



GSR Distance Determination

Test No. 22-5301/5 Summary Report

Each sample set contained one of the following: An evidence piece of clothing for chemical processing for a GSR pattern (Q1) and either photographs (22-5301) or directly downloadable digital images (22-5305) of GSR patterns produced by test shots at known distances. These were provided on untreated test fabric (K1a) and treated test fabric after chemical processing using Modified Griess (K1b) and Sodium Rhodizonate (K1c). Participants were requested to process the Q1 clothing sample and report the range of distances, along with their conclusions and comments. Data were returned from 129 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 contained a piece of clothing evidence (Q1) for chemical processing and either photographs or digital images of known distance test GSR patterns on unprocessed test fabric (K1a) and test fabric after chemical processing using Modified Griess (K1b) and Sodium Rhodizonate (K1c). Participants were requested to process the clothing item and report the range of distances that the muzzle of the firearm could have been from the fabric (Q1) at the time of discharge.

SAMPLE PREPARATION: The firearm used to produce the distance standards and evidence item was a Glock 17 9mm semiautomatic handgun with a 5" Bear Creek Arsenal aftermarket barrel and the ammunition used was Winchester 9mm 147 grain FMJ.

DISTANCE STANDARDS (K1a-c): The fabric used for the known distances was white cotton. The firearm was locked into a fixture and the white cotton fabric was placed at a predetermined distance from the firearm. This was done for each of the predetermined distances. First, the known GSR patterns were imaged. Each known pattern was then processed using the Modified Griess procedure. Immediately following processing, the film paper was imaged. Finally, the known patterns were processed with Sodium Rhodizonate reagents, and the fabric imaged immediately after processing.

QUESTIONED ITEM (Q1): Item Q1 consisted of one section of a white T-shirt material (60% Cotton, 40% Polyester blend knit). The firearm was locked into a fixture and the shirt was placed 5 inches away from the muzzle of the firearm. After firing, the article of clothing (Q1) was packaged. This process was repeated until all of the items were created.

SAMPLE SET ASSEMBLY: For the printed photos, the Q1, K1a, K1b, and K1c envelopes were placed into a pre-labeled sample pack envelope, sealed with evidence tape, and initialed "CTS." For the Digital Download version, the Q1 item was placed in a pre-labeled sample pack envelope and the K1a, K1b and K1c files were loaded onto the CTS Portal.

VERIFICATION: The predistribution laboratories reported the following "greater than" and "less than" ranges (in inches): 0" to 9", 0" to 15", and 3" to 18".

Summary Comments

This test was designed to allow participants to assess their proficiency in muzzle to target distance determination using gunshot residue (GSR) patterns. Each participant received an evidence piece of clothing for chemical processing (Q1), images of GSR patterns at known distances on untreated fabric (K1a), and images of GSR patterns at known distances on fabric chemically processed using Modified Griess (K1b) and Sodium Rhodizonate (K1c). The evidence piece of clothing (Q1) was prepared with the firearm locked into a fixture and the white T-shirt material (60% Cotton, 40% Polyester blend knit) placed 5 inches away from the muzzle of the firearm (refer to the Manufacturer's Information for preparation details).

In Table 1, 118 of the 129 responding participants (91%) reported a "greater than" distance between contact/0 and 6 inches and a "less than" distance response of 6 and 18 inches. Eight participants did not report a "greater than/less than" range, but did provide distance related results in their conclusions or additional comments. Participants that reported "contact" in Table 1 is represented by "C*". In the summary of this table, CTS has grouped the responses provided by the participants based on their "greater than"/"less than" distance results and provided a tally of the ranges between responses as calculated by CTS.

For greater than/less than distances, a +/-2 inch allowance from the known shot distance (5 inches) was used as the baseline. CTS then reviewed the ranges based on participants' reported values and determined the most common reported range, the mode, was 12 inches. A 3-inch allowance was applied to the modal value to account for the difference between the known standard distances. Therefore, any reported range larger than 15 inches was highlighted as inconsistent.

CTS is aware that laboratory reporting policies differ and there are varying acceptable ranges. It will therefore be at the discretion of the laboratory to further evaluate participant's results based on their own policies and procedures.

Distance Determination Results

What is the distance range that the muzzle of the firearm could have been from the shirt (Q1) at the time of discharge? Please report a numeral response (e.g. 6) from the supplied Distance Standards. If reporting Contact, indicate with the numeral 0.

TABLE 1
(Distance in Inches)

WebCode- Test	Greater Than	Less Than	Calc. Range	WebCode- Test	Greater Than	Less Than	Calc. Range	WebCode- Test	Greater Than	Less Than	Calc. Range
23D493- 5301	3	15	12	82GW6R- 5305	3	12	9	AMV4UP- 5301	3	6	3
3H79U6- 5301	6	15	9	88RR8F- 5305	6	15	9	B7NRQL- 5305	6	15	9
42AFKN- 5301	3	15	12	8CLPUL- 5301	6	15	9	BEV26J- 5305	0	12	12
4EKTGXH- 5305	3	15	12	8FHDDDE- 5305	6	15	9	BK2UYE- 5301	6	15	9
4LKBCV- 5301	3	12	9	8KBDPN- 5301	6	15	9	BQBVF- 5305	6	15	9
66AU2L- 5301				8TPGFM- 5305	3	9	6	BYKJUB- 5305	3	15	12
67YDLK- 5301	0	9	9	8X2AQL- 5301	3	15	12	C9PPLR- 5305	3	15	12
6BENZN- 5301				97BX6K- 5305	3	15	12	CEUTA6- 5301	3	15	12
6EWDCT- 5301	6	15	9	9CTJRX- 5301	6	12	6	CM6UV7- 5301	3	18	15
6F8P23- 5301	3	15	12	9L8BGV- 5305	3	12	9	CXP2RA- 5305			
6N2KRT- 5301	3	15	12	A7LEGP- 5305	3	12	9	DRWG4J- 5305	3	9	6
6UR67M- 5301	0	18	18	ABZTLJ- 5301	3	18	15	E3NKKJ- 5301	3	18	15
6ZYXXYX- 5305	3	12	9	AD88TP- 5301	0	15	15	EHM9Y4- 5301	6	12	6
7F7EKQ- 5301	3	10	7	AE2VBK- 5305	3	12	9	EKQ6KR- 5305	9	12	3

TABLE 1
(Distance in Inches)

WebCode- Test	Greater Than	Less Than	Calc. Range	WebCode- Test	Greater Than	Less Than	Calc. Range	WebCode- Test	Greater Than	Less Than	Calc. Range
EWLD4U- 5305	3	24	21	JDEJLC- 5301	3	15	12	MLUPQ6- 5305	3	15	12
FEHZAJ- 5301	6	15	9	JGWW4E- 5301	3	15	12	MY2FN8- 5305	3	15	12
FMQU3R- 5305	6	12	6	JKW8ZE- 5301	3	18	15	N7XWE3- 5305	3	12	9
FWGF9P- 5305	6	12	6	JQKUTY- 5301	6	18	12	NAGM68- 5305	6	18	12
G7JXG8- 5301	3	15	12	JX279K- 5305	0	15	15	NMA9A3- 5301	6	18	12
GHZKRT- 5301	3	24	21	K9WW4C- 5305	3	9	6	NQM7F4- 5301	3	15	12
GV2BCC- 5301	3	15	12	KG8ZBB- 5301	6	15	9	NX4PVX- 5305			
GY2M8C- 5301	6	15	9	KJEHA7- 5301				P2KAHD- 5301	3	15	12
GZVDDQ- 5301	0	12	12	LP3KUH- 5301	3	15	12	P3FK78- 5305	6	15	9
H4C3B9- 5301	3	27	24	LV6RC7- 5305	3	18	15	P4PYM8- 5305	C*	15	15
H7D3B7- 5301	0	12	12	LZHW28- 5305	6	9	3	P92RX7- 5305	3	12	9
HMPL8C- 5301	3	15	12	LZXUF7- 5301	0	12	12	PJF23B- 5301	3	15	12
HNWYTK- 5305	3	12	9	MGF7ER- 5305	6	18	12	PP6L47- 5301	6	15	9
HRHLL9- 5305	3	12	9	MGKC7L- 5305	3	15	12	PQJNDY- 5301	0	12	12
HYFB7H- 5301	0	15	15	MLE778- 5305	3	12	9	PXKZBG- 5301	3	15	12

TABLE 1
(Distance in Inches)

WebCode- Test	Greater Than			Less Than			Calc. Range			WebCode- Test	Greater Than			Less Than			Calc. Range			WebCode- Test	Greater Than			Less Than			Calc. Range		
Q9YC47- 5305	3	12	9				UDW8CU- 5301	3	15	12	XHYF92- 5301	0	15	15							XZXQRX- 5305	6	12	6					
QRCWZA- 5305	0	12	12				UM48KW- 5301																						
QYNBH6- 5305	6	12	6				UQ3JK3- 5305	6	12	6	Y4WWZV- 5305	9	12	3															
QZ6AW3- 5301	6	18	12				UU9CT3- 5301	3	15	12	YBXKLM- 5305																		
R36ZH9- 5301	3	15	12				UZRA6A- 5301	C*	12	12	YGNVZR- 5301	3	15	12															
R8ZUFA- 5301	3	12	9				V3E9WD- 5301	3	12	9	YUB6HQ- 5301	3	18	15															
RJC2DV- 5301	3	15	12				VX4VGY- 5305	0	9	9	YXQ37Z- 5301	0	12	12															
RKM4ZT- 5305							VZ9M7R- 5301	3	15	12	Z2PBW9- 5305	6	12	6															
RPYCH7- 5301	9	12	3				W9FMHE- 5301	6	9	3	Z8PR6T- 5301	6	18	12															
RUUH72- 5301	3	15	12				WLLUXB- 5305	3	18	15	ZFNALQ- 5301	3	15	12															
RWJ6G4- 5305	4	11	7				WRWQ47- 5305	3	9	6	ZHQBK3- 5305	3	12	9															
TRZEQZ- 5305	3	12	9				WVBJUY- 5305	6	12	6	ZMMY2A- 5301	3	12	9															
TUAJ4N- 5305	3	12	9				X3L6G8- 5301	3	15	12																			
U289MD- 5301	3	15	12				XD92KU- 5301	3	12	9																			
U3EQJN- 5301	3	12	9				XFWF94- 5301	6	15	9																			

