



Toolmarks Examination Test No. 17-528 Summary Report

This test was sent to 210 participants. Each sample set consisted of one diagonal cutter (Item 1) and two pieces of copper wire (Items 2 and 3) containing the questioned toolmarks. Participants were requested to determine if the recovered diagonal cutter had cut either of the questioned pieces of wire. Data were returned from 176 participants (84% response rate) and are compiled into the following tables:

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

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

Manufacturer's Information

Each sample set contained a diagonal cutter (Item 1), two 10 gauge copper wire pieces containing questioned toolmarks (Items 2 and 3) and two pieces of copper wire for test cut purposes. Participants were requested to determine which, if any, of the questioned toolmarks were made by the submitted tool. The Item 2 piece of copper wire was cut by the Item 1 diagonal cutter. The Item 3 piece of copper wire was cut by a different cutter that was not provided for examination.

ITEM 3 (ELIMINATION MARKS): The Item 3 copper wire (with red painted end) was cut by a pair of Stanley 6" Diagonal Cutting Pliers (not provided) and packaged into a pre-labeled Item 3 envelope and assembled into the sample pack box as described below. The above process was repeated until all elimination toolmarks had been prepared.

ITEMS 1 and 2 (IDENTIFICATION MARKS): The Item 2 copper wire (with blue painted end) was cut by the Item 1 Pittsburgh® 7" Professional Diagonal Pliers and packaged into a pre-labeled Item 2 envelope. The corresponding diagonal cutter was labeled with an Item 1 label and packaged in bubble wrap. Items 1 and 2 were then immediately assembled into the sample pack box as described below. The above process was repeated until all identification toolmarks had been prepared.

SAMPLE SET ASSEMBLY: The corresponding Item 1 diagonal cutter and Item 2 were packaged into a pre-labeled sample pack box along with the Item 3 and two pieces of copper wire for testing purposes. This process was repeated until the required number of sample sets were produced. Once verification was completed, the sample sets were sealed with evidence tape and initialed "CTS".

VERIFICATION: In addition to the sample sets examined and confirmed by predistribution laboratories, 10 randomly selected sample sets were examined by a qualified toolmark examiner who also confirmed the expected results.

Summary Comments

This test was designed to allow participants to assess their proficiency at a toolmark examination involving striated type toolmarks caused by a tool utilizing a pinching action. Each sample set consisted of one diagonal cutter (Item 1) and two pieces of copper wire (Items 2 and 3) containing the questioned toolmarks. Participants were requested to determine if the recovered diagonal cutter had cut either of the questioned pieces of wire. The Item 2 piece of copper wire was cut by the Item 1 diagonal cutter. The Item 3 piece of copper wire was cut by a diagonal cutter that was not provided for examination. [Refer to Manufacturer's Information for preparation details.]

Of the 176 responding participants, 162 (92%) identified the Item 1 diagonal cutter as having cut the Item 2 copper wire and either eliminated (140) or were inconclusive (22) as to it having cut the item 3 copper wire. Eleven participants were inconclusive for the Item 1 diagonal cutter being responsible for the marks on Item 2 and either eliminated or were inconclusive as to Item 3 having been cut by the Item 1 diagonal cutter. Two participants either eliminated or were inconclusive for Item 2 as having been cut by the Item 1 diagonal cutter and identified Item 3 as having been cut by the Item 1 diagonal cutter. The remaining participant identified both Item 2 and Item 3 as having been cut by the Item 1 diagonal cutter.

Many participants noted that there were areas of subclass characteristics in regards to the Item 1 diagonal cutter. Although most of the participants still made the expected ID/eliminations, some of the participants who reported inconclusive stated in their additional comments that this was due to the strong subclass characteristics present.

In regards to Item 3, as a matter of policy, many labs will not eliminate without access to the tool or when class characteristics match.

