



Glass Analysis

Test No. 21-5481 Summary Report

Each participant received a sample set consisting of one set of known glass fragments (Item 1) and two sets of questioned glass particles (Items 2 and 3). Participants were requested to analyze and compare these and report their findings. Data were returned from 70 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 set consisted of three samples of glass, one Known (Item 1) and two Questioned (Items 2 and 3). Items 1, 2, and 3 were collected from the same outer pane of a 2015 Toyota 4Runner. Examiners were instructed to examine the questioned glass particles and determine if any could have originated from the same source as the known recovered glass fragments (Item 1).

SAMPLE PREPARATION: The windshield used for this test was wiped down and checked for defects. The windshield pane was cut and broken using glass tools to remove the edges and unwanted areas. Fragments from the outer pane were separated from the inner membrane using a razor blade.

ITEMS 1, 2, and 3 (IDENTIFICATION): For the Known Item 1 samples, two glass fragments approximately 1/8" x 1/8" in size were selected and packaged in a glassine bag and then a pre-labeled Item 1 coin envelope. For the questioned Item 2 and Item 3 samples, two glass particles approximately 1/16" x 1/16" in size were selected and packaged in each glassine bag and then into a prelabeled Item 2 or Item 3 coin envelope. Items 1, 2, and 3 samples were taken in close spatial proximity to one another and were kept together as an identification group and packaged into the sample set as described below.

SAMPLE SET ASSEMBLY: For each sample set, an Item 1, Item 2, and Item 3 from the same identification group were placed in a pre-labeled envelope. The sample pack was sealed with invisible tape. Once verification was completed, all sample packs were further sealed with a piece of evidence tape and initialed "CTS".

The average refractive indices for the glass as reported by predistribution laboratories are as follows: Item 1 RI = 1.51945, Item 2 RI = 1.51944, and Item 3 RI = 1.51943.

VERIFICATION - All three predistribution laboratories reported the expected associations. The methods employed by the predistribution laboratories included Color, ICP-MS, Refractive Index nD, SEM/EDS, Thickness, UV Fluorescence Short and Long, and XRS/XRF.

Summary Comments

This test was designed to allow participants to assess their proficiency in the examination, comparison, and interpretation of glass samples. Each sample set consisted of three samples of glass, one known (Item 1) and two questioned (Items 2 and 3). Items 1, 2, and 3 were from the same outer pane of the 2015 Toyota 4Runner. Participants were instructed to examine the questioned samples and determine if either set could have come from the known source. (Refer to the Manufacturer's Information for preparation details.)

Out of the 70 responding participants, 66 reported the expected results for both questioned items.

Of the 70 participants that reported results for Item 2, 68 participants (97.1%) reported that Item 2 could have originated from the Item 1 known glass sample. The remaining two participants (2.9%) reported that Item 2 could not have originated from the Item 1 known glass sample.

Of the 70 reported results for Item 3, 66 participants (94.3%) reported that Item 3 could have originated from the Item 1 known glass sample. Three participants (4.3%) reported that Item 3 could not have originated from the Item 1 known glass sample, and the last remaining participant reported inconclusive results.

The most commonly reported methods of analysis were thickness (94%), refractive index (nD) (81%), color (77%), and short UV (71%).

Examination Results

Could the questioned glass fragments recovered from the victim's clothing (Item 2) and/or concrete median (Item 3) have originated from the damaged area of the suspect's windshield as represented by Item 1?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
28ACHD	Yes	Yes	FE37UD	Yes	Yes
2RFMLG	Yes	Yes	FUWTZ7	Yes	Yes
2VFVTD	Yes	Yes	G2DNGZ	Yes	Yes
3PKNKN	Yes	Yes	GBF7R3	Yes	Yes
4R6XAF	Yes	Yes	GFVG68	Yes	Yes
4YNZGH	Yes	Yes	GLXPCY	Yes	Yes
4YPVZN	Yes	Yes	HF7Z6U	Yes	Yes
6RNZGF	Yes	Yes	KBNJM2	Yes	Yes
6WXAQX	Yes	Yes	LAPD78	No	No
7346AX	Yes	Yes	M99UJF	Yes	Yes
7TT4PW	Yes	Yes	MEWJWX	Yes	Yes
88QGGD	Yes	Yes	MMTALF	Yes	Yes
93C4CK	No	No	MV2QCZ	Yes	Yes
9NARH7	Yes	Yes	PC3CRR	Yes	Yes
9U2URX	Yes	Yes	PW9PLY	Yes	Yes
BUAVKA	Yes	Yes	PZMMQ2	Yes	Yes
C2M4LB	Yes	Yes	Q9W9EV	Yes	Yes
CA6DA8	Yes	Yes	QCG2QX	Yes	Yes
CDZ4H6	Yes	Yes	QGEH4R	Yes	Yes
CPUHH2	Yes	Yes	QNRTUX	Yes	Yes
CPVHFF	Yes	Yes	QTLR9T	Yes	Inc
CV2BBC	Yes	Yes	RRR4PX	Yes	Yes
CV4W7R	Yes	Yes	TLZAAC	Yes	Yes
D92894	Yes	Yes	TWURHP	Yes	Yes
EAWC34	Yes	Yes	U4UCKK	Yes	Yes
ECWHGA	Yes	Yes	U99APM	Yes	Yes
EE37WY	Yes	Yes	ULD9XT	Yes	Yes
END8FE	Yes	Yes	UPE4P9	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
V9J9KV	Yes	Yes			
W94CRW	Yes	Yes			
W9EDEV	Yes	No			
WFEVQL	Yes	Yes			
WPNXCM	Yes	Yes			
WUHWQH	Yes	Yes			
XBGL37	Yes	Yes			
YK8CGK	Yes	Yes			
YR67EJ	Yes	Yes			
Z2QP8H	Yes	Yes			
Z32PB4	Yes	Yes			
ZPBZ9D	Yes	Yes			
ZQ7HBE	Yes	Yes			
ZZFPBN	Yes	Yes			

Response Summary		Total Participants: 70	
<i>Could the questioned glass fragments recovered from the victim's clothing (Item 2) and/or concrete median (Item 3) have originated from the damaged area of the suspect's windshield as represented by Item 1?</i>			
Response		<u>Item 2</u>	<u>Item 3</u>
	Yes	68 (97.1%)	66 (94.3%)
	No	2 (2.9%)	3 (4.3%)
	Inconclusive	0 (0.0%)	1 (1.4%)