Distance Determination				Participants: 129	
Response Summary		Less Than Distance	Participants Reporting	CTS Calculated Range	Participants Reporting
Greater Than Distance	Participants Reporting				
Contact / 0	16 (12.40%)	Contact / 0	0 (0.00%)	3	6 (4.65%)
3	69 (53.49%)	3	0 (0.00%)	6	13 (10.08%)
6	32 (24.81%)	6	1 (0.78%)	9	37 (28.68%)
9	3 (2.33%)	9	8 (6.20%)	12	47 (36.43%)
12	0 (0.00%)	12	40 (31.01%)	15	12 (9.30%)
15	0 (0.00%)	15	53 (41.09%)	18	1 (0.78%)
18	0 (0.00%)	18	14 (10.85%)	21	2 (1.55%)
21	0 (0.00%)	21	0 (0.00%)	24	1 (0.78%)
24	0 (0.00%)	24	2 (1.55%)	Other	2 (1.55%)
27	0 (0.00%)	27	1 (0.78%)	No Response	8 (6.20%)
Other	1 (0.78%)	Other	2 (1.55%)		
No Response	8 (6.20%)	No Response	8 (6.20%)		

Conclusions

TABLE 2

WebCode-Test	Conclusions
23D493-5301	The area around Hole 1 in Item 4 was microscopically examined and chemically processed for the presence of gunshot residues. Residues were found which are consistent with the discharge of a firearm and passage of a bullet. Using the suspect firearm and ammunition, the pattern of residues observed around Hole 1 in Item 4 was reproduced at a distance of between approximately 3 inches to 15 inches.
3H79U6-5301	Conclusion: A series of controlled test firings performed using the questioned firearm (Glock 17 with 5" aftermarket barrel) and ammunition (Winchester 9mm FMJ) on a comparable target material at multiple ranges. These test materials and the exhibit were examined and subjected to a series of chemical enhancement techniques to assist in the examination of shooting distance. Based on the examinations performed, including comparison between the questioned item and the results of controlled test firings, it is my opinion that the distance between the muzzle of the firearm and the target at the time the firearm was discharged was not less than approximately 6" (~15cm) and not greater than approximately 15" (~38cm). It should be noted that: The above conclusion is based on the assumption that test firings were generated under conditions comparable to those encountered in the incident under investigation. Case information indicates that the incident under investigation occurred outside. Nil detail regarding the performance of test firings has been provided
42AFKN-5301	The area around defect A was visually examined, microscopically examined and chemically processed for the presence of gunshot residues. The pattern of gunshot residues around defect A is consistent with a muzzle to target distance between 3 inches and 15 inches.
4EKTGX-5305	Q1 has one hole that is consistent with the passage of a bullet. Lead and burned powder were present beyond the edges of the holes. The distance tests reproduced a similar residue deposition between 3 to 15 inches.
4LKBCV-5301	The victim's shirt was at a distance between 3 and 12 inches from the barrel of the firearm when the shot was fired.
66AU2L-5301	Item Q1 was visually and microscopically examined and chemically processed for the presence of gunshot residues. Residues were found on Item Q1 which were consistent with an intermediate muzzle-to-target distance.
67YDLK-5301	The residue pattern from item 1.1 indicates a muzzle-to-target distance between contact – 9 inches.
6BENZN-5301	At the time of discharge, Item Q1 was within close proximity of the firearm; as gunshot residues were visually and chemically detected.
6EWDCT-5301	During the optical and chemical examination of the bullet hole mentioned in 5.1, propellant residue was found surrounding the hole. Comparison of the GSR spread pattern obtained after application of Modified Griess chemical treatment of the exhibit with the distance standards mentioned in 3.2.1 to 3.2.3 indicate that the hole mentioned in 5.1 was created by a shot fired at a distance of between 6"/15,24cm and 15"/38,1cm.
6F8P23-5301	The damage to the shirt, Exhibit Q1 , is consistent with having been caused by a gunshot at a muzzle-to-target distance of greater than 3-inches and less than 15-inches when compared to the known distance standards, Exhibit K1.
6N2KRT-5301	Results of Examinations: The area around the hole in the Item 1 shirt was microscopically examined and chemically processed for the presence of gunshot residues, and a pattern of Nitrite residues was found. The pattern of residues present on the Item 1 shirt was reproduced

TABLE 2

WebCode-Test	Conclusions
	at a muzzle-to-target range of greater than three and less than fifteen inches when using the submitted Item 2 standards. Additionally, vaporous lead residue deposits were found.
6UR67M-5301	Item 4 is a piece of white cotton twill with a suspect bullet hole located in the approximate center. The area around the suspect bullet hole was microscopically examined and chemically processed for the presence of gunshot residues. Using the provided standards (Items 1 through 3), the muzzle to target range was determined to be between contact and 18 inches.
6ZYXXY-5305	The presence of fouling and the powder grain pattern detected on the section of white fabric labeled Q1, and the nitrite pattern detected on the griess test for defect A entrance on the section of white fabric labeled Q1, are consistent with the presence of fouling and the powder grain patterns observed on item 2, the image set of test fire targets, K1a, and the nitrite patterns detected on item 3, the image set of test fire targets treated with the griess test, K1b, between the distances greater than 3 inches and less than 12 inches.
7F7EKQ-5301	According with the tests made in our Lab, we could come to the conclusion that the shooting might have been produced between 3 and 10 inches.
82GW6R-5305	The distance of the muzzle of the firearm from the shirt was estimated to be between 3 inches and 12 inches.
88RR8F-5305	Distance determination testing indicated a similar pattern at distances greater than 6 inches and less than 15 inches.
8CLPUL-5301	The powder pattern on the shirt (item 1) was compared to the series of test firings and I estimate that the shot was fired from a distance of between 6" and 15".
8FHDDE-5305	Distance determination testing using Item #1 and Item #2 indicated a similar pattern could be produced at distances greater than 6 inches and less than 15 inches
8KBDPN-5301	The area around hole #1 on the front center of Item Q1 was microscopically examined and chemically processed for the presence of gunshot residue. Examinations showed hole #1 was consistent with the passage of a bullet. The residue and physical effects were consistent with a bracketed distance greater than six (6) inches and less than fifteen (15) inches.
8TPGFM-5305	The shirt presents a bullet hole inflected by short distance in a range between 3 and 9 inches
8X2AQL-5301	The shirt, Item 1.4 (CLC-4) was microscopically examined and chemically processed for the presence of gunshot residues and a pattern was found. A similar pattern was produced when the distance of the muzzle of the firearm to the shirt was greater than three (3) inches and less than fifteen (15) inches.
97BX6K-5305	Item 1 is a piece of fabric with a possible bullet hole. It was microscopically examined and chemically processed for gunshot residues and a pattern of residues was found. Using the provided distance standards this pattern of residues was reproduced at a distance greater than three inches and less than fifteen inches.
9CTJRX-5301	The shooting distance was determined by comparison of the GSR patters obtained from the victim's shirt with the ones obtained from a series of shots with known muzzle-to-target distances. The shooting distance is estimated being in range of 6" to 12" under the assumption that there were no objects inbetween the muzzle and the target blocking parts of the GSR cloud and no major amounts of GSR have been lost during medical treatment.
9L8BGV-5305	Fouling was observed visually. Powder grains were observed visually. A wipe-off rim was observed visually. A griess test was performed on defect A entrance and nitrites were detected. The fouling pattern, the powder grain pattern and the nitrite pattern detected on the griess test

