WEV3J	The metallic silver paint in Item 3 was different from the metallic silver paint in Items 1 and 2. This means that the questioned paint chips recovered from the clothing of the pedestrian did not come from the damaged area of suspect vehicle #1 or the damaged area of suspect vehicle #2.
A3CU8E	The paint in Item 3 is similar in color and layer structure to the paint in Item 1, however, it is dissimilar in infrared absorbance spectra. Therefore the paint in Item 1 and 3 could not have originated from the same source. The paint in Item 3 is similar in color to the paint in Item 2, however, it is dissimilar in infrared absorbance spectra. Therefore the paint in Items 2 and 3 could not have originated from the same source.
AAGMKH	The paint samples from the suspect vehicles in Exhibits 1 and 2 have different physical characteristics and chemical composition than the paint chip from the clothing of the pedestrian (Exhibit 3). The paint chip in Exhibit 3 could not have originated from the damaged area of the suspect vehicles in Exhibits 1 and 2.
AJGJY6	Visual and microscopic examination of the questioned paint chips (item 3) to known paint samples item 1 and item 2 disclosed that they are similar with respect to paint layer structure. Therefore, item 3 could have originated from either suspect vehicle item 1 or item 2.
APPK9	3.1 Microscopic, instrumental examinations and comparisons of the paint samples of item 2 and item 3 revealed that they are dissimilar to one another with respect of layer colours and binder classifications therefore item 3 could not have originated from the source represented by item 2. 3.2 Microscopic examinations and comparisons of the paint samples of item 1 and item 3 revealed that they are dissimilar to one another with respect of layer colours therefore item 3 could not have originated from the source represented by item 1.
AQJL9C	Known paints (Items 1 and 2), reportedly from suspect vehicles #1 and #2 respectively, were examined and found to be inconsistent with the questioned paint (Item 3), reportedly from the pedestrian's clothing, with respect to color and composition.
BUHZTF	Examination of the silver colored metallic paint chips recovered from the clothing of the pedestrian (Item 3) found that the paint is four layers of automotive paint that is similar in topcoat color but different in layer structure and chemistry to the four layered silver colored automotive paint from the known vehicle samples (Items 1 and 2.) The paint chips from Item 3 could not have come from the same damaged areas as the known paint samples from Items 1 or 2. Chemical analyses performed include Fourier transformed[sic] infrared spectroscopy.

TABLE 3

WebCode	Conclusions
BXHFVC	<p>Samples collected and analyzed during the examination and analysis of the items in this case (ex. Slides with cross sections) have been returned to and retained with the original items.</p> <p>The paint in item 3 is similar in color and layer structure to the paint in item 1, however, it is dissimilar in infra-red absorbance spectra. Therefore the paint in items 3 &amp; 1 could not have originated from the same source. The paint in item 3 is similar in color and layer structure to the paint in item 2, however, it is dissimilar in infra-red absorbance spectra. Therefore the paint in items 3 &amp; 2 could not have originated from the same source.</p>
CRADA9	<p>Item 1, 2, and 3 consist of four-layered automotive paint systems (clearcoat, silver metallic colorcoat, gray primer, gray primer). The topmost gray primers differ in shade/color between Item 1/ Item 2 and the two chips comprising Item 3. Therefore, neither Item 1 nor Item 2 is the source of the Item 3 paint chips (Elimination). [Participant included an interpretation scale that could not be reproduced here.]</p>
CUFR38	<p>Items 1 - 3 were examined stereoscopically, visually with an ultra-violet light source and instrumentally using Fourier Transform Infrared Spectrometry (FTIR) and Scanning Electron Microscopy/Energy Dispersive Spectrometry (SEM/EDS). The questioned paint chips in Item 3 were not consistent with items 1 or 2. Although all three were observed to be four layer paint systems, one of the layers in item 3 (often referred to as the primer and/or base coat) displayed significant differences in relative composition when comparing the instrumental results to items 1 and 2.</p>
DBGUF7	<p>The unknown paint chips from the victim's clothing (Item 3), though visibly similar in color (silver), displayed a different chemical composition (FTIR) in one of the primer layers compared to the known paint from Item 1 (said to be from the damaged area of suspect vehicle #1) and the known paint from Item 2 (said to be from the damaged area of suspect vehicle #2). Therefore, the unknown paint did not come from the area of the vehicles where the known sample was taken (Elimination). It should be noted that vehicles may have different paint systems on different panels of the same vehicle. Further comparisons can be performed if additional known samples are submitted. 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. 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. KEY for instrument acronyms: FTIR – Fourier Transform Infrared Spectroscopy</p>
DHC3E4	<p>The colour, microscopic appearance and layer sequence of the recovered paint sample (item 3) has been compared with that of the suspect samples (item 1 and item 2). The recovered paint was found to be different in microscopic appearance from both of the suspect samples. If the suspect samples are fully representative of the damaged area from the respective vehicle they have originated from, then the recovered paint (item 3) could not have originated from the damaged area of either of these vehicles.</p>
DTZYG6	<p>It was found that item 1 could have originated from item 3, item 2 could not have originated from item 3</p>
EBADB4	<p>The paint in Exhibit 3 did not originate from the source of Exhibit 1 or 2.</p>
EBUR23	<p>The questioned paint chip was compared to the chips coming from the suspects vehicules[sic] (item 1 and item 2). It could be differentiated[sic] from both item 1 and item 2. There are differences in thickness and color of the layers.</p>
F8QJ9C	<p>It was determined utilizing stereomicroscopic, FTIR and XRF analysis that, Item 1, Item 2 and Item 3 exhibit dissimilar characteristics. Therefore, Item 1 and Item 2 can be eliminated as being the possible source of the questioned sample 3.</p>