Examination Procedures

TABLE 2

WebCode	Refractive Index					Elemental			UV			
	nD	nF	nC	Δ RI	Color	Density	Thickness	SEM/ EDS	XRS/ XRF	Long	Short	Other
28ACHD	✓				✓		✓			✓	✓	LIBS
2RFMLG	✓						✓		✓	✓	✓	
2VFVTD	✓				✓		✓			✓	✓	
3PKNKN				✓	✓	✓	✓	✓	✓	✓	✓	
4R6XAF	✓				✓		✓	✓		✓	✓	Physical Fit Analysis
4YNZGH							✓	✓				
4YPVZN	✓			✓	✓		✓	✓				
6RNZGF					✓		✓					LA-ICP/MS
6WXAQX	✓						✓				✓	Laser Ablation ICP-MS
7346AX	✓			✓	✓		✓				✓	Interferometry
7TT4PW				✓			✓		✓		✓	
88QGGD	✓			✓	✓		✓			✓	✓	
93C4CK	✓				✓	✓	✓	✓	✓	✓	✓	
9NARH7					✓		✓			✓		LA-ICP-MS
9U2URX	✓				✓		✓		✓		✓	
BUAVKA	✓				✓		✓	✓			✓	
C2M4LB	✓				✓		✓	✓		✓	✓	
CA6DA8	✓						✓					
CDZ4H6	✓				✓		✓		✓	✓	✓	
CPUHH2	✓			✓	✓		✓					surface analysis
CPVHFF	✓						✓		✓		✓	
CV2BBC	✓				✓		✓			✓	✓	
CV4W7R	✓			✓	✓		✓	✓			✓	
D92894	✓				✓		✓			✓	✓	ICP-MS
EAWC34	✓				✓		✓		✓	✓	✓	
ECWHGA	✓				✓		✓				✓	ICP-OES
EE37WY	✓				✓		✓		✓		✓	
END8FE							✓		✓			

TABLE 2

WebCode	Refractive Index					Density	Thickness	Elemental		UV		
	nD	nF	nC	Δ RI	Color			SEM/ EDS	XRS/ XRF	Long	Short	Other
FE37UD								✓				FTIR spectroscopy
FUWTZ7	✓				✓		✓			✓	✓	
G2DNGZ	✓				✓		✓					✓ Laser Ablation / ICP-MS
GBF7R3	✓				✓		✓	✓		✓	✓	Raman
GFVG68	✓				✓		✓		✓	✓		LA-ICPMS
GLXPCY	✓				✓		✓		✓	✓	✓	
HF7Z6U	✓			✓	✓		✓					✓
KBNJM2	✓				✓		✓		✓			
LAPD78				✓	✓		✓					
M99UJF	✓						✓	✓				✓
MEWJWX	✓				✓		✓		✓			✓
MMTALF	✓						✓			✓	✓	
MV2QCZ	✓			✓			✓					✓ Surface features
PC3CRR	✓				✓		✓		✓	✓	✓	Macroscopic and stereomicroscopic examinations of morphological characteristics
PW9PLY	✓			✓	✓		✓		✓			✓
PZMMQ2	✓			✓	✓		✓	✓				✓
Q9W9EV	✓				✓		✓	✓				
QCG2QX	✓				✓		✓					✓ LA-ICP-MS
QGEH4R	✓				✓		✓		✓	✓	✓	
QNRTUX	✓				✓		✓					LA-ICP-MS
QTLR9T				✓								
RRR4PX						✓			✓			LIBS
TLZAAC	✓				✓		✓	✓		✓	✓	
TWURHP												ICP-MS
U4UCKK	✓				✓		✓		✓			✓
U99APM	✓				✓		✓		✓	✓	✓	
ULD9XT	✓						✓			✓	✓	

TABLE 2

WebCode	Refractive Index					Density	Thickness	Elemental		UV		
	nD	nF	nC	Δ RI	Color			SEM/ EDS	XRS/ XRF	Long	Short	Other
UPE4P9	✓				✓		✓	✓		✓	✓	
V9J9KV	✓			✓	✓		✓		✓			
W94CRW	✓				✓		✓		✓		✓	
W9EDEV					✓		✓	✓	✓			
WFEVQL	✓				✓		✓	✓		✓	✓	SIMS, XPS
WPNXCM	✓				✓		✓		✓	✓	✓	
WUHWQH	✓				✓		✓			✓	✓	temper and polarized light
XBGL37	✓				✓		✓	✓		✓	✓	
YK8CGK	✓			✓	✓		✓					LA-ICP-MS
YR67EJ	✓				✓		✓	✓		✓	✓	
Z2QP8H	✓						✓		✓	✓	✓	
Z32PB4	✓				✓		✓	✓				
ZPBZ9D	✓				✓		✓	✓		✓	✓	
ZQ7HBE				✓	✓	✓	✓	✓		✓	✓	
ZZFPBN	✓				✓		✓		✓	✓	✓	

Response Summary

Participants	Refractive Index					Density	Thickness	Elemental		UV	
	nD	nF	nC	Δ RI	Color			SEM/ EDS	XRS/ XRF	Long	Short
70	57	0	0	16	54	4	66	22	26	33	50
Percent	81%	0%	0%	23%	77%	6%	94%	31%	37%	47%	71%