TABLE 2

WebCode- Test	Conclusions
	for defect A entrance on item 1, the section of the white shirt, is consistent in diameter and particle population with the fouling patterns, powder grain patterns and nitrite patterns detected from the test fire targets between the distances of 3 inches and 12 inches.
A7LEGP- 5305	The estimating of the shooting distance range to the periphery of the entry hole present in cutting cloth item Q1 it was established between three (3) inches and twelve (12) inches from muzzle of the gun to the cloth. The above was set by comparison with cts photographs received with the results of the physical and chemical study test on fabric
ABZTLJ- 5301	The shirt of item Q1 was visually and microscopically examined. There was a defect hole noted in the center of this shirt. The area around the hole was microscopically examined and chemically processed for the presence of gunpowder and lead residues. Residues consistent with the discharge of a firearm were developed. The results of this processing were compared to items K1a, K1b and K1c. These comparisons showed that the defect hole in the t-shirt of item #Q1 is consistent with gunshot occurring at a distance greater than 3" and less than 18".
AD88TP- 5301	The hole in the Item Q1 cloth was designated as Hole Q1-A. The area surrounding Hole Q1-A was visually and microscopically examined for the presence of GSR. Bullet wipe, soot and gunpowder particles (unburned/partially burned/burned) were detected surrounding the hole. Hole Q1-A is consistent with the passage of a bullet. The area surrounding Hole Q1-A was also chemically processed for the presence of GSR using the MGT, a color-producing test for the presence of nitrites, and the SRT, a color-producing test for the presence of lead. A particulate nitrite pattern of ~4 1/2" in diameter was detected surrounding the hole. Dense vaporous lead was also detected surrounding the hole. Items K1a, K1b and K1c were visually examined and the observations were documented. The results of the MGT and SRT for Hole Q1-A were compared to the photographs from Items K1b and K1c. Based on the results of the testing, the muzzle-to-garment distance for Hole Q1-A in the Item Q1 cloth is determined to be great than Contact and less than 15".
AE2VBK- 5305	The distance at which the shot was fired was greater than 3 inches and less than 12 inches.
AMV4UP- 5301	The victim was shot at a short range of maximum 6 inches. This is based on the results of the Na-Rhodizonate test.
B7NRQL- 5305	Comparison of the gunshot residue pattern found on item Q1 to a series of known distance standards (K1a-c) indicates that the muzzle-to-target distance was greater than 6 inches and less than 15 inches.
BEV26J- 5305	Examination of Item 1 revealed a bullet hole. Visual, microscopic, and chemical distance determination testing revealed that a similar pattern could be produced at a distance greater than contact and less than 12 inches.
BK2UYE- 5301	The Item Q1 was examined and consisted of a white cloth with a defect located in the middle. The defect had apparent bullet wipe on the peripheral edges, which is indicative of the passage of a bullet. Surrounding the defect was a pattern of gunshot residues that include partially burnt and unburnt powder particles, as well as vaporous lead. The Item Q1 was visually examined and chemically processed using the Modified Griess test and Sodium Rhodizonate. Gunshot residue patterns were detected. The visual and chemically obtained gunshot residue patterns from Item Q1 were compared to Item K1a, K1b and K1c. The residue pattern found around the defect in Item Q1 is consistent in pattern size and density with having been produced at a muzzle-to-target distance that is further than 6 inches and closer than 15 inches.

TABLE 2

WebCode-Test	Conclusions
BQBVFC-5305	Distance determination testing using Item #1 and Item #2 indicated a similar pattern could be produced at distances greater than six inches and less than fifteen inches.
BYKJUB-5305	Q1 is consistent with the passage of a bullet with the muzzle of the firearm between three (3) inches and fifteen (15) inches from the target when discharged. The distribution of lead particulate beyond the edges of the holes and the burned and unburned powder present is consistent visually and chemically on Q1 with the known distance tests provided.
C9PPLR-5305	Distance determination testing using known distance test images in Item 1 and Item Q1 indicated a similar pattern could be produced at distances greater than 3 inches and less than 15 inches.
CEUTA6-5301	Q1. One (1) manila envelope labeled in part "Item Q1" containing one (1) cotton twill jean (white cloth) (unknown sample) with one (1) defect/hole present, designated as defect "A". Q1A. Chemical test pattern collected from Item Q1, the white cloth, during laboratory examination. K1a. One (1) manila envelope labeled in part "Item K1a", containing ten (10) standard distance panel photographs (unprocessed) shot at contact, 3 inches, 6 inches, 9 inches, 12 inches, 15 inches, 18 inches, 21 inches, 24 inches, and 27 inches. K1b. One (1) manila envelope labeled in part "Item K1b", containing ten (10) standard distance panel photographs (processed with Modified Griess) shot at contact, 3 inches, 6 inches, 9 inches, 12 inches, 15 inches, 18 inches, 21 inches, 24 inches, and 27 inches. K1c. One (1) manila envelope labeled in part "Item K1c", containing ten (10) standard distance panel photographs (processed with sodium rhodizonate) shot at contact, 3 inches, 6 inches, 9 inches, 12 inches, 15 inches, 18 inches, 21 inches, 24 inches, and 27 inches. Clothing Analysis: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate): Microscopy (Stereo Microscope). Analysis of Item Q1: No visible red-brown stains were observed on the Item Q1, the white cloth. One (1) defect was observed on Item Q1, the white cloth, and described as follows: The defect/hole, designated as "A", measured approximately 1/4 inch in greatest dimensions and was located approximately 4 1/2 inches from the top and 3 1/2 inches from the left side the white cloth. Visual and microscopic examination of defect/hole "A" revealed the presence of apparent bullet wipe, soot, and gunpowder. Chemical testing of defect/hole "A" indicates the presence of *nitrite residues and **lead residues. Note: *Nitrites are present in gunpowder residue. **Lead residue can be present in bullets/bullet cores and ammunition primers. Opinion/Interpretation: Examination of defect "A" indicated that it was visually consistent with the passage of a projectile/bullet based upon the physical properties observed and the chemical tests performed. Distance Determination: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate). The pattern of gunpowder and gunpowder residues observed and documented from Item Q1, the white cloth, and Q1A, the chemical analysis of defect/hole "A", was reproduced at a muzzle to target distance between 3 and 15 inches. Miscellaneous: Item Q1A, the chemical test patterns, was sealed in a manila envelope and will be returned with the evidence to the submitted agency. Item K1a, the photographs, was sealed in a manila envelope and will be returned with the evidence to the submitted agency. Item K1b, the photographs, was sealed in a manila envelope and will be returned with the evidence to the submitted agency. Item K1c, the photographs, was sealed in a manila envelope and will be returned with the evidence to the submitted agency. Evidence in this case will be returned to the investigative agency.
CM6UV7-5301	Clothing Analysis: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate): Microscopy (Stereo Microscope). The defect/hole, designated as "A", measured approximately 1/4 inch in greatest dimensions and was located approximately 4 inches below the top edge and 3 1/2 inches from the right edge of the piece of cloth twill

TABLE 2

WebCode-Test	Conclusions
	<p>jean. Visual and microscopic examination of defect/hole "A" revealed the presence of apparent bullet wipe/soot/gunpowder. The patterns of apparent soot measured approximately 3 1/2 inches in diameter. The patterns of apparent gunpowder measured approximately 2 inches in diameter. Chemical testing of defect/hole "A" indicates the presence of *nitrite residues/**lead residues. Note: *Nitrites are present in gunpowder residue. **Lead residue can be present in bullets/bullet cores and ammunition primers. Opinion/Interpretation: Examination of defect/hole "A" indicated that it was visually consistent with the passage of a projectile/bullet based upon the physical characteristics observed and the chemical tests performed. Distance Determination: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate): Microscopy (Stereo/Comparison Microscope). Test patterns were submitted at distances of Contact, 3, 6, 9, 12, 15, 18, 21, 24, and 27 inches. The test target media was cloth twill jean. The pattern of gunpowder/gunpowder residues observed and documented from Item Q1, the cloth twill jean, was reproduced at a muzzle to target distance between 3 and 18 inches. Miscellaneous: Item Q1A, the test patterns, were sealed in a manila envelope and will be returned with the evidence to the submitting agency. Item K1a, the photographs, were sealed in a manila envelope and will be returned with the evidence to the submitting agency. Item K1b, the photographs, were sealed in a manila envelope and will be returned with the evidence to the submitting agency. Item K1c, the photographs, were sealed in a manila envelope and will be returned with the evidence to the submitting agency.</p>
CXP2RA-5305	<p>1. Exhibit is a cutting of white cloth with a defect in the center. a. Examination of Exhibit 1 revealed characteristics consistent with those observed at a close range of fire. TECHNICAL NOTES: Contact or Near Contact is defined as when the muzzle of the firearm is in/near contact with the target at the time of discharge. Close is defined as the range of fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Undetermined is defined as when a specific muzzle to target distance could not be determined due to a lack of defined gunshot residue patterns. This may indicate the shot was discharged from a distance beyond the maximum distance for the deposition of residues, an intervening object was present at the time of discharge, or that residues were lost during handling of the item prior to examination.</p>
DRWG4J-5305	The firing distance range was between 3 and 9 inches
E3NKKJ-5301	<p>The Item Q1 cloth was visually and microscopically examined and chemically processed for the presence of holes and close-range firearm discharge residues. One hole was found in the approximate center. As a result of the visual and microscopic examinations and chemical testing, the muzzle to object distance was determined to be greater than three inches and less than eighteen inches. The Item K1a, K1b and K1c photographs were utilized in the distance determination process.</p>
EHM9Y4-5301	<p>A visual comparison of the results obtained from the 'shirt' (Item Q1) in its original form and after it had undergone both the Modified Griess Test and the Sodium Rhodizonate Test to the known distances for each method, it is my opinion that the distance between target (Item Q1) and muzzle of the firearm is between 6 inches and 12 inches.</p>
EKQ6KR-5305	<p>the muzzle of the firearm was estimated to have been between 9 inches and 12 inches from the shirt.</p>
EWLD4U-5305	<p>Shot fired between approximately 3 inches and 24 inches muzzle to target based on available information.</p>