TABLE 3

WebCode	Conclusions
FDX3EG	Physical, microscopic and chemical differences were observed between the questioned paint chips recovered from the clothing of the pedestrian (item 3) and the known paint samples representative of the damaged areas from both suspect vehicle #1 (item 1) and suspect vehicle #2 (item 2); therefore item 3 did not originate from the same source as either item 1 or item 2.
FQ6XP7	It is in the opinion of the undersigned that item #3 could not have come from the same source as represented by items #1 and 2.
G247TA	1. Comparative examinations of the paint chips in Exhibits 1 (known paint sample from suspect vehicle #1) and 3 (questioned paint from clothing) disclosed them to be dissimilar in their physical characteristics. Therefore, the questioned paint in Exhibit 3 did not originate from the damaged area of suspect vehicle #1 as represented by Exhibit 1. 2. Comparative examinations of the paint chips in Exhibits 2 (known paint sample from suspect vehicle #2) and 3 (questioned paint from clothing) disclosed them to be dissimilar in their physical characteristics. Therefore, the questioned paint in Exhibit 3 did not originate from the damaged area of suspect vehicle #2 as represented by Exhibit 2. 3. If another potential source(s) of the questioned paint in Exhibit 3 is found and deemed probative to this investigation, please submit for comparison(s).
G8KN2B	Item #3 could not have come from the sources represented by items #1 or #2.
G9F87X	1. The sample of painting known described as Item 1, the sample of painting known described as Item 2 and the questioned paint chips described as Item 3, consist of four layers paint system. The item 1 with the following layer structure: 1. Colorless acrylic-melamine enamel clear coat, 2. Bright light gray acrylic-melamine enamel base coat, 3. Light gray acrylic-melamine enamel primer with china clay paint extender, and 4. Dark gray isophthalate polyester-melamine enamel primer with barium sulfate paint extender. The item 2 with the following layer structure: 1. Colorless acrylic-urethane (new generation) with melamine enamel clear coat, 2. Bright light gray acrylic-melamine enamel base coat, 3. Light gray acrylic-melamine enamel primer with china clay paint extender, and 4. Dark gray isophthalate polyester-melamine enamel primer with barium sulfate paint extender. The item 3 with the following layer structure: 1. Colorless acrylic-melamine enamel clear coat, 2. Bright light gray acrylic-melamine enamel base coat, 3. Light gray terephthalate polyester-epoxy alkyl modified enamel primer with calcium carbonate paint extender, and 4. Dark gray terephthalate polyester-epoxy alkyl modified enamel primer with calcium carbonate paint extender. All this sequences exhibits typical characteristics of an original automotive finish. 2. The four layers of paint on items 1 and 2 do not match in all properties analyzed in relation to the four layers of item 3, particularly in the chemical composition the first, third and fourth layer paint. Therefore, the item 1 and 2 does not have a common origin with the painting of item 3.
GDA7H8	Top layer of Item 3 is similar with item 1, not item 2 by FT-IR spectroscopy. But gray layer of item 3 is different with item 1.
GMYRN7	The paint layers from representative paint chips in Item 3 and the paint layers in Items 1 and 2 were examined and compared visually, microscopically and instrumentally and were found to be inconsistent in all measured chemical compositions. They could not have come from the same source.
GXWRZA	The paint in Exhibit 3 did not originate from the same source-area as the paint in Exhibit 1. The paint in Exhibit 3 did not originate from the same source-area as the paint in Exhibit 2.
GY73T8	The paint in Exhibit #3 did not originate from the same area of the same vehicle represented by the paint in either Exhibit #1 or #2.
H2CMG8	The known paint samples (Item 1 and Item 2) and the questioned paint chips (Item 3) consist