Conclusions

TABLE 3

WebCode	Conclusions
28ACHD	The questioned glass in Items 2 and 3 are consistent with the known glass in Item 1 on the basis of color, thickness, luminescence, refractive index, and elemental composition. Therefore, the glass in Items 2 and 3 could have shared a common source with the known glass in Item 1.
2RFMLG	The questioned glass from Items 2 and 3 is similar in color, thickness, fluorescence, elemental composition, and refractive index in comparison to the known glass, Item 1. The glass from Item 2 and Item 3 could have originated from Item 1 or any other broken glass source that is similar in color, thickness, fluorescence, elemental composition, and refractive index. Chemical analysis performed includes: Polarized Light Microscopy, Fluorescence, X-Ray Fluorescence Spectroscopy and Glass Refractive Index Measurement (GRIM). Samples collected and analyzed during the examination of the items in this case (ex. slides) have been returned to and retained with the original item.
2VFVTD	METHODS: Items 1, 2, and 3 were examined visually and using a digital caliper, ultraviolet light and the Glass Refractive Index Measurement system (GRIM3). It should be noted that this examination did not include elemental analysis. RESULTS AND INTERPRETATIONS: The Item 2 and 3 glass fragments were consistent with the Item 1 glass in color, type, temper, thickness, and refractive index. Based on the fragments examined, it was concluded that these fragments originated from either the broken glass source represented by Item 1 or another source of broken glass with the same color, type, temper, thickness, and refractive index (Level III – Association with Discriminating Characteristics). This type of conclusion was reached because other glass sheets or products produced with the same properties would also be indistinguishable. Despite the utilization of discriminating techniques, the chance of finding coincidental associations are higher when no elemental analysis is performed. Date(s) of testing: 05/10/2021 – 05/14/2021. Supporting examination documentation is maintained in the case file. The above listed methods are those approved for use at the time of analysis.
3PKNKN	The questioned glass fragments recovered from the victim's clothing (Item 2) and the concrete median (Item 3) both could have been originated from the suspect's windshield (Item 1) because of their similarities of their physical properties & chemical composition.
4R6XAF	The glass recovered from the victim's clothing (Item #2) and the glass recovered from the concrete median (Item #3) compare by physical, elemental, and optical properties to the glass recovered from the suspect's windshield (Item #1) indicating that they could have had a common origin or could have originated from another glass source with indistinguishable properties.
4YNZGH	The evidence (elemental composition of glass samples as well as the thickness measurements) provides support for the proposition that glass fragments recovered from the victim's clothing (Item 2) and the concrete median (Item 3) could have originated from the the suspect's windshield (Item 1).
4YPVZN	In my opinion the correspondence observed between the pieces of recovered glass, items 2 and 3, and sample of glass from the windshield of the vehicle, item 1, is of significance. Although the sample from the windscreen cannot be considered unique it can be differentiated by its properties from very many other glasses, including many other window glasses. As such, I consider the likelihood of these pieces of glass matching by chance, had they not originated from the windscreen of the vehicle, to be low. In my opinion, therefore, the findings provide moderately strong support for the view that the recovered pieces of glass in items 2 and 3 originated from the windscreen of the suspect's vehicle.
6RNZGF	Item 2 and Item 3 could have originated from the same source as the Item 1 based on the physical characteristics (color and thickness) and trace elemental composition.

TABLE 3

WebCode	Conclusions
6WXAQX	<p>Clothing: The LR(s) for this examination was calculated using the following propositions: H1 clothing was close to glass (within 1 - 2m) at the scene when it was broken. H2 clothing was not close to the glass at the scene when it was broken. Therefore, in my opinion the findings provide very strongly support for the proposition that the clothing was close to the glass at the scene when it broke, rather than the proposition that it was not close to the glass at the scene when it was broken. Median Strip: The LR(s) for this examination was calculated using the following propositions: H1 glass located at the scene originated from the windscreen of the vehicle. H2 glass located at the scene originated from a another source of glass. Therefore, in my opinion the findings provide very strongly support for the proposition that the glass located at the scene originated from the windscreen of the vehicle, rather than the proposition that it originated from another source of glass.</p>
7346AX	<p>The two pieces of glass from the victim's clothing (item 2) had the same refractive index, colour, thickness, and were the same type of glass as the glass from the vehicle broken windscreen (item 1). The samples of glass were annealed which indicated that both had originated from a source of non-toughened glass. Therefore, these pieces of glass could have come from the broken windscreen. However, other sources of glass are possible. In my opinion, the glass evidence provides very strong support to the suggestion that the victim's clothing was close to the breaking vehicle windscreen. The two pieces of glass from the concrete median (item 3) had the same refractive index, colour, thickness, and were the same type of glass as the glass from the vehicle broken windscreen (item 1). The samples of glass were annealed which indicated that both had originated from a source of non-toughened glass. Therefore, these pieces of glass could have come from the broken windscreen. However, other sources of glass are possible. In my opinion, the glass evidence provides very strong support to the suggestion that the concrete median was close to the breaking vehicle windscreen.</p>
7TT4PW	<p>1. I have considered the following propositions to evaluate my findings: a). The glass fragments recovered from the victims' clothing and/or the concrete median originated from the broken windshield. b). The glass fragments recovered from the victims' clothing and/or the concrete median originated from an unrelated source and are present due to chance. 2. Given the above, I consider the findings to be more probable if the first proposition is true, that is, the glass fragments recovered from the victims' clothing and/or the concrete median originated from the suspects' windshield rather than the second that the glass was present by chance. 3. Consequently it is my opinion that the findings provide moderate support for the proposition that the recovered glass fragments from the victims' clothing (Item 2) and the concrete median (Item 3) originated from the broken windshield glass (Item 1).</p>
88QGGD	<p>The recovered glass samples, Item 2 and Item 3, are similar in colour, physical characteristics, refractive index and thermal history to the control glass sample Item 1, such that in our opinion, all three glass samples could have had a common origin.</p>
93C4CK	<p>Neither questioned item (2) nor item (3) could have originated from item (1).</p>
9NARH7	<p>The results of the examination are considered under the following two hypotheses: H1: one or more glass fragments from the examined items originate from the windshield. H2: all glass fragments originate from another glass pane. The results of the examination are much more likely(1) when hypothesis 1 is true than if hypothesis 2 is true. (1). The verbal scale comes from a standardized range of scale (left column in table). This range of verbal scales is used when the examiners do not have (enough) numerical data to warrant a numerical expression of the likelihood ratio. The used verbal scale is, amongst others, based upon subject knowledge and experience obtained in case (research). The NFI has numerically defined the verbal scale to increase transparency for the reader and to increase uniformity between different expert areas. These definitions are expressed in the ranges listed in the right column of the table. E.g. with the expression 'somewhat more likely' the chances to observe the examination results are twice to</p>