TABLE 2

WebCode- Test	Conclusions
FEHZAJ- 5301	Item 1LMCC2-1 consisted of 3 envelopes labelled: '1 x Test no. 22-5301 item kla' – propellant distribution, '1 x Test no. 22-5301 item kllb' – Griess test, '1 x Test no. 22-5301 item klc' – NaRhod test. Each envelope contained 10 x photographs showing a range of fire from contact to 27". A fourth envelope labelled: Test no. 22-5301 item Q1 contained an unknown fabric sample. The fabric sample was compared visually to the propellant distribution photographs (kla). The sample was then visualised using NaRhod and compared to the photographs (klc). Results: Test sample consistent with sooty deposits and propellant distribution at a range of: 6" – 15". Test sample consistent with NaRhod test at a range of: 12" – 15". Conclusion: In my opinion, using the maximum results, the sample shot was fired from a range of between 6" and 15"
FMQU3R- 5305	Visual examination and chemical processing of the submitted (Item Q1) in comparison to submitted standards (Item K1a-c) put the muzzle of the firearm greater than 6 inches and less than 12 inches from the shirt (Item Q1) at the time of discharge.
FWGF9P- 5305	The suspect shotgun was fired at a distance of approximately greater than 6 feet and less than 12 feet.
G7JXG8- 5301	A hole was present in the approximate center of the Q1 shirt. The hole and the area around the hole was visually, microscopically, and chemically processed for the presence of firearm discharge residues. The gunshot residue pattern around the hole is consistent with tests fired at a muzzle-to-target distance greater than 3 inches and less than 15 inches.
GHZKRT- 5301	In my opinion the muzzle to target distance was greater than 3 inches and less than 24 inches from the victim at the time the gun was discharged.
GV2BCC- 5301	The area around Hole A on the damaged white cloth (Item #Q1) was visually inspected, microscopically examined, and chemically processed for the presence of gunshot residues. A pattern of residues was observed. Using photographs of known ranges submitted by the agency (Items #K1a, #K1b, and #K1c), a similar pattern of residues was observed at an approximate muzzle-to-target distance of greater than 3 inches and less than 15 inches.
GY2M8C- 5301	The area around Hole A (item 1D) was visually inspected, microscopically examined and chemically processed for the presence of gunshot residues. A pattern of residues was observed. Based on the test patterns and chemical processing results of those test patterns provided, an approximate muzzle-to-garment distance of greater than 6 inches and less than 15 inches was determined.
GZVDDQ- 5301	[No Conclusions Reported.]
H4C3B9- 5301	Examination of the Item A1-1 piece of white cloth revealed the presence of a hole, consistent with a bullet hole, through the fabric. The area around this hole was examined microscopically, and processed chemically for the presence of propellant and lead residues (gunshot residues), and a pattern of residues was found. Comparison of the Item A1-2 submitted test patterns to the Item A1-1 submitted piece of fabric, showed the Item A1-1 residue pattern to be consistent in size and density with patterns observed on the Item A1-2 submitted standards. Based on this comparison, the bullet hole observed on Item A1-1 is consistent with a shot fired from a distance between approximately three (3) inches, and approximately twenty-seven (27) inches from muzzle to target
H7D3B7- 5301	Item Q1 was microscopically examined and chemically processed for the presence of gunshot residues. Item Q1 bears gunshot residues consistent with a muzzle to target distance greater than contact and less than 12 inches.

TABLE 2

WebCode- Test	Conclusions
HMPL8C- 5301	The area surrounding the defect in approximately the center of the piece of white T-shirt, Item Q1, was visually examined, microscopically examined and chemically processed for the presence of gunshot residues. This examination revealed a pattern of gunshot residues. Using the provided Distance Standards, Items K1A - K1C, it was determined that a pattern of residues like that displayed on Item Q1 could be produced at a muzzle to target distance between three (3) inches and fifteen (15) inches.
HNWYTK- 5305	The fouling pattern, the powder grain pattern, and the nitrite pattern from the griess test of defect A entrance on the section of white fabric labeled victim's shirt with bullet hole, Q1, (item 1), are consistent in diameter and particle population with the fouling patterns and the powder grain patterns of the test fire series labeled distance standards on untreated white cotton cloth targets, K1a, (item 2), and are consistent in diameter and particle population with the nitrite patterns of the test fire series labeled modified griess tests of untreated white cotton cloth targets, K1b, (item 3), between the distances of 3 inches and 12 inches.
HRHLL9- 5305	Item Q1 was a rectangular-shaped white cotton swatch (approximately 8"x10 1/4") with a hole centrally. The area around the hole was examined both visually and with a stereomicroscope and a pattern of residues was observed. The hole was approximately 1/4" x 1/4" in diameter, had torn fibers, and had bullet wipe around the margins. Dense burnt and partially burnt gunpowder was deposited around the hole conically approximately 2 1/4" x 2." Additionally, visible smoke was deposited around the hole conically approximately 4 1/2" x 3 1/2." Item Q1 was chemically processed for nitrites (burnt and partially burnt gunpowder) using the Modified Griess Test. The area around the hole tested positive for nitrites. The area around the hole was then chemically processed for lead using the Sodium Rhodizonate Test. The area around the hole tested positive for lead. Comparing the Gun Shot Residue patterns from the digital images on the USB drive (K1) to the visual/microscopic exam and chemical processing of Item Q1 the following conclusion could be made: The muzzle to target distance of the Glock pistol to the bullet hole in Item Q1 was greater than 3 inches and less than 12 inches.
HYFB7H- 5301	The item was separated from the firearm by a distance that was greater than contact and less than fifteen inches at the time of discharge.
JDEJLC- 5301	Item #2 (shirt with bullet hole) was microscopically examined and chemically processed for gunshot residues on 4/19/2022. A pattern of residues consistent with the discharge of a firearm and the passage of a bullet was observed near the center of the shirt. Using Item #1 (Distance Standards K1 a-c) the muzzle to target distance was determined to be between 3 inches and 15 inches.
JGWW4E- 5301	The area on item Q1 around H1 was both visually and microscopically examined for the presence of gunshot residue. Apparent bullet wipe, smoke, and a pattern of burned, partially burned, and unburned gunpowder particles were visible in the area around H1. H1 is consistent with having been made by the passage of a bullet. H1 was also chemically processed using the Modified Griess Test and the Sodium Rhodizonate Test. These are color producing test that are sensitive to nitrites and lead respectively. The residue patterns surrounding H1 were compared to the photographs contained in Items K1a, K1b, and K1c. As a result of the examinations and chemical tests performed, the muzzle to target distance for H1 is greater than 3 inches and less than 15 inches. The item 1 envelope was not examined. Item MGT will be forwarded to the submitting agency.
JKW8ZE- 5301	The area around H1 was both visually and microscopically examined for the presence of gunshot residue. Apparent bullet wipe, smoke and a pattern of burned, partially burned and unburned gunpowder particles were visible in the area around H1. H1 is consistent with having

TABLE 2

WebCode- Test	Conclusions
	been created by the passage of a bullet. H1 was also chemically processed using the Modified Griess Test and the Sodium Rhodizonate Test, which are color producing tests that are sensitive to nitrites and lead respectively. The residue patterns surrounding H1 were compared to the photographs contained in items K1a, K1b and K1c. As a result of the examinations and the chemical tests performed, the muzzle to target distance for H1 is greater than 3 inches and less than 18 inches.
JQKUTY- 5301	It is my opinion that the distance of the exhibit firearm's muzzle to the victim's t-shirt when it was discharged was greater than 6.0 inches and less than 18.0 inches.
JX279K- 5305	Examination of Item Q1 revealed a gunshot residue pattern associated with a bullet hole. Distance determination testing using Item Q1 and submitted test patterns indicated a similar pattern could be produced at distances greater than contact and less than 15 inches.
K9WW4C- 5305	[No Conclusions Reported.]
KG8ZBB- 5301	The area around the hole in the center of the Q1 shirt was microscopically examined and chemically processed for the presence of gunshot residues and a pattern of residues was found. This pattern of residues was reproduced at a distance of between six (6) and fifteen (15) inches, based on the provided distance standards.
KJEHA7- 5301	The muzzle to target distance for the gunshot residue pattern on Q1 was determined to be intermediate. Intermediate is defined as the range at which the firearm and ammunition combination will deposit visible or detectable gunpowder particles on the target material. Drop off is the minimum distance at which the firearm, ammunition, and substrate combination no longer deposits gunpowder particles on the target material.
LP3KUH- 5301	The area around Hole #1 in Item 4 was microscopically examined and chemically processed for the presence of gunshot residues. Residues were found which are consistent with the discharge of a firearm and passage of a bullet. Using the Glock 17 handgun with Winchester 9mm 147 grain ammunition, the pattern of residues observed around Hole #1 in Item 4 was reproduced at a distance of between approximately 3 inches to 15 inches.
LV6RC7- 5305	Q1 questioned pattern was produced at a muzzle-to-target distance of greater than 3 inches and less than 18 inches when compared against the K1 a-c distance standards.
LZHW28- 5305	[No Conclusions Reported.]
LZXUF7- 5301	The Item 4 piece of white cotton twill was examined and one suspect bullet hole (#1) was found in the approximate center of the item. The area around suspect hole #1 was visually and chemically processed using the Modified Griess and Sodium Rhodizonate tests. Using the provided standards and chemical test results, a comparison of the patterns were conducted and the results are: Suspect bullet hole #1 is consistent with the passage of a bullet. A muzzle-to-target range of beyond contact to 12 inches was established.
MGF7ER- 5305	The shirt, item Q1, was examined visually, microscopically, and chemically tested for firearm discharge residues. The observed patterns were compared to the provided distance standard images. The distance range that the muzzle of the firearm could have been from the shirt at the time of discharge was in my opinion, greater than 6 inches and less than 18 inches.
MGKC7L- 5305	The unknown target provided has a distribution of gunshot residues consistent with test shots delivered between farther than approximately 3 to closer than approximately 15 inches. The unknown target is consistent with the 6 inch test target provided.