Examination Results

Was the questioned cable cutter (Item 1) used to cut either of the copper wire pieces (Items 2 or 3)?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
22JGNK	Yes	No	83CKGT	Yes	No
26GYLC	Yes	Inc	86YYAA	Yes	No
294G4X	Yes	No	87TUN6	Yes	No
2E6TX9	Yes	No	8CKRJN	Yes	Inc
2GU6WE	Yes	No	8CXNPT	Yes	No
2PQUHP	Yes	No	8RFCZC	Yes	No
36DULU	Yes	No	8U2XTY	Yes	No
42RC49	Yes	No	8X26CB	Yes	No
44W37H	Inc	No	8XXMA7	Yes	Inc
49BKLD	Yes	No	96G8WJ	Yes	No
4FQEJV	Yes	No	978BM6	Yes	No
4GMY4A	Yes	No	9B8KVL	Yes	No
4LGNVE	Yes	No	9K98JC	Inc	No
4QCM3H	Inc	Inc	9YP3Y9	Yes	No
4UP6HE	Yes	No	A6EZ6B	Yes	Inc
4UWA4H	Yes	No	A7JRV3	Yes	No
4V7EFL	Yes	Inc	A82EUK	Yes	No
4Y37JC	Yes	No	A9DDQE	Yes	No
6D6W2B	Yes	No	AMTG94	Yes	No
77D442	Yes	No	ARPZCM	Yes	No
7F3R2P	Yes	No	ATGYQL	Yes	No
7F4MMF	Yes	No	B6QW9U	Yes	No
7J4Z7Y	Inc	No	BEUBR8	Yes	No
7LT8QW	Yes	No	BWUFUPE	Yes	No
7MPHMK	Yes	No	BY49B4	Yes	No
7YFCXT	Yes	No	BZE89X	Yes	No

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
C6NQ7Q	Yes	No	HXMH67	Yes	No
C8QLRE	Yes	No	HZQFDD	Yes	No
C8UBUQ	Yes	Inc	HZRBV6	Yes	No
CBCBCR	Yes	No	J3AUET	Yes	Inc
CQ3DTV	Yes	No	JB6UV7	Yes	No
CQ63V8	Inc	Inc	JBPBB9	Yes	No
CWBU46	Yes	Inc	JDFGRY	Yes	No
DDXFKP	Yes	No	JGDX4T	Inc	No
DF2B4R	Yes	No	JKVDAE	Yes	No
DL3PM9	Yes	No	JNQ88F	Yes	No
DQMCN9	Yes	No	JP82AB	Yes	No
DQYBFW	Yes	Inc	JXYGYE	Yes	No
E2FE2Z	Inc	No	K2JQN7	Yes	No
E4K68F	Yes	No	KA9LGU	Yes	Inc
E4KZT8	Yes	Inc	KE8UUH	Yes	No
E6YA4T	Yes	No	KNQ76U	Yes	No
E9E2UL	Yes	Inc	KXHMUY	Yes	No
ENC PN9	Yes	No	L2PUBT	Yes	Inc
FCAXBZ	Yes	No	LA9VWX	Yes	No
FCF3W4	Yes	No	LAPWVU	Yes	No
FEXJP9	Yes	No	LMUBXC	Yes	No
FPF7V4	Yes	No	LPW7JZ	Yes	No
FZD2W6	Yes	No	LUR34K	Yes	No
G9NTV2	Yes	No	M4EFKW	Yes	No
GJRJZX	Yes	No	M6N9VX	Yes	No
GM992L	Yes	No	M9R2RH	Yes	No
H4TZJX	Yes	No	MDZLDT	Yes	No
HGTY8V	Yes	No	MJCBFB	Yes	No
HJZCT3	Yes	No	MK4D3Q	Yes	No

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
MUM3JB	Yes	No	TRYGF2	Yes	No
MZBPEG	Yes	No	TY3L6Z	Yes	Yes
N4T88L	Yes	Inc	UGWGF3	Yes	No
N6JDLQ	Yes	No	UGXDLR	Yes	Inc
N6K3UU	Yes	No	VAWGHL	Yes	No
P63GXX	Inc	Inc	VCLRDL	Inc	No
P876GU	Yes	Inc	VCZC2P	Yes	No
P8MK6V	Yes	Inc	VN92VK	Yes	No
P9H7YL	Yes	No	VUYCAP	Inc	Yes
PLQPWG	Inc	No	VW7M7T	Yes	No
PQJNBC	Yes	No	VYRGYM	Yes	Inc
PTLP9N	Yes	No	VYUY6X	Yes	No
QP229N	Yes	No	W7A2P6	Yes	No
QPLXFG	Yes	No	W826CK	Yes	No
QUE8JN	Yes	No	WG86RE	Yes	No
QVN4X6	Yes	No	WH3HGR	Yes	No
R3K7TP	Yes	No	WL24ZH	Yes	Inc
R3RBET	Yes	No	WMXCET	Yes	No
R8L82Y	Yes	No	WPHL4K	Yes	No
R8Y2EE	Yes	No	X2TE7K	Yes	Inc
R9QX2M	Yes	No	X4EZY8	Yes	No
RBY8W6	Yes	No	X7JQ2G	Yes	No
RCVN93	Yes	No	XA2R6F	Yes	No
RFU2VR	Yes	No	XA78J2	Yes	No
RMAHN2	Yes	No	XNLAXJ	Yes	No
RYMK8E	Yes	No	YA33HX	Yes	No
RZWUXQ	Yes	No	YGHL2X	Yes	No
TAJB2K	Yes	No	YGJGMN	Yes	No
TCAEVR	Yes	Inc	YHVFFC	No	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
YKKLZA	Yes	No			
YM9ZNJ	Yes	No			
YVFVHC	Yes	No			
YYZR6G	Yes	No			
ZAJFL2	Inc	No			
ZRXU2B	Yes	No			
ZTU9QN	Yes	Inc			
ZZPBPE	Yes	No			