TABLE 3

WebCode	Conclusions
	ten times more likely when one hypotheses is true, then when the other hypotheses is true. Verbal scale Range evidential value: Just as likely 1-2. Somewhat more likely 2-10. More likely 10-100. Much more likely 100-10.000. Very much more likely 10.000-1.000.000. Extremely much more likely > 1.000.000. The conclusion phrases the evidential value of the examination results under the hypotheses. The conclusion does not reflect the probability that a specific hypothesis is true. That probability is also dependent on other evidence and information outside of the forensic field of expertise and there falls outside of the scope of this report.
9U2URX	The glass fragments recovered from the victim's clothing and from the concrete median could not be distinguished from the glass collected from the suspect's windshield by the tests performed. For this reason I consider the findings to be more likely if the recovered glass fragments had originated from the windshield rather than if they had not and had originated from another source at random. In my opinion the findings provide support for the proposition that the glass fragments recovered from the victim's clothing and the concrete median originated from the suspect's windshield.
BUAVKA	Examination and comparison of the representative pieces of glass from Items 1, 2 and 3 revealed glass that was similar in all measured physical, optical and elemental properties. They could have come from the same source or any other source with the same properties.
C2M4LB	The questioned glass fragments marked "Item 2" and "Item 3" were found to have no significant difference with the known glass fragments marked "Item 1" in terms of colour, fluorescence, thickness, refractive index and elemental composition. Hence, the questioned glass fragments marked "Item 2" and "Item 3" could have originated from the same source as the known glass fragments marked "Item 1", or another source of glass with similar characteristics.
CA6DA8	The fragments taken from the suspect's car windshield (known fragments, ITEM 1) and the fragments recovered from the victim's clothing (questioned, ITEM 2) and from the concrete median (questioned, ITEM 3), show the same results in all the analyses performed (physical properties).
CDZ4H6	1. Comparative examinations of Exhibit 1 (known glass standard from the suspect's windshield) with Exhibit 2 (questioned glass fragments recovered from the victim's clothing) and Exhibit 3 (questioned glass fragments recovered from the concrete median) disclosed them to be consistent in their physical characteristics, refractive indices, and elemental compositions. As a result of these findings, the questioned glass fragments from Exhibits 2 and 3 could have originated from the windshield (Exhibit 1) or another source of broken glass with the same characteristics. 2. A glass association is not a means of positive identification and the number of possible sources for a specific glass is unknown.
CPUHH2	The above glass findings provide moderately strong support for the view that the recovered glass fragments from the injured party's clothing (item 2) and the concrete median close to the scene (item 3) originated from the windscreen of the suspects vehicle (item 1), rather than they originated from another different source.
CPVHFF	The questioned glass fragments from Items #2 and #3 were consistent in thickness, color, optical properties and elemental composition with the known glass from Item 1; therefore, Items #1, #2 and #3 could share the same source (Level III association). Terminology Key for Associative Evidence: The following descriptions are meant to provide context to the levels of opinions reached in this report. Every level of conclusion may not be applicable in every case nor for every material type. Level I Association: A physical match; items physically fit back to one another, indicating that the items were once from the same source. Level II Association: An association in which items are consistent in observed and measured physical properties and/or chemical composition and share atypical characteristic(s) that would not be expected to be readily available in the population of this evidence type. Level III Association: An association in

TABLE 3

WebCode	Conclusions
	<p>which items are consistent in observed and measured physical properties and/or chemical composition and, therefore, could have originated from the same source. Because other items have been manufactured that would also be indistinguishable from the submitted evidence, an individual source cannot be determined. Level IV Association: An association in which items are consistent in observed and measured physical properties and/or chemical composition and, therefore, could have originated from the same source. As compared to a Level III association, items categorized within a Level IV share characteristics that are more common amongst these kinds of manufactured products. Alternatively, an association between items would be categorized as a Level IV if a limited analysis was performed due to characteristics or size of the specimen(s). Level V Association: An association in which items are consistent in some, but not all, physical properties and/or chemical composition. Some minor variation(s) exists between the known and questioned items and could be due to factors such as sample heterogeneity, contamination of the sample(s), or having a sample of insufficient size to adequately assess homogeneity of the entity from which it was derived. Inconclusive: No conclusion could be reached regarding an association/elimination between the items. Elimination: The items were dissimilar in physical properties and/or chemical composition, indicating that they did not originate from the same source.</p>
CV2BBC	<p>The two (02) fragments of questioned glass recovered from the concrete median (item3) and the two (02) fragments of questioned glass recovered from the victim's clothing (item2) have the same physical properties (thickness, colour, fluorescence and refractive index) to the two (02) fragments of known glass recovered from the suspect's windshield (item1). Therefore, the two (02) fragments of questioned glass recovered from the concrete median (item3) and the two (02) fragments of questioned glass recovered from the victim's clothing (item2) could have originated from the glass recovered from the suspect's windshield (item1) or from another source exhibiting the same physical properties.</p>
CV4W7R	<p>The results give strong support for the hypothesis that the examined piece of glass in Item 2, from the victim's clothing, originate from the suspect's broken windshield, represented by Item 1 (Level +3). The results give strong support for the hypothesis that the examined piece of glass in Item 3, from the concrete median, originate from the suspect's broken windshield, represented by Item 1 (Level +3).</p>
D92894	<p>Microscopic and elemental analysis and comparison of the item 1 glass to the glass from item 2 and item 3 revealed them to be the same with respect to physical properties, optical properties, and elemental composition. Therefore the glass from item 2 and item 3 came from the source represented by the Item 1 glass or another source with the same physical properties, optical properties, and elemental composition. These results were confirmed using digital calipers, glass refractive index measurement system, and inductively coupled plasma mass spectrometry.</p>
EAWC34	<p>The following methodologies were used in the examination of this case: visual examination, physical examination, microscopy, digital calipers, UV fluorescence, XRF and GRIM3. Analysis showed the known glass fragments recovered from the suspect's windshield (item #1) and the questioned glass fragments recovered from the victim's clothing (item #2) were consistent in physical properties, refractive index, and elemental composition. These fragments could have shared a common origin. Analysis showed the known glass fragments recovered from the suspect's windshield (item #1) and the questioned glass fragments recovered from the concrete median (item #3) were consistent in physical properties, refractive index, and elemental composition. These fragments could have shared a common origin.</p>
ECWHGA	<p>Glass recovered from the victim's clothing (Item 2) and the concrete median (Item 3) is indistinguishable from glass from the suspect's windshield (Item 1). Consequently, the glass from the victim's clothing (Item 2) and the concrete median (Item 3) either originated from the suspect's windshield (Item 1) or from another source of broken glass indistinguishable in all of</p>