TABLE 2

WebCode- Test	Conclusions
MLE778- 5305	Distance determination testing using Item #1 and provided images indicated a similar pattern could be produced at distances greater than 3 inches and less than 12 inches.
MLUPQ6- 5305	a. Upon examining hole 1 in the shirt (Exhibit Q1), I have found a full match to characteristics of a bullet entrance hole. b. Upon examining hole 1 in the shirt (Exhibit Q1), I have found a high-level match to the scenario in which the shooting towards the victim occurred from an estimated distance in the range of 3" to 15". *The shooting distance estimation is based on the assumption that exhibit 1 was the first medium to be hit by the bullet, and that the shooting was performed under normal conditions.
MY2FN8- 5305	The area around the hole in the center of Item 2 (a piece of white fabric said to be from a shirt and bearing a bullet hole) was visually examined and chemically processed for the presence of gunshot residues. Based on comparison of the pattern on Item 2 against the images of Item 1 (images of known distance patterns), the pattern of residues on Item 2 is consistent with having been produced a distance of between 3 to 15 inches.
N7XWE3- 5305	Examination of the Item Q1 shirt revealed a hole. The area around the hole was microscopically examined and chemically processed for the presence of gunshot residues, and a pattern of residues was found. The residue pattern found around the hole in the Item Q1 shirt is consistent in pattern size and density with having been produced at an approximate distance between 3 inches and 12 inches.
NAGM68- 5305	On the patron of franela there are reference the one hole produced for the projectile shooting for firearms was established a range of distancia the greater than 6 inches and less than 18 inches approximately between site the impact and muzzle of the weapon o firearm the past answer based on the comparison between the diatnace of standars and the sample delivery for study
NMA9A3- 5301	The area around Hole A on Item 1A was visually inspected, microscopically examined, and chemically processed for the presence of gunshot residues. A pattern of residues was observed. Using Items 1B, 1C, and 1D (known photographs) a similar pattern was observed at an approximate muzzle-to-target distance of greater than six (6) inches and less than 18 inches.
NQM7F4- 5301	The area around defect A was visually examined, microscopically examined and chemically processed for the presence of gunshot residues. The pattern of gunshot residues around defect A is consistent with a muzzle to target distance between 3 inches and 15 inches.
NX4PVX- 5305	1. Exhibit 1 is a piece of white fabric with a defect near the center. Examination of Exhibit 1 revealed that the defect is consistent with the discharge of a firearm at a close range of fire.
P2KAHD- 5301	Item CTS Q1 square piece of white in color cloth (shirt) exhibits a single perforating defect surrounded by a pattern of black in color particles and medium sootting. One particle was removed and tested positive for gunpowder. Visual and chemical testing of the defect on the Item CTS Q1 is most consistent with the entry of a projectile occurring when the muzzle of the seized firearm, using the reported ammunition, was at a distance greater than 3 inches but less than 15 inches from the material at the time of firing.
P3FK78- 5305	The "shirt with bullet hole" (Item Q1) was shot at a distance greater than 6 inches but less than 15 inches.
P4PYM8- 5305	Examination of Item #1 revealed a gunshot residue pattern associated with a bullet hole. Distance determination testing using known photographs submitted and the unknown submitted in Item #1 indicated a similar pattern could be produced at distances greater than contact and less than 15 inches.

TABLE 2

WebCode- Test	Conclusions
P92RX7- 5305	The patterns of gunshot residues on Item Q1 are consistent in size and density with the muzzle of a firearm having been greater than approximately 3 inches and less than approximately 12 inches from this area, at the time of firing. The area around the hole of Item Q1 was visually and microscopically examined and chemically processed for gunpowder and lead residues (gunshot residue).
PJF23B- 5301	The muzzle to target distance at the time of discharge was greater than 3 inches and less than 15 inches.
PP6L47- 5301	The area around the hole in Item Q1 was microscopically examined and chemically processed for the presence of gunshot residues and a pattern of residues was found. Comparison with the distance standards provided showed this pattern of residues was produced at a distance of greater than six (6) inches and less than fifteen (15) inches.
PQJNDY- 5301	The area around the hole in Item Q1 was examined and chemically processed for the presence of gunshot residues. The gunshot residue pattern around the hole in Item Q1 is consistent with tests fired at a muzzle-to-target distance greater than contact and less than 12 inches using the known standards K1a, K1b, and K1c.
PXKZBG- 5301	Test patterns were compared to the pattern on the Q1. Patterns like the pattern on the Q1 were produced at a distance greater than 3 inches and less than 15 inches.
Q9YC47- 5305	The range of distance between the muzzle of the firearm and the impacted garment is between three (3) inches and twelve (12) inches
QRWCZA- 5305	In view of the revelations obtained on the tee-shirt, which was the subject of the sealed record in question, and the comparisons made with the matrix/weapon/ammunition trio, the shooting distance is estimated to be between (0;12) inches. It should be noted, however, that an interpretation can only be made on the basis of the elements brought to our attention in the investigation. The emergence of an additional element may have an influence on the interpretation of the analytical results
QYNBH6- 5305	It is established that the perforation found in the piece of fabric analyzed was the product of the passage of a copper projectile fired in a single charge firearms carried out between the mouth of the firearm and the affected surface at a distance of approximately 6 to the 12 inches
QZ6AW3- 5301	Shooting distance from the muzzle of the firearm to the shirt is 6"-18".
R36ZH9- 5301	Examination of Item 4 revealed a hole in the center of the cloth. The area surrounding the hole was visually and microscopically examined and chemically processed. The detected pattern surrounding the hole in the center of Item 4 is consistent in size, density, and appearance to the test patterns produced at muzzle-to-target distances of between three (3) and fifteen (15) inches. The range was determined by examining Item 4 and the submitted photo arrays which represent test patterns at known distances.
R8ZUFA- 5301	The muzzle of the firearm was at a distance range of greater than 3 inches and less than 12 inches from the bullet hole of shirt (Q1) at the time of discharge.
RJC2DV- 5301	The area around the hole in Item 1 was microscopically examined and chemically processed for a pattern of residues. Residues like that observed on Item 1 were reproduced in Items 2, 3, and 4 at minimum distance of three inches and a maximum distance of fifteen inches.
RKM4ZT- 5305	1. Examination of Exhibit 1 disclosed a shirt with a perforating defect near the center of the fabric. a. The area around the hole was visually and microscopically examined. b. Physical characteristics and a pattern of gunshot residues associated with the discharge of a firearm

TABLE 2

WebCode- Test	Conclusions
	were observed. These characteristics are consistent with a close range of fire.
RPyCH7- 5301	The entrance hole in the piece of fabric is circular and measures approx. 8x8 mm. For the shooting distance examination of the piece of fabric, a Modified Griess Test was prepared. A laminated piece of photo paper was soaked in a solution of sulphanilic acid dissolved in distilled water and 1-naphthol dissolved in methanol. At the same time, a cotton swab was dipped in a solution of sodium nitrite dissolved in distilled water. The photo paper and the cotton swap were hung to dry. The dry cotton swap was, after being dipped in acetic acid, 15 %, applied to the four corners of the dry photo paper. An orange marking appeared in each corner, proving that the Modified Griess Test was valid and responsive to nitrite. The entry side of the piece of fabric were placed against the photo paper, pieces of gauze, dripped in acetic acid, 15 %, was placed upon the fabric and finally brown wrapping paper was placed on top. A hot iron was pressed down on the brown wrapping paper, and any appearance of nitrite particles would appear as orange dots on the photo paper. After a close examination of the photo paper, the orange pattern of nitrite particles that emerged was compared to the pictures in the case, and it was concluded, that the distance from the muzzle of the discharged firearm to the piece of fabric was greater than 9 inches and less than 12 inches.
RUUH72- 5301	The area around hole #1 of Item Q1 was microscopically examined and chemically processed for the presence of gunshot residue. Examinations showed hole #1 was consistent with the passage of a bullet. The residue and physical effects were consistent with a muzzle to garment distance of three (3) inches to fifteen (15) inches +/- 1/8 of an inch at a minimum coverage probability of 99%.
RWJ6G4- 5305	According with the tests made in our Lab, we could come to the conclusion that the shooting might have been produced between 4 and 11 inches.
TRZEQZ- 5305	The area around the bullet hole in the piece of fabric (item 1) was visually and microscopically inspected and processed chemically for the presence of a gunpowder and/or lead residue pattern. A pattern consisting of discharge residues was identified. Using the test patterns created by CTS, results indicate the most probable firing distance was between approximately three (3) and twelve (12) inches.
TUAJ4N- 5305	The cloth was visually and chemically examined for gunshot residue patterns. The results from the visual and chemical treatment of the item Q1 was compared with test samplings. The result shows that the shooting distance is estimated to be greater than 3" but less than 12".
U289MD- 5301	Damage to the shirt, Exhibit Q1, is consistent with having been caused by a muzzle to target distance of greater than 3 inches, less than 15 inches.
U3EQJN- 5301	Item 1 was found to consist of a piece of white fabric with an apparent bullet hole near the centre. Test firings from the suspect firearm were also submitted. The area around the bullet hole was visually and chemically examined for the presence of gun shot residues. Visual examination and chemical testing indicated a pattern of residues consistent with the discharge of the firearm in question at a distance of between 6 inches and 12 inches from the fabric.
UDW8CU- 5301	Clothing Analysis: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate): Microscopy (Stereo/Comparison Microscope). One (1) apparent defect was observed on Item 1D (Q1), the shirt sample, and described as follows: The defect, designated as "A", measured approximately 1/4 inch in greatest dimensions and was located approximately 4 inches from the top edge and 3 3/4 inches from the right side edge on the anterior portion of the shirt sample. Visual/microscopic examination of defect "A" revealed the presence of apparent bullet wipe, soot and gunpowder. Chemical testing of defect "A" indicates the presence of nitrite residues and lead residues which are found in gunpowder