Response Summary			Total Participants: 176	
<i>Was the questioned cable cutter (Item 1) used to cut either of the copper wire pieces (Items 2 or 3)?</i>				
Responses		<u>ITEM 2</u>	<u>ITEM 3</u>	
	Yes	163 (92.6%)	3 (1.7%)	
	No	1 (0.6%)	148 (84.1%)	
	Inc	12 (6.8%)	25 (14.2%)	

Conclusions

TABLE 2

WebCode	Conclusions
22JGNK	Sufficient agreements of class, potential subclass, and individual characteristics confirmed the item 2 wire was cut by the item 1 diagonal cutters. Sufficient disagreements of potential subclass and individual characteristics confirmed the item 3 wire was not cut by the item 1 diagonal cutters.
26GYLC	The Item 2 and Item 3 questioned toolmarks were compared to test toolmarks produced using the Item 1 wire cutter. The Item 2 questioned toolmark was made using the Item 1 wire cutter. The Item 3 questioned toolmark could neither be identified nor eliminated as having been cut by the Item 1 wire cutter due to similarities in class characteristics but differences in individual characteristics.
294G4X	The evidence in items 1, 2, and 3 was analyzed by physical and microscopic examination. The toolmarks present on the cut copper wire in item 2 were determined to have been made by the diagonal cutter in item 1. The toolmarks present on the cut copper wire in item 3 were determined not to have been made by the diagonal cutter in item 1. Further analysis is pending submission of another tool for additional comparison.
2E6TX9	The tool marks on Item #2 the copper wire were microscopically identified as having been made by the Item #1 tool. Item #3-The tool marks were not made by the Item #1 tool (in its present condition).
2GU6WE	The following findings reflect the professional opinion of the examiner authoring this report. Examination of Item #1 revealed one (1) Pittsburg Brand, diagonal cutter, with a black & red handle, and a 3/4 inch cutting surface. Examination of Item #2 revealed one (1) copper wire, 3 7/16 inches in length, with blue paint on one end and cut (toolmarks) on the other end. Further examination of Item #2 with tests toolmarks created from Item #1 revealed Item #2 was cut by the submitted Pittsburg diagonal cutter (Item #1). Examination of Item #3 revealed one (1) copper wire, 3 5/8 inches in length, with red paint on one end and cut (toolmarks) on the other end. Item #3 was not cut by the submitted Pittsburg diagonal cutter (Item #1).
2PQUHP	Items 2 and 3 are eliminated as having been cut by the same tool due to differing class characteristics. Tests from Item 1 and Item 2 were compared microscopically with each other. There is agreement of all discernable class characteristics and sufficient agreement of individual characteristics for identification. Item 1 cut Item 2.
36DULU	Item2 matches Item1, while Item3 does not match Item1.
42RC49	The cut in the submitted copper wire, Item 2, was identified as having been made by the submitted diagonal wire cutters, Item 1. The cut in the submitted copper wire, Item 3, was eliminated as having been made by the submitted diagonal wire cutters, Item 1, due to differences in class characteristics.
44W37H	Item: 1 Diagonal cutter, described as "recovered from suspect". Item: 1.1 Test specimens produced by Item 1 using Laboratory supplied test media. RESULTS: Item 1 was physically and microscopically examined and found to be in working order. The Item 1.1 test specimens were packaged for return with the other evidence. Item: 2 Cut copper wire piece, described as "recovered from scene (blue)". Item: 3 Cut copper wire piece, described as "recovered from scene (red)". RESULTS: Items 2 and 3 were physically examined and microscopically compared with each other and with the test specimens produced using the Item 1 cutter. From these comparisons, the following conclusions were reached: Due to insufficient individual identifying characteristics, the results of comparisons between Item 2 and the Item 1 test specimens were inconclusive. It could not be determined whether Item 2 was cut by Item 1 or by another tool with similar characteristics. While some similarities were noted, the possibility of subclass characteristics could not be excluded. Due to differences in class characteristics, it was concluded that Item 3 was not cut by Item 1.
49BKLD	After checking for class marks on both pieces of wire I excluded item 3 because the class marks were