TABLE 3

WebCode	Conclusions
	each of a system of four paint layers. The known paint sample (Item 1) has a paint system different from the questioned paint sample (Item 3). The known paint sample (Item 2) has a paint system different from questioned paint sample (Item 3). Therefore the questioned paint chips (Item 3) recovered from the clothing of the pedestrian, cannot have originated from the damaged area of either suspect vehicle #1 or #2 as represented by Items 1 and 2, respectively.
H7L3NB	Item 1, item 2 and item 3 have been examined[sic]. As analysis methods carried out, we can conclude that the paint chips recovered from the clothing of the pedestrian do not come neither from the front bumper oh[sic] the suspect vehicle #1 (Item 1) nor from the front bumper of the suspect vehicle #2 (Item 2).
JY3U2Y	Based on the sample analysis, it was concluded that the questioned paint chips (Item - 3) could not have originated from the damaged area of either suspect vehicle #1 or #2.
JZC237	The three silver effect paint samples (Item 1, 2 and 3) exhibit a similar layer construction, consisting of a clear coat, a silver effect basecoat, a grey primer surfacer and a black first primer. The three paint chips were analyzed with microscopic methods (stereomicroscope and fluorescence) and with infrared spectroscopy and SEM/EDX. Item 3 is distinguishable from Item 1 and 2 with microscopic methods and SEM/EDX. The grey layer of Item 3 is darker grey than the corresponding layers of the other two paint chips (Item 1 and 2) and contains additional iron. Difference between the Items 1 and 2 were also found in the chemical properties of the clear coat, silver effect basecoat and the grey primer surfacer observed by infrared spectroscopy. The questioned paint chips recovered from the clothing of the pedestrian (Item 3) were found to be different from the paint samples collected from the damaged area of the suspect vehicle #1 (Item 1) and from those collected from the damaged area of the suspect vehicle #2 (Item 2).
KJ66J8	The paint from item 3 (Questioned paint chips recovered from the clothing of the pedestrian) and the paint from item 1 (known paint sample representative of the damage area of suspect vehicle Number 1) were inconsistent on chemical composition and could not have the same source. The paint from item 3 (Questioned paint chips recovered from the clothing of the pedestrian) and the paint from item 2 (known paint sample representative of the damage area of suspect vehicle Number 2) were inconsistent on chemical composition and could not have the same source.
KNGAU8	On analysis, I found the questioned paint chips in Item 3 to be dissimilar with the known paint sample in Item 1 and Item 2.
KQAYN2	Items 1, 2, and 3 were examined visually and using stereomicroscopy, fluorescence microscopy, and Fourier Transform Infrared Spectrophotometry (FTIR). The multilayered silver paint particles with decorative flake in Item 3 could not be associated with the multilayered silver paint with decorative flake in Item 1 or Item 2 due to differences in color and chemical composition.
LBRNBX	Examination of the paint standards in Items 1 and 2 revealed the following layer structure: Clear coat, Silver with decorative flake, Light tan, Dark gray. Examination of Item 3 revealed paint samples with a different layer structure from Submissions 1 and 2. The paint samples from Item 3 were found to differ from the paint standards with respect to color, tint, and thickness of layer three. Therefore, the paint in Submission 3 did not originate from the same sources as the paint standards of Submissions 1 and 2. The evidence is available for pickup.
LDDEDN	Microscopic and instrumental analysis (FTIR and SEM/EDX) of the submitted paint sample (item 1, item 2, item 3) yielded the following result: item 2 and item 3 are consistent with respect to color, texture, type and lay structure. Therefore item 2 could have originated from