TABLE 3

WebCode	Conclusions
	the measured or observed physical properties, refractive index, and elemental composition.
EE37WY	All glass fragments from items 2 and 3 could have come from the same source as item 1, or from another source of broken glass with similar manufactured characteristics.
END8FE	Based on the analysis performed, the fragments of glass sampled from the victim's clothing and the glass recovered from the concrete median had a similar appearance, thickness and composition as the fragments of known glass recovered from the suspect's windshield.
FE37UD	Elemental compositions from the EDS analysis conclude that Item 2 (victim's clothing) and Item 3 (concrete median) could have originated from the suspect's windshield (Item 1). The FTIR analysis results further support that neither Item 2 nor Item 3 can be excluded as originating from Item 1. We therefore conclude that both Item 2 (victim's clothing) and Item 3 (concrete median) could have originated from the suspect's windshield (Item 1).
FUWTZ7	The glass from questioned "item 2" and "item 3" was found to be consistent with the known glass "item 1". Therefore, the glass from the "item 2" and "item 3" could have come from the same source as the glass from "item 1".
G2DNGZ	The glass, item 001-2, recovered from the victim's clothing and the glass, item 001-3, recovered from the concrete median was indistinguishable from the glass fragments, item 001-1, recovered from the suspect's windshield. Therefore, the glass recovered from the victim's clothing and the glass recovered from the concrete median could have come from the suspect's windshield, or from another source of glass produced by the same glass manufacturer exhibiting the same physical and chemical properties.
GBF7R3	Two particles of questioned glass recovered from the victim's clothing (Item 2) and two particles of questioned glass recovered from the concrete median (Item 3) are consistent with two fragments of known glass recovered from the suspect's windshield (Item 1) in color, thickness, UV fluorescence, refractive index, elemental composition and Raman spectrum. Item 2 and item 3 could have originated from the damaged area of the suspect's windshield.
GFVG68	Two fragments were found in each packing unit (item 1,2 and 3). All of them had the appearance of bright green glass and had the same thickness. Samples of the items 1,2 and 3 were analyzed by XRF, LUCIA and LA-ICPMS (at least 13 isoptes). Item 1 was not different from items 2 and 3. The size of all glass fragments recovered was big. Unintentional carry-over seemed unlikely. There is a high probability that items 1, 2 and 3 have the same source.
GLXPCY	CONCLUSIONS: Two glass fragments identified as recovered from the victim's clothing (Item 2) and two glass fragments identified as recovered from the concrete median (Item 3) either originated from the suspect's windshield (Item 1) or another source of broken glass possessing the same distinct physical, optical, and chemical characteristics. RESULTS: Glass identified as from the victim's clothing and the concrete median (Items 2 and 3) was examined for the purpose of determining whether or not it is like the known glass standard from the suspect's windshield (Item 1). The known glass standard from the suspect's windshield (Item 1) is light blue-green non-tempered float sheet glass. Examination of the questioned glass identified as from the victim's clothing (Item 2) revealed two full thickness glass fragments. Examination of the questioned glass identified as from the concrete median (Item 3) revealed two full thickness glass fragments. Examination and comparison of the four questioned glass fragments from Items 2 and 3 with the known glass standard from the suspect's windshield (Item 1) revealed they are alike with respect to physical, optical, and chemical characteristics. It is therefore concluded that these four questioned glass fragments either originated from the suspect's windshield or another source of broken glass possessing the same distinct physical, optical, and chemical characteristics. METHODS OF ANALYSIS: Examinations were performed visually, by stereo microscopy, polarized light microscopy, ultraviolet fluorescence, micrometry, refractive index determination, and x-ray fluorescence spectroscopy.

TABLE 3

WebCode	Conclusions
HF7Z6U	Particles of questioned glass recovered from the victim`s clothing (Item 2) and from the concrete median (Item 3) could have a common origin with glass fragments of known glass taken from the suspect`s windshield (Item 1).
KBNJM2	On analysis, I found: The refractive index of the questioned glass fragments from the victim's clothing (Item 2) and concrete median (Item 3) to be similar with the refractive index of the known glass fragments taken from the suspect's windshield (Item 1). Therefore, I am opinion that: The questioned glass fragments from the victim's clothing (Item 2) and concrete median (Item 3) could have originated from the damaged area of the suspect's windshield as represented by Item 1.
LAPD78	Examination on the questioned glass fragments recovered from victim`s clothing (Item 2) were consistent with known glass fragments from the damaged area of the suspect`s windshield represented by Item 1 in colour and thickness. However, questioned glass fragments (Item 2) were not consistent with known glass fragments (Item 1) in refractive index. Examination on the questioned glass fragments recovered from concrete median (Item 3) were consistent with known glass fragments from the damaged area of the suspect`s windshield represented by Item 1 in colour. However, questioned glass fragments (Item 3) were not consistent with known glass fragments (Item 1) in thickness and refractive index. Based on the above findings, in my professional opinion; Questioned glass fragments recovered from the victim`s clothing (Item 2) and concrete median (Item 3) could not have originated from the damaged area of the suspect`s windshield as represented by Item 1.
M99UJF	Item 1 comprised 2 fragments of pale green, float glass. Item 2 comprised 2 fragments of pale green float glass. These fragments corresponded in thickness, average RI and bulk elemental composition to the control glass, item 1. These results support the proposition that the fragments from the victims clothing originated from the windscreen. Item 3 comprised 2 fragments of pale green float glass. These fragments corresponded in thickness, average RI and bulk elemental composition to the control glass, item 1. These results support the proposition that the fragments from the concrete median originated from the windscreen. The frequency of broken glass indistinguishable from the windscreen, item 1, is unknown.
MEWJWX	Utilizing a Micrometer, Polarized Light Microscopy, X-Ray Fluorescence Spectroscopy (XRF), and Glass Refractive Index Measurement System (GRIM3), it was determined that the questioned glass fragments selected from item 002 and the questioned glass fragments from item 003 exhibited consistent physical, chemical, and optical properties with the known glass, item 001. Therefore, the known glass, item 001, cannot be eliminated as being the possible source of the questioned glass from items 002 and 003.
MMTALF	Based on the techniques used, I formed the opinion that the glass fragments recovered from the victim`s clothing (item 2) had the same appearance and refractive index as the control glass taken from the suspect`s windshield (item 1) and could have originated from it. I also formed the opinion that the glass fragments recovered from the concrete median (item 3) had the same appearance and refractive index as the control glass taken from the suspect`s windshield (item 1) and could have originated from it.
MV2QCZ	The glass samples within item 2 and item 3 could have originated from the control glass, item 1.
PC3CRR	The sample in Item 1 consists of two light green glass fragments that exhibit characteristics consistent with non-tempered float sheet (window) glass. These fragments have their full thickness. They were used as standards for comparison to the glass in Items 2 and 3. Items 2 and 3 each consist of two light green glass fragments that have their full thickness and exhibit characteristics consistent with non-tempered float sheet (window) glass. Macroscopic, microscopic and instrumental examinations and comparisons of Items 2 and 3 with Item 1 revealed that the questioned glass fragments are like the glass standard in Item 1 with respect to

