



Shotgun Distance Determination Test No. 20-5306 Summary Report

Each sample set contained images of a questioned shotgun pattern and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the target at the time of discharge. Data were returned from 28 participants and are compiled into the following tables:

	<u>Page</u>
<u>Manufacturer's Information</u>	<u>2</u>
<u>Summary Comments</u>	<u>3</u>
<u>Table 1: Distance Determination Results</u>	<u>4</u>
<u>Table 2: Conclusions</u>	<u>6</u>
<u>Table 3: Additional Comments</u>	<u>8</u>
<u>Appendix: Data Sheet</u>	

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 questioned shotgun pattern image (Unknown) and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the questioned shotgun pattern (Unknown) at the time of discharge.

SAMPLE PREPARATION: The shotgun used to produce the distance standards and evidence item was a Remington 870 Tac-14 shotgun and the ammunition was Winchester Super X 3 inch #2 steel shot 1 1/4 load.

DISTANCE STANDARDS: Item designated as "Known" consisted of a collection of shotgun patterns on 24" wide white printer paper. The shotgun was locked into a fixture and the paper was placed at a predetermined distance from the shotgun. This was done for each of the predetermined distances. After firing, the shot patterns were scanned.

QUESTIONED ITEM: Item designated as "Unknown" consisted of a shot pattern on 24" wide white printer paper. The shotgun was locked into a fixture and the paper was placed 10 feet away from the muzzle of the shotgun. After firing, the shot pattern was scanned.

SAMPLE SET ASSEMBLY: The unknown and known patterns were rolled up and placed into a pre-labeled sample pack plastic sleeve.

VERIFICATION: Both predistribution laboratories reported a "greater than" distance range of 6 feet. For the "less than" distance range, one laboratory reported 12 feet and the other laboratory reported 15 feet. Overall, each predistribution laboratory reported a range that included the production muzzle to target distance of 10 feet.

Summary Comments

This test was designed to allow participants to assess their proficiency in muzzle to target distance determination using shotgun patterns. Each sample set contained images of a questioned shotgun pattern and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the target at the time of discharge. The questioned shotgun pattern was prepared with the firearm locked into a fixture and the white paper target was placed 10 feet away from the muzzle of the shotgun (Refer to the Manufacturer's Information for preparation details).

In Table 1, all 28 responding participants (100%) reported a greater than distance between 3 and 9 feet and a less than distance between 9 and 15 feet. 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 +/-3 feet allowance from the known shot distance (10 feet) was used as the baseline. A consensus of 100% of participants reported a greater than/less than range that included the known target distance of 10 feet.

The ranges of the reported values were reviewed and CTS did not recognize any extreme range values.

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 participants' results based on their own policies and procedures.

Distance Determination Results

What is the distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge? Please report a numeral response (e.g. "6") from the supplied Distance Standards.

TABLE 1 (Distance in Feet)

WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range
36GFBA	6	15	9	KQC6BR	7	13	6	WKBU9G	8	11	3
47NVHF	6	12	6	LPMZFY	6	12	6	ZYX9XK	6	15	9
6RZ8M9	9	12	3	LZJ79X	6	15	9				
AQTL23	6	12	6	MQ94MW	6	12	6				
B76JJ9	6	9	3	MY7WVQ	6	12	6				
BZDCZZ	6	12	6	Q392YL	6	12	6				
DGWMZ8	6	12	6	QGQUNT	6	15	9				
ETMXN6	6	12	6	QZ74NU	6	12	6				
G4UQ7V	3	9	6	QZJX6U	6	15	9				
GX6BE3	6	15	9	RGNLWK	6	12	6				
HM6YJ2	6	15	9	RQP7WR	6	15	9				
HQ6BF2	3	12	9	RZZ9HT	6	12	6				
J49TQ2	6	12	6	VPMFGM	6	12	6				

Response Summary				Participants: 28	
Greater Than Distance	Participants Reporting	Less Than Distance	Participants Reporting	CTS Calculated Range	Participants Reporting
1	0 (0.00%)	1	0 (0.00%)	3	3 (10.71%)
3	2 (7.14%)	3	0 (0.00%)	6	16 (57.14%)
6	23 (82.14%)	6	0 (0.00%)	9	9 (32.14%)
9	1 (3.57%)	9	2 (7.14%)	12	0 (0.00%)
12	0 (0.00%)	12	16 (57.14%)	15	0 (0.00%)
15	0 (0.00%)	15	8 (28.57%)	18	0 (0.00%)
18	0 (0.00%)	18	0 (0.00%)	21	0 (0.00%)
21	0 (0.00%)	21	0 (0.00%)	24	0 (0.00%)
24	0 (0.00%)	24	0 (0.00%)	27	0 (0.00%)
27	0 (0.00%)	27	0 (0.00%)	30	0 (0.00%)
30	0 (0.00%)	30	0 (0.00%)	Other	0 (0.00%)
33	0 (0.00%)	33	0 (0.00%)		
Other	2 (7.14%)	Other	2 (7.14%)		
No Response	0 (0.00%)	No Response	0 (0.00%)		