TABLE 3

WebCode	Conclusions
	the source represented by item 3 . Item 1 and item 3 are disimilar[sic] with respect to chemical composition of layer 2. Therefore, item 1 could not have originated from the same source as item 3.
LQJBV6	The known paint samples representative of the damaged areas of suspect vehicles #1 and #2 (Items 1 and 2) consist of four layers: a clearcoat, a silver metallic basecoat, a light grey primer surfacer and a dark grey first primer. The questioned paint chips recovered from the clothing of the pedestrian (Item 3) consists of four layers, too: a clearcoat, a silver metallic basecoat, a grey primer surfacer and a dark grey first primer. The colour and chemical composition of the third layer of Item 3 is different from that of Items 1 and 2. Then questioned paint chips (Item 3) could not have originated from the damaged area of suspect vehicles #1 or #2 (Items 1 and 2).
LVHNUH	The paint from Items 2 and 3 are not comparable with the paint from Item 1.
M6KJX6	CONCLUSION The examined portions of the questioned paint chips recovered from the clothing of the pedestrian (Item 1-3) were found to be different instrumentally from the examined portions of the known paint sample representative of the damaged area of suspect vehicle #1 (Item 1-1). Accordingly, the questioned paint chips recovered from the clothing of the pedestrian could not have originated from the known paint sample representative of the damaged area of suspect vehicle #1. The examined portions of the questioned paint chips recovered from the clothing of the pedestrian (Item 1-3) were found to be different instrumentally from the examined portions of the known paint sample representative of the damaged area of suspect vehicle #2 (Item 1-2). Accordingly, the questioned paint chips recovered from the clothing of the pedestrian could not have originated from the known paint sample representative of the damaged area of suspect vehicle #2.
ME4ZHY	Questioned paint chips recovered from the clothing of the pedestrian (Item 3) was different chemical composition of clear coat or surfacer from Known paint sample representative of the damaged area of suspect vehicle #1 (Item 1) and Known paint sample representative of the damaged area of suspect vehicle #2 (Item 2). Therefore, Item3 could not have come from Item1 and Item2.
NELBWX	Features of layers of item #3 are different from the same features of item #1 and #2 as well (morphologies, infrared spectra, inorganic element concentrations).
NK79M7	The questioned paint chips recovered from the clothing of the pedestrian, marked "Item 3", did not originate from the same sources as the control paint samples collected from the damaged areas of the suspect vehicle #1 and suspect vehicle #2, marked "Item 1" and "Item 2" respectively.
PPXVVK	Item 3 could not have originated from item 1 or item 2.
PRN2DW	Microscopical examination of the paint standards from the two suspect vehicles in Items 1 and 2 revealed each exhibited the following layer structure: Clear coat, Silver flake, Light gray primer, Charcoal gray primer. Microscopical examination of paint from the clothing in Item 3 revealed the following layer structure: Clear coat, Silver flake, Medium gray primer, Charcoal gray primer. Comparison of the paint from the clothing in Item 3 with the paint standards from the vehicles in Items 1 and 2 revealed a distinct difference in the color of the top primer layer. Therefore, the paint in Item 3 also exhibits a different layer structure than that of Items 1 and 2. Based on these finding, the paint in Item 3 is different from those in Items 1 and 2 and does not have the same origin.
PWWDE3	The examined portions of the questioned paint chips recovered from the clothing of the pedestrian (Item 1-3) were found to be different in microscopic appearance and instrumental properties from the examined portions of the known paint sample representative of suspect



TABLE 3

WebCode	Conclusions
	vehicle # 1 (Item 1-1) and the known paint sample representative of suspect vehicle # 2 (Item 1-2). Accordingly, the questioned paint chips recovered from the clothing of the pedestrian could not have originated from known paint sample representative of suspect vehicle # 1 or the known paint sample representative of suspect vehicle # 2.
Q2MGCY	Item #1 - Consists of known paint (vehicle 1) exhibiting the following layer structure: 1. clear coat top coat, 2. silver metallic color coat, 3. light gray primer, 4. medium grey primer. Item #2 - Consists of known paint (vehicle 2) exhibiting the following layer structure: 1. Clear coat top coat, 2. Silver metallic color coat, 3. light gray primer, 4. medium gray primer. Item #3 - Consists of the questioned paint exhibiting the following layer structure: 1. clear coat top coat, 2. silver metallic color coat, 3. light-medium gray primer, 4. medium gray primer. Microscopic, microchemical, and instrumental analysis (Micro - FTIR) of the submitted paint particles from items #1 (known), #2 (known) and #3 (questioned) disclosed that the questioned paint (item #3) cannot be associated with the painted surfaces represented by items #1 and #2.
Q7LN24	The damaged areas of the suspect vehicles (as represented by Items 1 and 2) are both eliminated as a possible[sic] source of the paint recovered from the clothing of the pedestrian (Item 3). Different areas of a vehicle can be painted or repaired differently, therefore if additional samples from the suspect vehicle #1 are available, they can be submitted along with item 3 for examination.
Q9NLCW	The paint chips from all 3 items were consistent with a four coat automotive paint system. These chips were dissimilar to each other in the chemical composition of their corresponding layers. Therefore, the chips from the clothing of the pedestrian (item 3) could not be associated with the damaged areas from either suspect vehicle (items 1 and 2).
QGF22Z	1. Examinations of Items 1 (known paint sample representative of the damaged area of the suspect vehicle # 1), 2 (known paint sample representative of the damaged area of the suspect vehicle # 2), and 3 (questioned paint chips recovered from the clothing of the pedestrian) disclosed the following: a. Each paint sample in Exhibit 1 and in Exhibit 2 revealed the presence of four layers of paint (clear-colorless/silver-metallic/light gray-tan hue/dark gray) on a metal substrate. Although the paint samples in Items 1 and 2 were indistinguishable from each other in their microscopic characteristics (layer structure, layer color, and sequence), further examinations disclosed that the clear-colorless layers in Items 1 and 2 were dissimilar in their chemical compositions. b. The paint chips in Item 3 revealed the presence of four layers of paint (clear-colorless/silver-metallic/gray/dark gray) on a metal substrate. 2. Comparative examinations of the paint chips in Item 3 with the paint samples in Items 1 and 2 disclosed them to be dissimilar in their microscopic characteristics (layer color and sequence). Therefore, the questioned paint chips in Item 3 could not have originated from the damaged area of the vehicles as represented by the paint sample in Item 1 or the paint sample in Item 2.
QYFYFP	The infrared spectrum produced by Item 3 was not consistent with the spectrum produced by Item 1 or the spectrum produced by Item 2. Therefore, Item 3 could not have originated from the damaged area of either suspect vehicle #1 or #2 as represented by Items 1 and 2, respectively.
R27BYV	The upper primer layer in Items 1 and 2 are visually and chemically dissimilar to the corresponding layer in Item 3. The paint chips in Item 3 did not originate from the same source as Item 1 or Item 2.
RYWAUN	The questioned paint chips recovered from the clothing of the pedestrian (Item 3) resembles with the known paint samples representative of the damaged area of suspect vehicle #1 (Item 1) and #2 (Item 2) with respect to the layer sequence [sic]. They all have a four-layer structure