TABLE 2

WebCode	Conclusions
	not the same. I then check item two against the tests cut by the diagonal cutter. I came to the conclusion that item 2 was cut by the diagonal cutter which is item one.
4FQEJV	Test marks from Item #1, the diagonal cutter recovered from the Suspect, were made on the enclosed length of wire. A microscopic examination and comparison of the questioned cut ends of Item #2 and Item #3 (cut copper wire pieces recovered from the scene) was made with test cuts produced with Item #1 (diagonal cutters). Item #2 was identified as being cut by the submitted diagonal cutter, Item #1. Item #3 was not cut by Item #1.
4GMY4A	2.1 The marks on the copper wire marked as Item 2 were produced by the diagonal cutter marked as Item 1. 2.2 The marks on the copper wire marked as Item 3 were not produced by the diagonal cutter marked as Item 1.
4LGNVE	Q-1 (Item 2) bears marks consistent with having been cut with K-1 (Item 1). Q-2 (Item 3) was not cut with K-1 (Item 1).
4QCM3H	Examination of Items #2 and #3 revealed the presence of toolmarks, which had been made by an opposed blade cutting tool. Test toolmarks produced by Item #1 were microscopically examined in conjunction with those present on Item #2 and Item #3. Based on these comparative examinations, it was determined that: A) Item #2 bears the same class characteristics, subclass characteristics and some similar individual characteristics as tests from Item #1. However, these similarities are insufficient for a more conclusive examination. B) Item #3 bears no similar markings to link it with the tool in Item #1.
4UP6HE	I compared the individual and class characteristic markings on the cut copper wire pieces (item 2 and item 3) and tests cut with the diagonal cutter (item 1) using a comparison microscope and find: 2.1 The marks on the blue copper wire piece (item 2) were produced by the diagonal cutter (item 1). 2.2 The marks on the red cut copper wire piece (item 3) were not produced by the diagonal cutter (item 1).
4UWA4H	The piece of copper wire (item 2) was identified as having been cut by the pair of diagonal cutters (item 1). Agreement of the characteristics is sufficient to determine that the diagonal cutters are the source of the toolmarks on the piece of copper wire. The piece of copper wire (item 3) was excluded as having been cut by the pair of diagonal cutters (item 1). Differences were found in characteristics sufficient to eliminate the diagonal cutters as the source of the toolmarks on the piece of copper wire.
4V7EFL	Test toolmarks were produced in lead and in the item 1-4 copper wire using the item 1-1 pliers. The test toolmarks were microscopically compared to the cut ends of items 1-2 and 1-3. Through microscopic comparisons, the item 1-2 copper wire was identified as having been cut by the item 1-1 pliers. This identification conclusion is based on sufficient similarities in the patterns of microscopic markings observed between item 1-2 and the test toolmark to which it was compared. Through microscopic comparisons, the item 1-3 copper wire could not be identified or eliminated as having been cut by the item 1-1 pliers. This inconclusive conclusion is based on insufficient similarities or differences in the patterns of microscopic markings observed between item 1-3 and the test toolmarks to which it was compared.
4Y37JC	The toolmark on the copper wire, item 2, was identified as having been made by the diagonal cutters, item 1. The toolmark on the copper wire, item 3, was eliminated as having been made by the diagonal cutters, item 1, based on a difference in class characteristics (coarse vs. fine striated marks).
6D6W2B	Toolmarks present on Item 2 were microscopically examined and identified as having been produced by Item 1. Toolmarks present on Item 3 were microscopically examined and eliminated as having been produced by Item 1 due to differences in individual characteristics. Three (3) tests produced using Item 1 are being returned as Item 1T in sample pack T1 and should be maintained for possible future examinations. Supporting examination documentation is maintained in the case file.