Conclusions

TABLE 2

WebCode	Conclusions
36GFBA	The Item Q1 banner exhibits multiple perforating defects consistent with a single shot from a shotgun produced when the muzzle of the shotgun was at a distance greater than 6 feet and less than 15 feet from the surface of the banner at the time the projectiles exited the muzzle of the firearm.
47NVHF	The muzzle to target distance on Item 2 is most consistent with a shot fired at a muzzle to target distance between 6 feet and 12 feet.
6RZ8M9	Based on the submitted "Known (K) shotgun pattern" distances at 3', 6', 9', 12', 15', 18', 21', 24', 27', and 30', they were visually compared against the Question (Q) shotgun pattern image. It was determined that the muzzle of the shotgun was fired at an approximate distance between 9 feet and 12 feet to the target.
AQTL23	The traces found indicate to a large extent that the shot was fired from a distance of more than 6ft and less than 12 ft.
B76JJ9	[No Conclusions Reported.]
BZDCZZ	The shot pellet pattern in Item Q1 was compared to known shot pellet patterns in Item K1. The known patterns were created using the submitted Remington shotgun and Winchester shotshells at distances of 1', 3', 6', 9', 12', 15', 18', 21', 24', 27' and 30'. Based on a visual comparison, the pattern in Item Q1 was produced at a muzzle to target distance of 6' to 12'.
DGWMZ8	The physical characteristics of the questioned shotgun pattern are consistent with a muzzle-to-target distance of between 6 and 12 feet away from the banner at the time of the shotgun's discharge.
ETMXN6	Considering the unknown shotgun pattern and the known ditances patterns observed, we strongly support that the shooting range, between the muzzle of the shotgun and the target, is between 6 feet and 12 feet.
G4UQ7V	[No Conclusions Reported.]
GX6BE3	The suspect shotgun was fired at a distance of approximately greater than 6 feet and less than 15 feet.
HM6YJ2	1. Q1- A pattern of residues consistent with the discharge of a firearm was observed. 2. The residues observed on the paper images of the known standard were compared to the pattern of residues around Q1. It is the opinion of the undersigned that the pattern of residues from Q1 indicates a muzzle-to-target distance between 6 feet and 15 feet.
HQ6BF2	The shotgun patterns of holes produced by the test fired standards (K1) were compared to the questioned shotgun pattern of holes (Q1) using pattern recognition only. It is the opinion of the undersigned that the shotgun pattern for Q1 indicates a muzzle to target distance greater than 3 feet and less than 12 feet.
J49TQ2	Examination of the banner revealed the presence of a shot pellet pattern in the middle front area that was visually examined. The shot pellet pattern found in the middle front area of the banner is consistent in size and density with having been produced at an approximate distance between 6 feet and 12 feet from the muzzle of the Remington shotgun.
KQC6BR	An examination of the test patterns indicates the muzzle to banner distance was greater than seven feet and less than thirteen feet.