TABLE 2

WebCode-Test	Conclusions
	<p>residue. Opinion/Interpretation: Examination of defect "A" indicated that it was visually consistent with the passage of a projectile/bullet based upon the physical characteristics observed and the chemical tests performed. Distance Determination: Methodology: Physical (Visual Examination): Chemical (Color Test Modified Griess/Sodium Rhodizonate). Opinion/Interpretation: The pattern of gunpowder/gunpowder residues observed and documented from Item 1D (Q1), the shirt sample, was compared to the test standards identified to be produced by CTS and determined to be between 3 and 15 inches.</p>
UM48KW-5301	<p>The defect in the piece of fabric, item Q1, was consistent with the passage of a bullet. The presence of lead residues, soot, and powder particles was consistent with a muzzle-to-target distance of intermediate. Based on the submitted test panels, K1a through K1c, drop-off distance is beyond 27".</p>
UQ3JK3-5305	<p>The shot fired in the fragment of fabric consistent with a short distance range, between six and twelve inches from the muzzle of the weapon and the target</p>
UU9CT3-5301	<p>The area around the hole in the Item 1 shirt was microscopically examined and chemically processed for the presence of gunshot residues, and a pattern of Nitrite and lead residues was found. The pattern of residues present on the Item 1 shirt was reproduced at a muzzle-to-target range at a distance greater than 3 inches to less than 15 inches when compared to the submitted distance standards.</p>
UZRA6A-5301	<p>The area around Hole #1 in Item 4 was microscopically examined and chemically processed for the presence of gunshot residues. Residues were found which are consistent with the discharge of a firearm and passage of a bullet. Using the Glock 17 firearm with Winchester 9mm 147 grain FMJ ammunition, the pattern of residues observed around Hole #1 in Item 4 was reproduced at a distance of between approximately contact to 12 inches.</p>
V3E9WD-5301	<p>By mean of physical study and chemical analysis, gun shot residues (gun powder, nitrites and lead) were detected around the shirt's (Q1) hole consistent with firing a gun from a muzzle to garment distance between three (3") inches to twelve (12") inches. The provided distance standards (K1a, K1b and K1c) were used for distance determination.</p>
VX4VGY-5305	<p>Examination revealed the presence of an apparent bullet hole with an associated gunshot residue pattern. Visual examination and chemical testing revealed that a similar gunshot residue pattern could be made at a distance greater than contact but less than 9 inches.</p>
VZ9M7R-5301	<p>The area around the suspected bullet hole on Item Q1 was microscopically examined and chemically processed and a pattern of residues was found. The pattern on Item Q1 was compared to the photographs of provided known distance patterns depicted in Items K1A, K1B, and K1C. The pattern of residues displayed on Item Q1 most resembles the known distance patterns generated between a minimum distance of 3 inches, and a maximum distance of 15 inches.</p>
W9FMHE-5301	<p>we apply color test technique on the shirt sample (Q1) using fresh modified griss and we conclude that there is nitrite anion which give indication of the presence of close shooting. By comparing the result obtained above we can estimate the distance of the muzzle of the firearm from the shirt was between (6-9) inches</p>
WLLUXB-5305	<p>Comparison of Q1 with the distance standards (untreated and sodium rhodizonate treated) indicates that the shot was fired between 3" and 18" (inches) away (muzzle to fabric distance).</p>
WRWQ47-5305	<p>The shot that caused the bullet hole in the shirt, Item Q1, was fired from a distance of more than 3 inches and less than 9 inches (measured from the muzzle to the target).</p>

TABLE 2

WebCode-Test	Conclusions
WVBJUY-5305	The piece of cloth belonging to the victim's shirt shows a hole consisting of input generated by the passage of a projectile fired by a single charge firearm based on the physical study the results of the chemical tests and the comparison with the photographs of reference samples taken at different distances from the dispersion of the gunshot residue Griess test and Rhodizonate it is inferred that the shot was performed in a distance range of minimum six inches (6") and maximum twelve inches (12") between the muzzle of the gun and the shirt
X3L6G8-5301	The hole H1 was found to be entrance hole made by firearm projectile while the item Q1 shirt was at the distance of between approximately 3 to 15 inches from the muzzle of the firearm at the time of firing.
XD92KU-5301	After comparing the pattern of gunshot residues surrounding the hole (Q1) and the submitted photographs we can estimate that the shooting distance was greater than 3 inches and less than 12 inches
XFWF94-5301	Visual examination and chemical processing of the submitted Item Q1 in comparison to submitted standards put the muzzle of the firearm further than 6 inches and less than 15 inches from the t-shirt at the time of discharge.
XHYF92-5301	The item Q1 section of cloth displayed one (1) hole that appeared to have been made by the passage of a bullet. The hole will be referred to as hole 1. The areas around the hole were examined visually and microscopically for the presence of gunpowder particles. Gunpowder particles were found all around the hole. Item Q1 was tested chemically using the Modified Griess Test and the Sodium Rhodizonate Test. The modified Griess Test and the Sodium Rhodizonate are color-producing tests for the presence of nitrites (burned or partially burned gunpowder) and lead, respectively, found in gunshot residues. A particulate nitrite pattern was detected around hole 1. A vaporous lead pattern was also developed around hole 1. Using the supplied photographs of the test shots, the photographs of the results of the Modified Griess Tests and the Sodium Rhodizonate Tests, the muzzle of the suspect firearm to item Q1 was determined to be greater than contact and less than 15".
XZXQRX-5305	The shot was fired between a minimum distance of approximately six (6) inches and a maximum of twelve (12) inches
Y4WWZV-5305	The best fitting distance for the shoot distance is greater than 9 inches and less than 12 inches. We can also hypothesize that the shooting distance is probably around 10.5 inches.
YBXKLM-5305	1). A hole of entry, vaporous lead, and a pattern of gunpowder, all associated with the discharge of a firearm, were located on Exhibit 1 (Piece of Fabric), and are consistent with characteristics observed at a close range of fire.
YGNVZR-5301	The residue pattern from the shirt indicates a muzzle-to-target distance between three (3) and fifteen (15) inches.
YUB6HQ-5301	Based on the visual comparison of the distribution of soot residues and powder particles and the results of the chemical enhancements performed, the muzzle of the firearm was likely discharged between 6 inches and 15 inches from Item 001-Q1. In order to conform with the CTS reporting structure, this range was reported to CTS as greater than 3 inches and less than 18 inches so that the 6 inch and 15 inch distances would be included in this reported range.
YXQ37Z-5301	Results of Examinations: The area around the hole in the Item 1 shirt was microscopically examined and chemically processed for the presence of gunshot residues, and a pattern of nitrite and lead residues was found. The pattern of nitrite residues present on the Item 1 shirt was reproduced at a muzzle-to-target range of greater than contact and less than twelve inches when using the submitted Item 2 distance standards.

TABLE 2

WebCode-Test	Conclusions
Z2PBW9-5305	Consistent with the discharge of a firearm between (6 - 12) inches.
Z8PR6T-5301	The area, around Hole #1 in the center front of the Item Q1 shirt portion, was microscopically examined and chemically processed for the presence of gunshot residues and a pattern of residues was found. The pattern of residues on the shirt portion was compared to the patterns on the provided samples and was found to be consistent with the firearm muzzle having been at a distance between six (6) and eighteen (18) inches when discharged.
ZFNALQ-5301	One (1) circular defect, designated #1, was located in the center of Item Q1. The defect and area surrounding the defect were examined microscopically and processed chemically for the presence of gunshot residues. A pattern of residues was developed. Using the distance standards listed under Item K1a-c, the pattern of residues on Item Q1 was reproduced at a muzzle distance of approximately three (3) to fifteen (15) inches.
ZHQBK3-5305	The presence of fouling and the powder grain pattern detected on the section of white fabric labeled Q1, and the nitrite pattern detected on the griess test for defect A entrance on the section of white fabric labeled Q1 are consistent in diameter and particle population with the presence of fouling and the powder grain patterns observed on item 2, the image set of test fire targets labeled K11, and the nitrite patterns detected on item 3, the image set of test fire targets treated with the griess test labeled K1b, between the distances of greater than 3 inches and less than 12 inches.
ZMMY2A-5301	The submitted Q1 fabric sample was tested by Modified Griess and Sodium Rhodizinate chemical processes and compared to the submitted distance standards. The muzzle to fabric surface distance was determined to be greater than three inches and less than twelve inches.