TABLE 2

WebCode	Conclusions
77D442	Tool Mark Analysis: Test marks were made with Item 1, the Pittsburgh Pro diagonal cutting pliers, using submitted testing media. Item 1A, the test marks, was sealed in a manila envelope and will be retained in the laboratory for possible future analysis. Methodology - Comparison Microscopy: The tool mark on Item 2, the copper wire, was made with Item 1, the Pittsburgh Pro diagonal cutting pliers, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 3, the copper wire, was not made with Item 1, the Pittsburgh Pro diagonal cutting pliers, based upon different class and individual microscopic characteristics.
7F3R2P	By means of microscopic exam and microscopic comparison of tool traces he/it has been determined that : The Diagonal cutter (recovered from suspect) described in Item 1, was the tool produced toolmarks present in the cut copper wire piece recovered from scene (blue) described in Item 2. Diagonal cutter (recovered from suspect) described in Item 1, was not the tool produced toolmarks present in the cut copper wire piece recovered from scene (red) describes in Item 3.
7F4MMF	Item 1 consists of a Pittsburgh Pro ® diagonal cutter approximately 7" inches in size with red and black rubber grip handles. Item 2 consists of a piece of cut copper wire bearing striated-type toolmarks which, based on sufficient correspondence of class and individual details, were identified as having been made by the diagonal cutters in Item 1. Item 3 consists of a piece of cut copper wire bearing striated-type toolmarks which exhibit sufficient differences in individual characteristics from marks produced by the diagonal cutters in Item 1 to eliminate the tool as the source of the striated-type marks in the Item 3 cut wire.
7J4Z7Y	The cutters were examined and determined to have not been used to make the toolmarks in the copper wire Item 3. The test toolmarks from the cutters and the toolmark in the copper wire (Item 2) possessed similar class and subclass marks. The results of examination and comparison between the cutters Item 1 and the toolmarks Item 2 were inconclusive.
7LT8QW	The tool marks on Item #2 were made by the submitted diagonal cutter, Item #1. The tool marks on Item #3 were not made by the submitted diagonal cutter, Item #1, based on differences in class characteristics.
7MPHNK	As a result of the microscopic comparison it is certain, that the toolmarks on the piece of copper wire marked as "Item 2" have been produced by the cutting pliers marked as "Item 1". Furthermore the comparison showed that it can be excluded, that the toolmarks on the piece of copper wire marked as "Item 3" have been produced by the cutting pliers marked as "Item 1".
7YFCXT	Test toolmarks created using the diagonal cutting pliers, Item 1, were microscopically compared to the toolmarks exhibited on the cut pieces of copper wire from Items 2 and 3. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks exhibited on the cut piece of copper wire, Item 2, were identified as having been created using the diagonal cutting pliers, Item 1. Based on significant disagreement of class characteristics, the toolmarks exhibited on the cut piece of copper wire, Item 3, could not have been created using the diagonal cutting pliers, Item 1.
83CKGT	There was agreement of class characteristics and sufficient agreement of individual characteristic markings to determine that the diagonal cutter, Item 1 had been used to cut the copper wire (blue tip), Item 2. The diagonal cutter, Item 1, had not been used to cut the copper wire (red tip), Item 3.
86YYAA	Item 1 is a pair of Pittsburgh Pro brand diagonal pliers that utilize a pinching action. Item 2 is a copper wire that appears to be cut with a tool that utilizes a pinching action. Toolmarks present on the Item 2 copper wire were identified as having been produced by the Item 1 diagonal pliers. Item 3 is a copper wire that appears to be cut with a tool that utilizes a pinching action. Due to a difference in class characteristics, the toolmarks present on the Item 3 copper wire were excluded as having been created by the Item 1 diagonal pliers.
87TUN6	Copper wire marked 291108/17B (Item 2) is positive to tests marked T1 and T2. Copper wire marked