TABLE 3

WebCode	Conclusions
	containing top clear coat, silver coat, grey coat and dark coat. However, the grey coat of Item 3 presents different optical characteristics from that of Item 1 and Item 2 through microscopic examination. Furthermore, the FTIR and SEM-EDS results of each layer of the three samples demonstrate that Item 3 is different from Item 1 and Item 2 in the chemical composition. Therefore, the questioned paint chips (Item 3) could not have originated from the damaged area of either suspect vehicle as represented by Item 1 and Item 2.
TFFFM	The metallic silver multi-layer paint chips recovered from the clothing, item 3, were microscopically examined and determined to have a top to bottom layer structure that is clear coat/ metallic flake coat/ medium grey primer/ dark grey primer. The layer structure was microscopically compared to the layer structures in the paint samples in items 1 and 2. The layer structure of the paint chips in item 3 was determined to be physically different from the layer structure of the vehicles in items 1 and 2. The top primer color for item 3 is a medium grey color and the top primer color for the samples in items 1 and 2 is a much lighter grey / beige color. Therefore, items 1 and 2 are excluded as being the source for the questioned paint chips item 3.
TTP7GU	The questioned paint chips in Item 3 were not consistent with the damaged areas of either suspect vehicle #1 or #2 as represented by Items 1 and 2.
UA8E2V	Microscopic and instrumental examinations and comparisons of the paint fragments recovered from the victim's clothing with the paint standards collected from suspect vehicle #1 and suspect vehicle #2 revealed significant differences in their layer 3 primers. Accordingly, the paint fragments recovered from the victim's clothing did not originate from either suspect vehicle #1 or suspect vehicle #2.
UJ99PT	The samples of paint from the suspect vehicles, item 1 and item 2, are similar to each other in colour and layer structure, but both are different, in terms of colour of one of the undercoat layers, from the paint from the clothing of the pedestrian. Therefore, the paint recovered from the clothing of the pedestrian could not have originated from the damaged area of suspect vehicle 1 or the damaged area of suspect vehicle 2.
URPK6E	Item 1 and Item 3 have similar chemical structure groups. Item 2 and Item 3 have dissimilar chemical structure groups.
VFB3UM	Examination of the known paint, Exhibits 1 and 2, showed that they consisted of a clearcoat over a silver metallic basecoat, light gray primer and dark gray primer. Examination of the questioned paint, Exhibit 3, showed it consisted of a clearcoat over a silver metallic basecoat, a medium gray primer and a dark primer. The medium gray primer from Exhibit 3 was not consistent in color or chemical composition with the light gray primers from Exhibits 1 and 2. Additionally, the size and shape of the aluminum pigments in Exhibit 3 appeared different than those in Exhibits 1 and 2. Therefore, Exhibit 3 did not come from the same source or vehicle panel as Exhibits 1 or 2.
VGMJ6F	The paint from the suspect vehicle 1, Item 1, was indistinguishable in the property examined from the questioned paint chips, Item 3. Therefore they could have originated from the same source. The paint from the suspect vehicle 2, Item 2, was different from one of the vehicle 3, Item 3, in the property examined.
VJCTCW	Based on comparisons to the submitted vehicle exemplars, the questioned paint chips could not have come from either suspect vehicle.
VPGKPZ	The paint from 'suspect vehicle #1' (Item 1) and 'suspect vehicle #2' (Item 2) consisted of four paint layers: a clear top coat, silver metallic 2nd layer, pale grey 3rd layer and a dark grey 4th layer. The paint chip from the 'clothing of the pedestrian' (Item 3) consisted of four paint layers: a clear top coat, silver metallic 2nd layer, grey 3rd layer and a dark grey 4th layer.