Additional Comments

TABLE 3

WebCode-Test	Additional Comments
4LKBCV-5301	Visual was closer to 3 to 9 inches. Griess was closer to 3 to 9 inches. Lead was closer to 3 to 9 inches.
66AU2L-5301	In a normal laboratory setting the drop-off distance with the specific firearm and ammunition combination would have been performed. Drop-off distance is the distance where the firearm and ammunition combination will no longer deposit observable/detectable residues on a specific target material.
67YDLK-5301	The uncertainty of measurement in the creation of known test fire patterns was established for our laboratory. Since we were supplied with test patterns created by CTS, our uncertainty of measurement does not apply and will not be reported.
6BENZN-5301	Close is defined as the range of fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Only the reporting of qualitative results are allowed, per policy.
6N2KRT-5301	<p>Methods: Gunshot Residue: Items submitted for gunshot residue testing are examined visually and microscopically for the presence of suspected bullet holes, physical effects from a firearm discharge such as singeing or tearing of fabric, and embedded particles of gunpowder, lead, and copper. If some or all of these conditions are noted, a series of chemical tests for the presence of nitrites (a component of gunpowder), lead, and copper may be performed. Each of these tests are chemically specific and produce a color reaction when in the presence of the specific chemical. The tests used for nitrite compounds, lead, and copper are the Modified Griess Test, the Sodium Rhodizonate Test, and the Dithiooxamide Test, respectively. If a suspect firearm and ammunition are submitted, test-fired exemplars are created at a variety of muzzle-to-target distances, are visually examined and chemically processed in the same manner as the evidence, and are compared directly with the submitted evidence. When test results at specific distances are distinctly different than the results on the submitted evidence, this is used as the basis for excluding an appropriate range of distances ("could not be reproduced at a distance of four inches or less"). When no suspect firearm and/or ammunition is submitted, results are more general and are based on common maximum distances for the deposition of gunshot residues ("residues like those found on the (Item #) are rarely deposited at a distance of six feet or greater"). If the only reaction produced in testing is a small ring of lead and/or copper around a suspected bullet hole, this is considered consistent with the passage of a bullet, but no distance determination can be made.</p> <p>Limitations: Gunshot Residue: While firearms are known to produce consistent gunshot residue pattern results under controlled conditions, variables including shooting environment, barrel condition and ammunition design can all influence the results of tests conducted on the submitted evidence and test-fired exemplars. Accordingly, gunshot residue test results are primarily used to exclude particular muzzle-to-target ranges and should only be considered valid for the particular combination of firearm and ammunition type used during testing in the Laboratory. The use of the phrase "consistent with" in this report is meant to indicate physical effects that are commonly found in a given shooting environment. No conclusions can be drawn when residues are absent due to the possibility of intervening objects or environmental and handling conditions. When a bullet impacts an intervening object, vaporous lead residue deposits can be produced that are occasionally dispersed onto neighboring items. Distance determinations involving a wound and/or injury are outside the scope of this procedure.</p>

TABLE 3

WebCode- Test	Additional Comments
9CTJRX- 5301	We are using not the original AFTE procedures but NC test according to Glattstein and Rhodizonat Test according to Suchenwirth.
AMV4UP- 5301	No HCl treatment was used after application of the rhodizonate reagent. This conforms to our standard procedures. We do not use the Griess test for nitrite particles.
BEV26J- 5305	Send the images in a format other than the huge TIF files. They are unable to be used by a lot of us and we have to find someone with a program that can convert them into a useable form to upload into our LIMS. Or just print them out on photo paper and include them in with the unknown panel in the test.
EHM9Y4- 5301	It was observed that the powder pattern on Item Q1 appeared to be more faint than the test firings and therefore may have resulted in a fainter colour change on the Modified Griess test and NaRH test compared to the test firings standards provided. This may introduce uncertainty in the estimated range due to the difference in intensity of the deposits on the Q1 compared to the standards. It was also noted that only one example for each increment of the standards were included and casework would require additional (up to three) in order to demonstrate and account for variation in the 'distance standards' patterns when determining an estimated range. It was also observed that Item Q1 was not attached or adhered to the cardboard and this may have resulted in possible loss of residues due to disturbance in transit.
EWLD4U- 5305	More shots at each distance would be preferable.
FMQU3R- 5305	Contact or Near Contact is defined as when the muzzle of the firearm is in/near contact with the target at the time of discharge. Close is defined as the range of the fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Undetermined is defined as when a specific muzzle to target distance could not be determined due to a lack of defined gunshot residues patterns. This may indicate the shot was discharged from a distance beyond the maximum distance for the deposition of residues, an intervening object was present at the time of discharge, or that residues were lost during handling of the item prior examination.
G7JXG8- 5301	Something has to be done about the Griess samples. This is the 2nd year I have not been able to use Griess in my determination due to the vast difference of my processed sample and the K1B photos. I think there is degradation of the sample if it sits for too long before being processed. So the samples should be sent at the same time the tests were generated so our processed sample resembles the K1 photos.
GHZKRT- 5301	Only one set of images was provided at each distance, I would prefer to have duplicate or triplicates at each distance to allow an assessment of the variability of the GSR pattern
GZVDDQ- 5301	The area around the questioned hole in the shirt, Item Q1, was microscopically examined and chemically processed for the presence of gunshot residues. Visible residues which are indicative of the passage of a bullet were found around the hole during a microscopic examination prior to chemical processing. Patterns of nitrite and lead residues were chemically detected on Item Q1 and compared with the distance standards provided for evaluation. Based on the presence, overall pattern, and density of residues observed between Item Q1 and the provided photographs of the distance standards, the questioned bullet hole on Item Q1 appears to have been created by a shot fired at a distance of greater than contact but less than twelve (12) inches from the shirt. This is a conservative estimate based on an evaluation of the untreated and chemically processed residue patterns and assumes there were no intervening objects between the muzzle of the firearm and the shirt at the time the shots were created. This estimated range is also predicated on the submitted distance standards being an

TABLE 3

WebCode- Test	Additional Comments
	accurate representation of the range of variation exhibited by the entire set of original test standards.
H4C3B9- 5301	The Modified Griess test did not have any positive reaction across the test paper, although the test paper prepared in-house reacted correctly with the positive control. Both the visual/microscopic initial exam and the Sodium Rhodizonate patterns indicated a range between 3"-18". Taking into consideration all of the tests performed this examiner was only able to determine that the test pattern was produced at a distance that was greater than contact range and less than the range at which no GSR particles would be present.
HRHLL9- 5305	Although the submitted images on K1 were good, the challenge still existed that I did not have the actual items for direct comparison against Q1 and viewing and printing images from K1 were subject to the potential limitations of the computer screen and printer. Additionally, there may have been a difference in sensitivity between my Griess paper and the papers used for K1.
JQKUTY- 5301	Quantafix nitrite testing sheets are used by this laboratory along with the modified Fiegl test for lead which has resulted in different visual enhancements of the fabric swatch which has made this comparison difficult.
JX279K- 5305	The image file sizes are very large and made it necessary to change the files to JPEGs to allow them to work with our LIMS. In the future, more moderately sized image files would be greatly appreciated.
KJEHA7- 5301	Our protocol is to not report a distance (or bracketed distance) and only report "Contact/near contact, Intermediate, or Distant."
LZXUF7- 5301	My range was not contact to 12 inches, as this is not a contact shot. However, your reporting did not allow for me to say that on the first page.
MGF7ER- 5305	Additional distance standards for each of the distances would have provided a better representation of the patterns that could be created by the firearm. The Greiss and Sodium Rhodizonate test patterns appeared visually quite different to the distance standards. The range provided was based on a broad best fit within the conclusion format requested. Additional distance standards within the range would have been carried out in the laboratory, to provide a narrower range bracket.
MLUPQ6- 5305	1. The match-level scale that is made use of in our laboratory for this type of examinations is (in descending order): A. Full matc. B. High-level matc. C. Partial matc. D. Inconclusive2. The procedures that are made use of by the manufacturers of this test, as well as the conditions of the test firing here, are different from those that are routinely applied by our laboratory. As a result, the above quoted figures for the minimum and maximum shooting distances may be wider, and the match therefore lower. 3. In estimating the shooting distance in this test, we mainly made use of the known-distance test firing results that were provided to us with the proficiency test.
N7XWE3- 5305	Materials produced as a result of chemically processing Item Q1 are being returned as Item Q1P and should be maintained for possible future examinations.
NX4PVX- 5305	TECHNICAL NOTES: Contact or Near Contact is defined as when the muzzle of the firearm is in/near contact with the target at the time of discharge. Close is defined as the range of fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Undetermined is defined as when a specific muzzle to target distance could not be determined due to a lack of defined gunshot residue patterns. This may indicate the shot was discharged from a distance beyond the maximum distance for the