TABLE 2

WebCode	Conclusions
	291108/17C (Item 2) is negative to tests marked T1 and T2.
8CKRJN	Item 2 copper wire was cut from the diagonal cutter marked Item 1. It could not be determined if the copper wire marked Item 3 was cut or was not cut by the diagonal cutter marked Item 1.
8CXNPT	The Item 2 (copper wire piece - marked blue color) was cut by questioned diagonal cable cutter referred to as Item 1. The Item 3 (copper wire piece - marked red color) was not cut by questioned diagonal cable cutter referred to as Item 1.
8RFCZC	Item 1 is a diagonal cutter bearing the trade name of Pittsburgh Pro. Toolmarks present on the Item 2 wire were identified as having been produced by the Item 1 tool. The Item 1 tool was excluded as having created the toolmarks present on the Item 3 wire due to a discernable difference in class characteristics.
8U2XTY	1. Exhibit 1 contains one Pittsburgh Pro Diagonal Cutters pinching type cutting tool. Exhibit 1.1 (toolmark standards from Exhibit 1) was created for comparison and is being retained in the lab with Exhibit 1. 2. Exhibit 2 (one copper wire) and Exhibit 3 (one copper wire) have damage consistent with a pinching type cutting tool. Exhibits 2 and 3 were visually and microscopically examined and compared to test toolmarks from Exhibit 1. a. Exhibit 1 caused the damage on Exhibit 2 (one copper wire). b. Exhibit 1 did not cause the damage on Exhibit 3 (one copper wire). Should a pinching type cutting tool that can be associated with a suspect be seized during the course of this investigation, submit the suspect tool along with Exhibit 3 for a comparison examination.
8X26CB	Results of Examinations: Toolmarks present on the Item 2 piece of wire were identified as having been produced by the Item 1 diagonal cutters. Due to a difference in class characteristics, (gross marks left from tool, cutting angle is different and a shearing/pinching action against a pinching action) the Item 3 wire was not cut by the Item 1 tool.
8XMA7	The submitted copper wire (Item 2) was severed by the submitted Pittsburgh Pro diagonal cutter (Item 1). The submitted copper wire (Item 3) was neither identified nor eliminated as having been severed by the submitted Pittsburgh Pro diagonal cutter (Item 1) due to insufficient corresponding individual and matching class characteristics. The submitted Pittsburgh Pro diagonal cutter (Item 1) was functional with no malfunctions detected during testing.
96G8WJ	The test cuts made with the diagonal cutter (Item 1) and the cut end of the copper wire (Item 2) were microscopically examined and compared. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, the diagonal cutter (Item 1) is identified as the tool used to produce the cut on the piece of copper wire (Item 2). The test cuts made with the diagonal cutter (Item 1) and the cut end of the copper wire (Item 3) were microscopically examined and compared. Based on the observed disagreement of their class characteristics, the diagonal cutter (Item 1) is eliminated as the tool used to produce the cut on the piece of copper wire (Item 3).
978BM6	The Item 01-02 copper wire was identified as having been cut by the Item 01-01 diagonal cutter. The Item 01-03 copper wire was eliminated from having been cut by the Item 01-01 diagonal cutter. Portions of the Item 01-04 copper wire were used in the generation of test cuts.
9B8KVL	Item 2 (blue): Due to corresponding characteristics found on the cut surface of the item 2 (blue) and characteristics on cut surface of the questioned cable cutter (item 1) the cut copper wire piece recovered from scene (item 2 - blue) was cut with questioned cable cutter (item 1). Item 3 (red): Due to differences found in characteristics on the cut surface of the item 3 (red) and characteristics on cut surface of the questioned cable cutter (item 1) the cut copper wire piece recovered from scene (item 3 - red) was not cut with questioned cable cutter (item 1).
9K98JC	Examination of the tool in Item 1 revealed it to be a double-bladed pinching-type cutter. Test toolmarks produced by Item 1 were microscopically examined in conjunction with the toolmarks