TABLE 3

WebCode	Conclusions
	<p>their color, thickness, refractive index values and chemical characteristics. It is therefore concluded that the glass fragments represented as having been recovered from the victim's clothing and the concrete median originated either from the broken windshield of the subject vehicle or from another source of broken non-tempered float sheet glass having these same characteristics.</p>
PW9PLY	<p>The following methods were applied: determination of the manufacturing process (i.e. float / non float) by UV fluorescence, comparison of the thickness, visual comparison of the colour, comparison of the refractive index in the original and annealed state, comparison of the semi quantitative elemental composition by x-ray fluorescence. The known glass sample from the windshield of the car of the suspect (item 1) could not be distinguished from the glass fragments recovered from the victim's clothing (item 2) and from the glass fragments recovered from the concrete median (item 3). Hence, the results strongly indicate that the victim was hit by the suspect's car. Due to the mass product character of glass products a different source cannot be excluded with certainty. Among a casework database, which consists of 3884 control glass items, there was no item, which matched the glass particles from the victim's clothing with respect to thickness and refractive index. These properties appear to be rare. Additionally, the size of the two glass fragments recovered from the victim's clothing (>5 mm / 0.2 in) is very large compared to glass particles found at random on garments of people not suspected to be involved in crimes. This suggests that these traces are relevant for the accident.</p>
PZMMQ2	<p>The glass fragments recovered from the victim's clothing and from the concrete median are indistinguishable from the glass fragments obtained from the vehicle's windshield, by the tests performed. In my opinion, the findings provide moderately strong support for the view that the glass fragments from the victim's clothing and from the concrete median have originated from the suspect's windshield, rather than the recovered fragments having properties matching the windshield due to chance.</p>
Q9W9EV	<p>The glass fragments from the victim's clothing (Item 2) and from the concrete median (Item 3) as well as the glass fragments from the suspect's windshield are float glasses and have a thickness of around 2,16 mm. The glass fragments from Item 3 and from Item 2 cannot be differentiated from Item 1 by their refractive indices, their thickness, color and elemental composition. Therefore the questioned glass particles from the victim's clothing (Item 2) and from the concrete median (Item 3) may have originated from the suspect's windshield (Item 1). As glass is a mass product, a matching refractive index is not an individual match, but a different refractive index proves the origin from different sources.</p>
QCG2QX	<p>Glass recovered from debris from the victim's clothing and the concrete median (Items 2 and 3) is indistinguishable from the suspect's windshield as represented by Item 1. Consequently, the glass recovered from the victim's clothing and the concrete median (Items 2 and 3) either originated from the suspect's windshield (Item 1) or from another source of broken glass indistinguishable in all of the measured or observed physical properties, refractive index, and elemental composition (an inclusion, see the interpretation section, below).</p>
QGEH4R	<p>Items 1, 2, and 3 were examined by stereomicroscopy, ultraviolet light fluorescence, micrometry, x-ray fluorescence microscopy, and refractive index determination. Glass found in Items 2 and 3 was indistinguishable from the glass in Item 1 in optical, physical, and elemental properties (Type 3 Association). This means the glass recovered from the victim's clothing and the glass recovered from the concrete median could have come from the suspect's windshield.</p>
QNRTUX	<p>The two glass fragments recovered from the victim's clothing (item 2) and the two glass fragments recovered from the concrete median (item 3) are indistinguishable to the glass from the suspect's windshield (item 1) in glass refractive index, elemental composition, color, and thickness. This result strongly suggest the opinion that the glass fragments item 2 and item 3 originally originate from the broken windshield item 1.</p>

TABLE 3

WebCode	Conclusions
QTLR9T	The evidence give morderatly strong support for the hypotesis stating that Item 1 and Item 2 have the same source/origin. The evidence do not support, nor reject the hypothesis that Item 1 and Item 3 have the same source/origin.
RRR4PX	The chemical composition of all three samples was determined with LIBS and XRF. The comparison of the chemical compositions of the samples showed a good ongruence between all three Items. Additionalle, the density of the samples was determined. All three Items have an identical density value. Conclusion: Item 2 as well as Item 3 originate from the same object as Item 1.
TLZAAC	No significant differences in colour, thickness, refractive index and elemental composition were detected between Item 1 and Item 2 glass. No significant differences in colour, thickness, refractive index and elemental composition were detected between Item 1 and Item 3 glass. In my opinion, there is moderate support for the contention that the glass from Item 2 originated from Item 1 and moderate support that the glass from Item 3 originated from Item 1.
TWURHP	Based on the analysis of triplicate 2-6 mg portions of glass fragments by Inductively Coupled Plasma – Mass Spectrometry, the concentration of 42 elements in Items 2 and 3 were not distinguishable from the concentration of those elements in Item 1. Distinguishability is based on the sample average and 4 x the standard deviation. This criterion has been used in the published literature to provide the lowest combination of type 1 and 2 error rates [1]. Elemental concentrations are considered indistinguishable if the range generated by their average concentration ± 4 [standard deviation] (above the MQL) overlap. Opinions/Interpretations: Based on the results Items 2 and 3 could have originated from Item 1.
U4UCKK	The questioned glass fragments from the victim's clothing (Item 2) and from the concrete median (Item 3) were compared to the known glass from the suspect's windshield (Item 1) using physical characteristics, refractive index measurements, and elemental analysis by X-ray fluorescence (XRF). The tested questioned glass fragments were similar in color, thickness, fluorescence, refractive index, and elemental composition to the known glass. The tested questioned glass fragments from the victim's clothing and from the concrete median originated either from the suspect's windshield represented by Item 1 or from another broken glass source with indistinguishable properties (Level 3 - Association). Because similar glass has been manufactured that would be indistinguishable from the submitted evidence, an individual source cannot be determined.
U99APM	Glass recovered from the victim's clothing (Item 2) and the concrete median (Item 3) are similar in color, thickness, fluorescence, refractive index, and elemental composition to the known glass from the suspect's windshield (Item 1). It is our opinion that the glass recovered from the victim's clothing (Item 2) and the concrete median (Item 3) could share a common origin to the known glass from the suspect's windshield (Item 1). No analysis was performed on additional pieces of glass from the victim's clothing (Item 2) or the concrete median (Item 3).
ULD9XT	Item 2 and Item 3 are consistent with Item 1.
UPE4P9	The known glass sample from the windshield of the suspect's car (item 1) was found to consist of two fragments of clear, pale green float glass. The questioned glass sample recovered from the victim's clothing (item 2) was found to consist of two fragments of clear, pale green float glass. In relation to colour, thickness, refractive index and elemental composition these two glass fragments were found to be indistinguishable to the glass from the windshield of the suspect's car (item 2). Therefore, these two glass samples may share a common origin. The questioned glass sample recovered from the concrete median (item 3) was found to consist of two fragments of clear, pale green float glass. In relation to colour, thickness, refractive index and elemental composition these two glass fragments were found to be indistinguishable to the glass from the windshield of the suspect's car (item 2). Therefore, these two glass samples may share a common