TABLE 2

WebCode	Conclusions
LPMZFY	The pellet patterns contained within Q1 and K1 were examined; based on size and density of the Q1 pattern, the muzzle of a shotgun was greater than approximately 6 feet and less than approximately 12 feet from this area at the time of firing.
LZJ79X	At the time of the discharge, the distance from the muzzle of the shotgun to the banner was greater 6 feet and less than 15 feet.
MQ94MW	The questioned shotgun pattern shows a nearly circular pattern with horizontal measurement of 150 mm and a vertical measurement of 135 mm. Compared to the known distance patterns the shooting distance for the questioned shotgun pattern is greater than 6 feet and less than 12 feet.
MY7WVQ	Based on the test data supplied I would estimate the questioned damage to have occurred with a muzzle to target distance of between 6 and 12 feet.
Q392YL	The questioned pattern, Item Q1, was compared to test patterns fired with the submitted shotgun and it was determined that the muzzle of the gun could not have been closer than 6 feet and not further than 12 feet from the target when the shot was discharged but most likely approximately 8ft.
QGQUNT	Item Q1 questioned shot pattern was compared to the Item K1 known distance standards and found to be fired from a muzzle-to-target distance of between 6 feet and 15 feet.
QZ74NU	The distance range between the muzzle of the shotgun and the target (Q1) was between 6 feet to 12 feet.
QZJX6U	Examination of Item Q1 revealed the presence of a pellet pattern. The pellet pattern found in Item Q1 was examined and found to be consistent in size and density with having been produced at a distance greater than approximately 6 feet and less than approximately 15 feet from the muzzle of the firearm at the time of firing. The test patterns are being returned as Item K1.
RGNLWK	Comparisons have been made between the questioned pattern Q1 and the known distance patterns K1. The findings indicate that the firing distance between the gun muzzle and the surface of the pattern Q1 was between 6 feet and 12 feet.
RQP7WR	Muzzle-to-target distance determinations were conducted using the submitted question and known shot patterns. A similar shot pattern to what is present in the question pattern can be observed on the known distance shot patterns at distances greater than 6 feet and less than 15 feet.
RZZ9HT	Based on the distance estimation experiment, the banner (item Q1) could have been shot from a distance as close as 6 feet or as far as 12 feet.
VPMFGM	Estimate shooting distance is from 6 to 12 feet.
WKBU9G	The distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge is greater than 8 feet and less than 11 feet.
ZYX9XK	The questioned shotgun pattern, marked #2 was examined and compared to the know distance standards marked #1. The distance range that the muzzle of the shotgun could have been fired from the target, at time of discharge, was greater than 6 feet and less than 15 feet.

Additional Comments

TABLE 3

WebCode	Additional Comments
36GFBA	If our laboratory made the known distance standards, the conclusion would also include the following (or similar) verbiage: "when using the Item XX firearm in combination with the Item YY unfired cartridges". The above conclusion is according to the submitted CTS knowns (Item K1) and not a general conclusion for all shotguns.
AQTL23	If we would have to state a single estimate for the distance, we would have stated 9 ft with a tolerance (ex. 9 ft +/- 2). The shooting pattern from the crime site was visually compared to the reference patterns. For us it is uncommon, to state results in such an environment (international test setup) in a non SI unit.
MQ94MW	If the shotgun would be available in our lab further test firings would have been carried out at distances between 9 and 12 feet.
MY7WVQ	With more test shots close to this range I would consider refining the uncertainty factored into this assessment.
RGNLWK	Additional comments: The findings were made on the assumption from the scenario information that the known patterns were generated using the incident gun and the same ammunition type.
RQP7WR	This is a proficiency test. The predistribution test was previously examined. The known distances and questioned distance are the same so these sheets were not photographed. (The photograph shown is from the predistribution test). It should be noted that our laboratory reports shot pattern analysis in yards. For the purposes of this test it was requested the results be reported in feet. Eleven of the sheets of paper contained scaled shot patterns at known distances. One sheet of paper contained a scaled question shot pattern. The sheets of paper had been labeled at the following distances: 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 feet. The known shot patterns were compared to the question pattern. A shot pattern was observed on the question sheet of paper. A similar shot pattern to what is present in the question pattern can be observed on the known distance shot patterns at distances greater than 6 feet and less than 15 feet. The 12 foot pattern most closely resembles the question pattern. Due to the 9 foot shot pattern being nonsymmetrical (oval) the results were expanded.
RZZ9HT	I would suggest including replicate shots at each distance (at least three) as this would more closely follow casework procedures and would allow for the calculation of the range.

-End of Report-
(Appendix may follow)

Test No. 20-5306: Shotgun Distance Determination

DATA MUST BE SUBMITTED BY **Dec. 7, 2020, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234B

WebCode: 39FUVE

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 an armed robbery at a liquor store. The victim stated that the suspect shot at him, missed and hit a banner. The suspect was apprehended later that night and police recovered a Remington 870 Tac-14 shotgun and Winchester Super X 3 Inch #2 steel shot 1 1/4 oz. load ammunition from his vehicle. Investigators are asking you to compare the recovered banner with the distance standards provided to determine the distance from the muzzle of the shotgun to the banner.

Please note the following:

-The distance determination for this test should be reported by pattern recognition only. Chemical processing cannot be performed, as the questioned shotgun pattern is a printed image.

Items Submitted (Sample Pack SDD):

Item K1: Known distance standards from 1' to 30'.

Item Q1: Questioned shotgun pattern.

1.) What is the distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge? Please report a numeral response (e.g. "6") from the supplied Distance Standards.

Greater than (feet) and Less than (feet)

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)