TABLE 3

WebCode	Conclusions
	<p>Significant differences were detected in the chemical composition of the clear top coat of the paint chip from the 'clothing of the pedestrian' (Item 3) and the clear top coat from 'suspect vehicle #2' (Item 2). In addition, significant differences were detected in the appearance and chemical composition of the grey 3rd layer and in the chemical composition of the grey 4th layer of the paint chip from the 'clothing of the pedestrian' (Item 3) and the respective layers from 'suspect vehicle #1' (Item 1) and 'suspect vehicle #2' (Item 2). Consequently, it is my opinion that the paint chip from the 'clothing of the pedestrian' (Item 3) did not originate from the damaged area of 'suspect vehicle #1' (Item 1) or from the damaged area of 'suspect vehicle #2' (Item 2).</p>
VR4L9T	<p>CONCLUSIONS: The questioned paint recovered from the pedestrian (item 1C/CTS item 3) did not originate from the areas/panels of the two suspect vehicles represented by item 1A (CTS item 1) and item 1B (CTS item 2). RESULTS: The questioned paint from the pedestrian was examined for the purpose of determining whether or not it is like that on suspect vehicle #1 or suspect vehicle #2. The paint standard from suspect vehicle #1 (item 1A) has the following layer structure: 1. Colorless clearcoat, 2. Light gray (silver) basecoat (with effect pigment), 3. Light gray acrylic-melamine enamel primer, 4. Dark gray primer. The paint standard from suspect vehicle #2 (item 1B) has the following layer structure: 1. Colorless acrylic-melamine enamel clearcoat, 2. Light gray (silver) acrylic-melamine enamel basecoat (with effect pigment), 3. Light gray acrylic-melamine enamel primer, 4. Dark gray primer. These paints exhibit characteristics typical of original automotive finishes and were used for comparison with the questioned paint recovered from the pedestrian (item 1C). The questioned paint recovered from the pedestrian (item 1C) has the following layer structure: 1. Colorless clearcoat, 2. Light gray (silver) basecoat (with effect pigment), 3. Light gray epoxy-polyester enamel primer, 4. Dark gray primer. Examination and comparison of the questioned paint (item 1C) with items 1A and 1B revealed they are dissimilar with respect to the color, binder type and pigment characteristics of layer 3 (light gray primer). It is therefore concluded that the questioned paint recovered from the pedestrian did not originate from the areas/panels of the vehicles represented by items 1A and 1B. It should be noted that it is not uncommon for vehicles to have different paint systems on different body panels of the same vehicle. Considering the similarities in layer structure and basecoat color, it is requested that additional standard samples be taken from every damaged panel/area on the subjects' vehicles and submitted to the laboratory for further comparison with the paint fragments recovered from the pedestrian (item 1C). METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, brightfield/polarized light comparison microscopy, microchemical tests, Fourier transform infrared microspectroscopy, pyrolysis gas chromatography, scanning electron microscopy/energy dispersive x-ray analysis and x-ray fluorescence spectroscopy.</p>
VZXGMQ	<p>Visual, microscopic examination and instrumental analysis (Fourier Transform Infrared Spectroscopy) of the questioned paint chips QA and QB and comparison to the known paint samples K1 and K2 disclosed they are different with respect to the color and chemical type of layer 3. Therefore, it is the opinion of the undersigned that the questioned paint chips QA and QB (lab item 3) could not have originated from the same source represented by the known paint samples K1 (lab item 1) or K2 (lab item 2).</p>
W7F6WM	<p>The questioned paint chips (Item 3) have originated from the damaged area of neither suspect vehicle #1 nor #2 as represented by Items 1 and 2, respectively.</p>
WA3YGU	<p>The paint in Item 3 was found to have a primer layer that was dissimilar in chemical composition to the primer layer in Item 1 and the primer layer in Item 2. The metallic silver layer and the clear coat layer in Item 3 were found to be dissimilar in chemical composition to the metallic silver layer and the clear coat layer in Item 2. Therefore, the paint in Item 3 could</p>