TABLE 3

WebCode	Conclusions
	origin.
V9J9KV	Comparative examinations of the questioned glass fragments in Item 2 and Item 3 with the known glass fragments in the Item 1 disclosed them to be indistinguishable in their physical characteristics, elemental composition and refractive indices. Questioned glass particles from the victim's clothing (Item 2) and from the concrete median (Item 3) either originated from the suspect's windshield (Item 1) or from another source coincidentally indistinguishable in physical characteristics, elemental composition and refractive indices.
W94CRW	The particles of glass recovered from the victim's clothing (Item 2) and the particles of glass recovered from the concrete median (Item 3) have matched with the fragments recovered from the suspect's windshield (Item 1) in all investigated features. That means, it may be assumed that the particles of glass recovered from the victim's clothing (Item 2) and the particles of glass recovered from the concrete median (Item 3) have originated from the same source like the fragments recovered from the suspect's windshield (Item 1). Note: It is not absolutely impossible that the glass fragments of Item 2 and the glass fragments of Item 3 have originated from another glass sources with the same features as the fragments of known glass taken from the suspect's windshild (Item 1).
W9EDEV	Based on our analytical results, item 2 is indistinguishable from item 1. Therefore, item 2 could have originated from item 1. Item 3 is distinguishable from item 1. In conclusion, item 3 does not originate from item 1.
WFEVQL	Comparison of Item 2 glass fragments with Item 1 known glass fragments found the Item 2 fragments indistinguishable from the Item 1 fragments, and therefore the Item 2 fragments may originate from the same source as the Item 1 fragments. Comparison of Item 3 glass fragments with Item 1 known glass fragments found the Item 3 fragments indistinguishable from the Item 1 fragments, and therefore the Item 3 fragments may originate from the same source as the Item 1 fragments. These conclusions are based upon the test methods used, and their sensitivities.
WPNXCM	Item Description Finding Conclusion: #2 Questioned glass fragments: Same color, thickness, refractive index, and elemental composition as Item #1 Support for same source 1 #3 Questioned glass fragments Same color, thickness, refractive index, and elemental composition as Item #1. Support for same source 1 1. This association is not exclusive; other manufactured items with the same characteristics may exist. Remarks: The evidence is being returned to your department. Digital images are being retained at BCI. Analytical Detail: These findings were determined using visual examination techniques, microscopical examination techniques (stereomicroscope, PLM) and instrumental analyses (rlQ, micro-XRF).
WUHWQH	METHODS: Items 1, 2, and 3 were examined using stereomicroscopy, a digital caliper, polarized light, ultraviolet light, and the Glass Refractive Index Measurement system (GRIM3). It should be noted that this examination did not include elemental analysis. RESULTS AND INTERPRETATIONS: The Item 2 and Item 3 glass fragments were consistent with the Item 1 glass in color, thickness, type, temper and refractive index. Based on the fragments examined, it was concluded that these fragments originated from either the broken glass source in Item 1 or another broken glass source with the same properties (Level III - Association with Discriminating Characteristics). This type of conclusion was reached because other glass windshields or products produced with the same properties would also be indistinguishable. Despite the utilization of discriminating techniques, the chance of finding coincidental associations are higher when no elemental analysis is performed. Date(s) of testing: 7/9/21 - 7/20/21. Supporting examination documentation is maintained in the case file. The above listed methods are those approved for use at the time of analysis.
XBGL37	The known glass sample item 1 comprised of two glass fragments of identical thickness. Both glass samples item 2 and item 3 comprised of two glass fragments which were found to agree in

TABLE 3

WebCode	Conclusions
	colour, thickness, UV fluorescence, refractive index and elemental composition with the known glass sample item 1, suggested that the glass fragments in both item 2 and item 3 could have originated from the suspect's windshield as represented by item 1.
YK8CGK	It is highly probable that both Item 2 and Item 3 could originate from Item 1.
YR67EJ	Item 1: Clear, colorless glass standard was analyzed for comparison to Item 2 and Item 3. Item 2: Two pieces of clear, colorless glass were found. The unknown glass from the victim's clothing either originated from the standard glass (Item 1) from the suspect's windshield or another source of broken glass possessing the same distinct physical and chemical characteristics. Item 3: Two pieces of clear, colorless glass were found. The unknown glass from the concrete median either originated from the standard glass (Item 1) from the suspect's windshield or another source of broken glass possessing the same distinct physical and chemical characteristics.
Z2QP8H	The questioned glass fragments recovered from the victim's clothing (Item 2) and concrete median (Item 3) are similar in color, thickness, fluorescence, elemental composition and refractive index in comparison to the known glass fragments recovered from the suspect's windshield (Item 1). The glass fragments from Item 2 and Item 3 could have originated from the same glass source as Item 1 or any other broken glass source similar in color, thickness, fluorescence, elemental composition and refractive index.
Z32PB4	The known glass sample item 1 comprised of two pieces of colourless glass fragments. Both questioned glass samples item 2 and item 3 comprised of two glass fragments which were found to agree in colour, thickness, refractive index and elemental composition with the known glass sample item 1, suggested that the glass fragments in both item 2 and item 3 could have originated from the suspect's windshield as represented by item 1.
ZPBZ9D	Items 1, 2 and 3 were examined visually, microscopically, by scanning electron microscopy/energy dispersive x-ray (SEM/EDX) for elemental composition and by a glass refractive index measurement system (GRIM). The questioned glass (item 2), reportedly recovered from the victim's clothes, was similar to the known glass reportedly recovered from the suspect's windshield (item 1) with respect to color, thickness, gross elemental composition, and refractive index. The questioned glass (item 3), reportedly recovered from the concrete median, was similar to the known glass reportedly recovered from the suspect's windshield (item 1) with respect to color, thickness, gross elemental composition, and refractive index. Based on these observations, the questioned glass (items 2 and 3) and the known glass (item 1) could have come from the same source or any source exhibiting the same analyzed characteristics.
ZQ7HBE	The analysis revealed the measured physical and chemical properties of Item #1, #2 and #3 are indistinguishable. The glass from Item #1 cannot be eliminated as the source of glass for Items #2 and #3.
ZZFPBN	The questioned glass fragments recovered from the victim's clothing (Item 2) and the concrete median (Item 3) can come from the suspect's windshield (as represented by Item 1) or from another glass material with the same characteristics.