TABLE 3

WebCode- Test	Additional Comments
	deposition of residues, an intervening object was present at the time of discharge, or that residues were lost during handling of the item prior to examination.
R36ZH9- 5301	Provided range is based on photographs of a single test pattern. Lab practice is to produce 3 test patterns to evaluate consistency and reproducibility and to visually and microscopically exam all items. It is possible a more narrow range would have been produced had these parameters been met.
RKM4ZT- 5305	TECHNICAL NOTES: Contact or Near Contact is defined as when the muzzle of the firearm is in/near contact with the target at the time of discharge. Close is defined as the range of fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Undetermined is defined as when a specific muzzle to target distance could not be determined due to a lack of defined gunshot residue patterns. This may indicate the shot was discharged from a distance beyond the maximum distance for the deposition of residues, an intervening object was present at the time of discharge, or that residues were lost during handling of the item prior to examination.
TRZEQZ- 5305	processed using quantofix sheets and not modified greiss
TUAJ4N- 5305	The laboratory standard procedures is not the same as used in the test samplings. Our standard operating procedures for examination of gunshot damages are: Visual examination, IR-detection, Reversed Modified Griess test, DTO for copper and Modified Sodium Sulphite test for lead.
UM48KW- 5301	"Greater than" and "Less than" fields left intentionally blank on answer page. Bracketing-type conclusions based on submitted test panels for proficiency purposes in case file notes was between approximately 3 and 15 inches based on K1a through K1c test panels. Per this agency's technical procedures, range bracketing is not typically reported.
UU9CT3- 5301	Methods: Gunshot Residue: Items submitted for gunshot residue testing are examined visually and microscopically for the presence of suspected bullet holes, physical effects from a firearm discharge such as singeing or tearing of fabric, and embedded particles of gunpowder, lead, and copper. If some or all of these conditions are noted, a series of chemical tests for the presence of nitrites (a component of gunpowder), lead, and copper may be performed. Each of these tests are chemically specific and produce a color reaction when in the presence of the specific chemical. The tests used for nitrite compounds, lead, and copper are the Modified Griess Test, the Sodium Rhodizonate Test, and the Dithiooxamide Test, respectively. If a suspect firearm and ammunition are submitted, test-fired exemplars are created at a variety of muzzle-to-target distances, are visually examined and chemically processed in the same manner as the evidence, and are compared directly with the submitted evidence. When test results at specific distances are distinctly different than the results on the submitted evidence, this is used as the basis for excluding an appropriate range of distances ("could not be reproduced at a distance of four inches or less"). When no suspect firearm and/or ammunition is submitted, results are more general and are based on common maximum distances for the deposition of gunshot residues ("residues like those found on the (Item #) are rarely deposited at a distance of six feet or greater"). If the only reaction produced in testing is a small ring of lead and/or copper around a suspected bullet hole, this is considered consistent with the passage of a bullet, but no distance determination can be made. Limitations: Gunshot Residue: While firearms are known to produce consistent gunshot residue pattern results under controlled conditions, variables including shooting environment, barrel condition and ammunition design can all influence the results of tests conducted on the submitted evidence and test-fired exemplars. Accordingly, gunshot residue test results are primarily used to

TABLE 3

WebCode- Test	Additional Comments
	exclude particular muzzle-to-target ranges and should only be considered valid for the particular combination of firearm and ammunition type used during testing in the Laboratory. The use of the phrase "consistent with" in this report is meant to indicate physical effects that are commonly found in a given shooting environment. No conclusions can be drawn when residues are absent due to the possibility of intervening objects or environmental and handling conditions. When a bullet impacts an intervening object, vaporous lead residue deposits can be produced that are occasionally dispersed onto neighboring items. Distance determinations involving a wound and/or injury are outside the scope of this procedure.
W9FMHE- 5301	we do an color test of the muzzle by sodium rhodizonate and compare the result with (Kls) sample .
WLLUXB- 5305	The Sodium Rhodizonate treatment was performed in accordance to the following article: Dillon, J.H. (1990) The Sodium Rhodizonate Test: A chemically specific chromophoric test for lead in gunshot residues. AFTE J. 22(3), 251-256. This article is different from our procedure. Comparison of Q1 with the distance standards (sodium rhodizonate treated) indicates that the shot was fired between 6" and 15" (inches) away (muzzle to fabric distance). However, given that this is not our standard procedure, there is too much uncertainty to assign this narrower span. The Modified Griess test have not been used as this method is not used in our procedures.
Y4WWZV- 5305	We use the method recommended by [Examiner] (from the [Laboratory]) to determine the shooting distance.
YBXKLM- 5305	TECHNICAL NOTES: Contact or Near Contact is defined as when the muzzle of the firearm is in/near contact with the target at the time of discharge. Close is defined as the range of fire at which a firearm and ammunition combination will deposit a pattern of gunpowder or vaporous lead on a target. Undetermined is defined as when a specific muzzle to target distance could not be determined due to a lack of defined gunshot residue patterns. This may indicate the shot was discharged from a distance beyond the maximum distance for the deposition of residues, an intervening object was present at the time of discharge, or that residues were lost during handling of the item prior to examination.
YGNVZR- 5301	The uncertainty of measurement in the creation of known test fire patterns was established for our laboratory. Since we were supplied with test patterns created by CTS, our uncertainty of measurement does not apply and will not be reported.
YUB6HQ- 5301	It is not clear that the same fabric material was used to create the distance standards to correspond to the material that the victim's shirt was made of. Another challenge with the testing format is that the participants are provided photographs of the distance standards while in normal casework, the standards themselves could be evaluated under the stereomicroscope. Dealing with photographs makes it challenging for the participant to determine if they are observing powder particles or if it could be artifacts on the camera lens, sensor, or even on the fabric itself. The number of particles that are visible may be less than what is actually present based on the brightness, contrast, and resolution of the printed image as well as the white balance settings, printer settings and resolution the test materials were printed. By having printed photographs of the distance standards, participants face the decision to do one of two things: 1) Compare the physical item Q1 to the photographs, which is not using consistent modalities where less particles may be visible in the photographs of the distance standards than would be visible if viewed directly as Q1 would be. 2) Create photographs of Item Q1, sizing them 1:1 and comparing the photographs of Q1 to the provided photographs of the distance standards. This would cause differences in the based on the brightness, contrast, and resolution of the printed images as well as the lighting

TABLE 3

WebCode- Test	Additional Comments
YXQ37Z- 5301	<p>conditions, white balance settings, printer settings and resolution of the test materials were printed vs the Q1 photographs created by the participants.</p> <p>Methods: Gunshot Residue: Items submitted for gunshot residue testing are examined visually and microscopically for the presence of suspected bullet holes, physical effects from a firearm discharge such as singeing or tearing of fabric, and embedded particles of gunpowder, lead, and copper. If some or all of these conditions are noted, a series of chemical tests for the presence of nitrites (a component of gunpowder), lead, and copper may be performed. Each of these tests are chemically specific and produce a color reaction when in the presence of the specific chemical. The tests used for nitrite compounds, lead, and copper are the Modified Griess Test, the Sodium Rhodizonate Test, and the Dithiooxamide Test, respectively. If a suspect firearm and ammunition are submitted, test-fired exemplars are created at a variety of muzzle-to-target distances, are visually examined and chemically processed in the same manner as the evidence, and are compared directly with the submitted evidence. When test results at specific distances are distinctly different than the results on the submitted evidence, this is used as the basis for excluding an appropriate range of distances ("could not be reproduced at a distance of four inches or less"). When no suspect firearm and/or ammunition is submitted, results are more general and are based on common maximum distances for the deposition of gunshot residues ("residues like those found on the (Item #) are rarely deposited at a distance of six feet or greater"). If the only reaction produced in testing is a small ring of lead and/or copper around a suspected bullet hole, this is considered consistent with the passage of a bullet, but no distance determination can be made. Limitations: Gunshot Residue: While firearms are known to produce consistent gunshot residue pattern results under controlled conditions, variables including shooting environment, barrel condition and ammunition design can all influence the results of tests conducted on the submitted evidence and test-fired exemplars. Accordingly, gunshot residue test results are primarily used to exclude particular muzzle-to-target ranges and should only be considered valid for the particular combination of firearm and ammunition type used during testing in the Laboratory. The use of the phrase "consistent with" in this report is meant to indicate physical effects that are commonly found in a given shooting environment. No conclusions can be drawn when residues are absent due to the possibility of intervening objects or environmental and handling conditions. When a bullet impacts an intervening object, vaporous lead residue deposits can be produced that are occasionally dispersed onto neighboring items. Distance determinations involving a wound and/or injury are outside the scope of this procedure.</p>

-End of Report-
(Appendix may follow)

Collaborative Testing Services ~ Forensic Testing Program

Test No. 22-5301: GSR Distance Determination

DATA MUST BE SUBMITTED BY May 9, 2022, 11:59 p.m. TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: LMCA7A

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 shooting at a local park. The victim's shirt was cut and removed by paramedics. The portion of the shirt with the bullet hole was recovered and is being submitted for examination. The coroner confirmed that no exit hole was present on the victim. A suspect was apprehended later that day and seized a Glock 17 handgun with a 5" Bear Creek Arsenal aftermarket barrel from his possession. The bullet recovered from the victim was identified as having come from the suspect's firearm. Rounds of Winchester 9mm 147 grain FMJ (which was consistent with the bullet recovered from the victim) were test fired with the suspect's firearm and the distance standards prepared. Investigators are asking you to compare the recovered victim's shirt with the distance standards provided to determine the distance of the muzzle of the firearm from the shirt.

Please note the following:

-The Modified Griess treatment was performed in accordance to the following article:

Dillon, J.H. (1990) *The Modified Griess test: A chemically specific chromophoric test for nitrite compounds in gunshot residues.* AFTE J. 22(3), 243-250.

-The Sodium Rhodizonate treatment was performed in accordance to the following article:

Dillon, J.H. (1990) *The Sodium Rhodizonate Test: A chemically specific chromophoric test for lead in gunshot residues.* AFTE J. 22(3), 251-256.

Items Submitted (Sample Pack GSRP - Photographs):

Item K1a-c: Distance Standards at 3 inch increments from Contact to 27 inches provided as images of GSR patterns on untreated white cotton cloths, and Modified Griess Test and Sodium Rhodizonate chemical treatments.

Item Q1: Shirt with bullet hole.

1.) What is the distance range that the muzzle of the firearm could have been from the shirt (Q1) at the time of discharge? Please report a numeral response (e.g. 6) from the supplied Distance Standards. If reporting Contact, indicate with the numeral 0.

Greater than (inches) and Less than (inches)

Please note: Any additional formatting applied in the free form spaces 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.

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

3.) 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)