TABLE 3

WebCode	Conclusions
	not have originated from the same source as the paint in Item 1 or the paint in Item 2.
WMLTMT	The following items were analyzed using the Polarized Light Microscope, Stereomicroscope, and Fourier Transform Infrared Microscope. Item 3 (Lab Item 1C) could not have originated from either Item 1 (Lab Item 1A) or Item 2 (Lab Item 1B) due to differences in layer cross-section and chemical composition.
WY6X6Q	The questioned paint chips (Item 3) originated from a source other than the damaged area of vehicle 1 (item 1) and vehicle 2 (item 2)
WYGXYX	Known paint samples in Items 1 and 2 from the damaged area of suspect vehicle #1 and #2 respectively each comprised one piece of fourth-layered metallic silver paint fragment having a first colourless layer, a second metallic silver layer, a third pale grey layer and a fourth dark grey layer. Questioned paint sample in Item 3 from the clothing of the pedestrian comprised two pieces of fourth-layered metallic silver paint fragments, agreeing in colour and layer sequence with the known paint samples in Items 1 and 2. However, the third layer of the questioned paint sample Item 3 was found to differ in chemical composition with the corresponding layer of the known paint sample Item 1. Whist[sic] the first to third layers of the questioned paint sample Item 3 were found to differ in chemical composition with the corresponding layers of the known paint sample Item 2. The above findings indicated the questioned paint sample Item 3 did not originate from the damaged areas of either suspect vehicle #1 or #2 from which the known paint samples Items 1 and 2 were taken respectively.
WZ83BJ	MICROSCOPIC, INSTRUMENTAL EXAMINATION AND COMPARISON OF PAINT SAMPLES; ITEM 1 AND ITEM 2, WITH ITEM 3 REVEALED THAT THEY ARE DISSIMILAR TO ONE ANOTHER WITH RESPECT TO THEIR LAYER COLOURS AND BINDER CLASSIFICATION. THEREFORE THE QUESTIONED PAINT CHIPS RECOVERED FROM THE CLOTHING OF THE PEDESTRIAN COULD NOT ORIGINATE FROM THE SOURCE REPRESENTED BY ITEM 1 AND ITEM 2.
Y467DP	1. Microscopic Analysis: Item 1, Item 2 and Item 3 are all 4 layers painted samples. 2. Chemical Analysis: The first layer of Item 3 is different from Item 1 and the third layer of Item 3 is different from Item 2. 3. Result: The paint chips recovered from the clothing of the pedestrian(Item 3) are different from Item 1 and 2.
ZN7GXJ	1.Questioned paint chips (Item3) and known paint samples (Item 1, 2) were found to be similar in color and layer structure. 2.Questioned paint chips (Item3) and known paint samples (Item 1, 2) were analyzed by FTIR and Py-GC, and none of the three samples is similar in composition.

# Additional Comments

TABLE 4

WebCode	Additional Comments
2RN2HD	In our laboratory the majority of casework received consists of automobile paint transfer, it is common to receive different exhibits from a real case scenario to compare with a suspect car. The typical problems are fragment size and usual refinish cars with more than 10 layers. According to our experience, this test is a usual scenario. The new for us is work only with OEM finish [sic].
89UDDB	This test was used as a training element in optical and FTIR microscopy.
AJGJY6	Paint layers - clearcoat, silver, metallic purple, light grey undercoat, dark grey undercoat.
CRADA9	Interpretation scale would be included in the report.
CUFR38	Our lab does not typically receive paint fragments on a metal substrate.
DHC3E4	All paint samples found to have the following layer sequence: Clear top coat; metallic silver; light grey; dark grey; metal. Differences found in fluorescence characteristics of clear top-coat of items 2 and 3, and light grey layer of item 3 versus items 1 and 2. Difference noted in relative layer thickness between item 3 and items 1 and 2.
EBUR23	Due to a lack of time, only one questioned paint chip has been treated. Though the color silver could not have been differentiated from the suspects color, the thickness of the layers and their reaction in fluorescence light microscopy are clearly different. It could not be excluded, that the paint could have come from a different part of the vehicles. [sic]
G9F87X	The possibility of paint samples questioned described as item 3 come from one of the two suspect vehicles, will determine that any of these vehicles present a refinish factory paint very close to the impact zone, and it is different chemically to the sample collected for comparison.
H7L3NB	However, we can also make two assumptions : - Item 3 comes from another part of the suspect vehicles (vehicles #1 or vehicle #2). - Item 3 comes from another vehicle (different from vehicle #1 and #2)
LVHNHU	The clearcoat from Item 2 is different from the clearcoats from Items 1 and 3. The clearcoats are acrylic melamine but Item 2 also is second generation urethane and styrene modified. Items 1 and 3 have different primer surfacers.
NK79M7	The third layer of the questioned paint chips marked "Item 3" was found to be different from the third layers of the control paint samples marked "Item 1" and "Item 2" in terms of colour. The outer two layers of the questioned paint chips marked "Item 3" were found to be similar to the outer two layers of the control paint sample marked "Item 1" respectively in terms of chemical composition. The third and fourth layers of the questioned paint chips marked "Item 3" were found to be different from the third and fourth layers of the control paint sample marked "Item 1" respectively in terms of chemical composition. The four layers of the questioned paint chips marked "Item 3" were found to be different from the four layers of the control paint sample marked "Item 2" respectively in terms of chemical composition.
Q2MGCY	Due to the presence of some similarities, I would suggest to the submitting investigator to submit additional known paint samples from all areas of damage on the vehicle.
Q7LN24	In this case I would phone the investigator to ask if all damaged areas of Suspect Vehicle#1 were sampled, and advise that different panels can be painted differently, especially plastic versus metal.