Additional Comments

TABLE 4

WebCode	Additional Comments
28ACHD	It should be pointed out that glass does not contain enough individual chemical and microscopic characteristics to be positively identified as originating from a particular source to the exclusion of all other sources. The conclusions in this report only pertain to the glass that was analyzed from each Item and makes no assumptions about the entire contents of each Item.
4YNZGH	Thickness of all objects (Item 1, 2 and 3) was the same. Quantitative elemental composition of glass fragments evaluated based on likelihood ratio (LR) calculation shows that hypothesis about common origin of both compared fragments was more probable than hypothesis that compared fragments originate from different sources. Based on obtained LR values, it was concluded that support for hypothesis about common origin of this fragments is strong. So based on elemental composition, this fragments (Item 1, 2 and 3) could not be differentiated. The samples can differ in refractive indices but we do not have appropriate equipment to measure this.
4YPVZN	The test originated from the US. The glass from the windshield of the vehicle is uncommon in relation to our database. The relevance of our database in the evaluation of these findings is uncertain and consequently a conservative source level conclusion has been expressed in this report.
6RNZGF	Item 2 and Item 3 were found to have no significant differences with Item 1 in terms of color, thickness and trace elemental composition.
6WXAQX	Laser Ablation ICPMS should be a selection for elemental analysis. Full thickness windscreen glass is generally not recovered.
C2M4LB	Refractive index (3SD range): Item 1: 1.5194 – 1.5196. Item 2: 1.5194 – 1.5196. Item 3: 1.5194 – 1.5196.
CPUHH2	Scale: I have chosen the above phrase from the following scale: weak support, moderate support, moderately strong support, strong support, very strong support, extremely strong support.
M99UJF	LA-ICP-MS is undergoing validation so was not available for use.
MMTALF	Our laboratory doesn't routinely conduct elemental analysis of glasses found to have the same appearance and refractive index.
PC3CRR	Examinations on the glass in Items 1, 2 and 3 were performed macroscopically, and by use of stereomicroscopy, ultraviolet fluorescence, a micrometer for thickness measurements, a refractive index measurement system and x-ray fluorescence spectrometry.
PW9PLY	The following match criteria were applied: Refractive index: Ten measurements were made at each sample. Then a Student-t-test was conducted where p-values above 1 percent would be assessed as a match. Elemental composition: Nine or ten measurements were made at the original (antifloat-) surface of each sample. Semi quantitative analysis was performed for elemental ratios Ca/Mg, Ca/K, Ca/Ti and Ca/Fe calculated from the net intensities. A match was stated if the mean of the questioned sample matched the mean of the known sample plus/minus the threefold standard deviation of the known sample.
PZMMQ2	Hit-and-run cases of the type presented in the trial scenario would normally be interpreted at activity level with regards to the victim's clothing. However, transfer and persistence factors are critical for activity level interpretations and as the trial presentation does not enable interpretation based on the number of fragments recovered from the victim's clothing, in this instance, it has only been possible to interpret all findings at source level.

TABLE 4

WebCode	Additional Comments
QCG2QX	The conclusion above would also contain additional information about methods, limitation and interpretation to assist the reader. But this information is too long for your text boxes so cannot be included.
QGEH4R	Type 3 Association: Association with Conventional Characteristics; Items are consistent in all measured and observed physical properties, chemical composition, and/or microscopic characteristics, and therefore could have originated from the same source. Because other items have been manufactured or are naturally occurring that would also be indistinguishable from the submitted evidence, an individual source cannot be determined.
RRR4PX	Density Item 1 = Density Item 2 = Density Item 3 = 2.4964 g/cm ³ .
ULD9XT	It is necessary to do elemental analysis, however, this lab cannot perform it at the moment.
WFEVQL	We would recommend further analysis for trace element chemistry by ASTM Method E2967 for forensic comparison of the samples.
WUHWQH	Typically we would also include a Terminology key for comparative examinations with the report.
Z2QP8H	Chemical Analysis performed includes: Polarized Light Microscopy, Fluorescence, X-Ray Fluorescence Spectroscopy, and Refractive Index. Samples collected and/or analyzed during the examination and analysis of the items in this case (ex. glass slides) have been returned to and retained with the original item.

-End of Report-
(Appendix may follow)

Test No. 21-5481: Glass Analysis

DATA MUST BE SUBMITTED BY **Aug. 9, 2021, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: BMTDAM

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

Scenario:

Police are investigating a fatal hit-and-run. Police collected glass particles from the victim's clothing and a nearby concrete median. The following day, police apprehended a suspect and conducted a search of his property where they found a car that had sustained damage to the windshield. Investigators are requesting that you examine and compare the glass particles recovered from the victim's clothing and nearby concrete median with the fragments recovered from the suspect's windshield.

Please Note:

-Samples contained within each individual Item are from a single source.

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

Items Submitted (Sample Pack GL):

Item 1: Known glass fragments recovered from the suspect's windshield.

Item 2: Questioned glass fragments recovered from the victim's clothing.

Item 3: Questioned glass fragments recovered from the concrete median.

1.) Could the questioned glass fragments recovered from the victim's clothing (Item 2) and/or concrete median (Item 3) have originated from the damaged area of the suspect's windshield as represented by Item 1?

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

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

<input type="checkbox"/> nD <input type="checkbox"/> nF	<u>Refractive Index:</u> <input type="checkbox"/> nC <input type="checkbox"/> Δ RI	<u>UV Fluorescence:</u> <input type="checkbox"/> Long <input type="checkbox"/> Short	<input type="checkbox"/> Color <input type="checkbox"/> Density	<input type="checkbox"/> Thickness
<input type="checkbox"/> SEM/EDS	<input type="checkbox"/> XRS/XRF	<u>Elemental Analysis:</u>		
Other: <input 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.

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

4.) 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.

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

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

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

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

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

A2LA Certificate No.

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

Authorized Contact Person and Title

Laboratory Name

Location (City/State)