TABLE 4

WebCode	Additional Comments
R27BYV	If this had been a real case the questioned sample (Item 3) would have been analyzed and searched through the PDQ database in an attempt to identify the make and model of the vehicle.
UJ99PT	I have made the assumption that the paint sample from each of the suspect vehicles is representative of the paint layer structure of each vehicle.
VFB3UM	I would email the investigator asking if there was other vehicle panel damaged on either vehicle and, if so, to submit paint from that area of the vehicle as well.
VR4L9T	Note-Item 3 was found to be dissimilar to Items 1 and 2 using stereomicroscopy and examinations would normally be halted at that point. My laboratory policy required me to continue performing additional tests because this is a proficiency test.
WA3YGU	CTS informed me to consider all four layers of each sample.
WY6X6Q	Items 1 and 2 were distinguishable using FTIR (lacquer layers). Item 3 was distinguishable from items 1 and 2 using microscopy. However, FTIR was also used.

# Appendix: Data Sheet

Collaborative Testing Services ~ Forensic Testing Program

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## Test No. 14-546: Paint Analysis

DATA MUST BE RECEIVED BY November 24, 2014 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

### Accreditation Release Statement

CTS submits external proficiency test data directly to ASCLD/LAB and ANSI-ASQ NAB/FQS. Please select one of the following statements to ensure your data is handled appropriately.

- This participant's data is intended for submission to ASCLD/LAB and/or ANSI-ASQ NAB/FQS. (Accreditation Release section on the last page must be completed and submitted.)
- This participant's data is NOT intended for submission to ASCLD/LAB or ANSI-ASQ NAB/FQS.

### Online Data Entry

Visit [www.cts-portal.com](http://www.cts-portal.com) to enter your proficiency test results online. If you have any questions please do not hesitate to contact CTS.

### Scenario:

Police are investigating a hit-and-run incident involving a pedestrian. Investigators have recovered silver paint chips from the clothing of the pedestrian. Two suspect vehicles have been located which match witness descriptions, both of which appear to have sustained damage to the front bumper. A known paint sample has been collected from the damaged area of each vehicle. Police are requesting that you examine the recovered paint chips and determine if they could have originated from the damaged area of either suspect vehicle.

Please Note:

- Samples contained within each individual item are representative of a single source.
- The purpose of this test is the examination of the paint; please ignore the metal substrate.

### Items Submitted (Sample Pack P2):

- Item 1: Known paint sample representative of the damaged area of suspect vehicle #1
- Item 2: Known paint sample representative of the damaged area of suspect vehicle #2
- Item 3: Questioned paint chips recovered from the clothing of the pedestrian

**1.) Could the questioned paint chips (Item 3) have originated from the damaged area of either suspect vehicle #1 or #2 as represented by Items 1 and 2, respectively?**

	<u>Suspect Vehicle 1 (Item 1)</u>				<u>Suspect Vehicle 2 (Item 2)</u>								
<b>Item 3</b>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inc	<input type="checkbox"/>	<b>Item 3</b>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inc	<input type="checkbox"/>

Please return all pages of this data sheet.

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Participant Code:

WebCode:

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

Microscopic Examinations:

Stereomicroscope

Polarized Light

Fluorescence

Pyrolysis GC

FTIR

Solubility/Chemical

XRS/XRF

SEM/EDX

Microspectrophotometry

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

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

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**4.) Additional Comments**

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**Return Instructions:** Data must be received via online data entry, fax (please include a cover sheet), or mail by *November 24, 2014* to be included in the report.

QUESTIONS?

TEL: +1-571-434-1925 (8 am - 4:30 pm EST)

EMAIL: [forensics@cts-interlab.com](mailto:forensics@cts-interlab.com)  
[www.ctsforensics.com](http://www.ctsforensics.com)

Participant Code:

ONLINE DATA ENTRY: [www.cts-portal.com](http://www.cts-portal.com)

FAX: +1-571-434-1937  
or Toll-Free: 1-866-FAX-2CTS (329-2287)

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

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

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## RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **14-546: Paint Analysis**

This release page must be completed and received by **November 24, 2014** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

### **ASCLD/LAB RELEASE**

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

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

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

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

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

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

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

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

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

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

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

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

### Accreditation Release

#### **Return Instructions**

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

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

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

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