TABLE 2

WebCode	Conclusions
	present on the Copper wires in Items 2 and 3. Based on these comparative examinations and observed class and individual characteristics, it was determined that: A) The toolmarks present on Item 2 bear the same class characteristics, some similar individual characteristics as test toolmarks from Item 1, and could have been produced by the tool in Item 1. However, these similarities are insufficient for a more conclusive examination. B) The toolmarks present on Item 3 bear the same class characteristics as test toolmarks from Item 1. However, there are no marks to link the toolmark in Item 3 as having been produced by the tool in Item 1.
9YP3Y9	Additional item -> Item 1T: Tests produced using Item 1 (item created at the [Laboratory]). Items 1, 1T, 2 ,and 3 were examined microscopically. Item 2 was identified as having been cut by the Item 1 tool. Item 3 was eliminated as having been cut by the Item 1 tool, due to sufficient differences in individual characteristics. Four (4) tests produced using Item 1 are being returned as Item 1T in Container T1 and should be maintained for possible future examinations.
A6EZ6B	Exhibit #1 was examined and used to make test toolmarks. Toolmarks on Exhibit #2 were made by Exhibit #1. Toolmarks on Exhibit #3 could not be identified or eliminated as having been made by Exhibit #1.
A7JRV3	The piece of copper wire with a blue end (2) was cut by the diagonal cutting pliers (1). The piece of copper wire with a red end (3) was not cut by the diagonal cutting pliers (1).
A82EUK	The marks on the copper wire marked Item 2 (blue) were produced by the diagonal cutter marked Item 1. The marks on the copper wire marked Item 3 (red) were not produced by the diagonal cutter marked Item 1.
A9DDQE	Results: Item 2 and Item 3 had class and individualizing characteristics that were compared to test marks made with Item 1. The presence of class characteristics and sufficient matching striae were found to reach the the conclusion that Item 1 was used to cut Item 2. However, even though there were class characteristics present, not enough matching striae were observed to indicate that Item 1 was used to cut Item 3. Conclusion: The Item 2 toolmark was identified as having been produced by Item 1. The Item 3 toolmark was eliminated as having been produced by Item 1.
AMTG94	The submitted copper wire (CTS Item 2 ; Laboratory Item 01-02) was cut by the submitted diagonal cutter (CTS Item 1 ; Laboratory Item 01-01). The submitted copper wire (CTS Item 3 ; Laboratory Item 01-03) was not cut by the submitted diagonal cutter (CTS Item 1 ; Laboratory Item 01-01).
ARPZCM	The item 2(blue) was cut by the item 1(cutter). The item 3(red) was not cut by the item 1(cutter).
ATGYQL	(a) The marks on the copper wire marked Item 2 were produced by the diagonal cable cutter marked as Item 1. (b) The marks on the copper wire marked Item 3 were not produced by the diagonal cable cutter marked as Item 1.
B6QW9U	The toolmarks on the cut ends of the copper wires, Items 2 and 3, were microscopically compared to exemplar toolmarks made by the diagonal cutter, Item 1. The toolmarks on the cut end of the copper wire, item 2, were identified as having been made by the Diagonal cutter, Item 1, by sufficient corresponding individual markings. The toolmarks on the other copper wire, Item 3, were determined to be physically different and were excluded as having been made by the diagonal cutters, Item 1.
BEUBR8	The tool marks present on Item #2 were made by Item #1. The tool marks present on Item #3 were not made by Item #1.
BWFUPE	The questioned toolmarks (item 2 + item 3) were compared to the test toolmarks produced by the submitted tool (item 1). Microscopic examination and comparison (comparison microscope from Leitz und ToolScan from LIM) of item 2 + 3 with the test toolmarks from item 1 revealed significant disagreement of individual characteristics. It was concluded that item 2 were made by item 1. Item 3 were not made by the submitted tool item 1.

TABLE 2

WebCode	Conclusions
BY49B4	The copper wire, Item 01-02(2), was cut by the submitted diagonal cutter, Item 01-01(1). The copper wire, Item 01-03(3), was not cut by the submitted diagonal cutter, Item 01-01(1).
BZE89X	I conducted an examination using a comparison microscope and compared the cut ends of Items 2 & 3 with those of test cuts made with Item 1. In my opinion Item 2 was cut by the tool - Item 1. Item 3 was not cut with Item 1 but by another tool with a slightly dissimilar cutting profile with enough of a difference for it to be eliminated/excluded.
C6NQ7Q	1. Exhibit 1 is a Pittsburgh Pro brand 7-inch long, offset diagonal cutter consistent with an opposed blade cutting tool. Test standards were created for comparison using lead and copper wire, were labeled as Exhibit 1.1, and are being returned with the tool. 2. Exhibits 2 and 3 are pieces of copper wire, approximately 3.5 inches in length. Each wire is cut at one end and marked with paint at the other end. The unmarked cut on each wire is consistent with an opposed blade cutter. The cuts were visually and microscopically compared to test toolmarks from Exhibit 1. a. Exhibit 1 caused the damage on Exhibit 2. b. Exhibit 1 did not cause the damage on Exhibit 3.
C8QLRE	The laboratory examinations of the wire pieces (item 2 and item 3) and a diagonal cutter (item 1) were analysed by application of the comparison microscope Leica FS C. The enclosed evidence material (item 2 and item 3) as well as the comparative material obtained with the diagonal cutter (item 1) were examined in order to find individual characteristics presented on their surfaces. Similar individual characteristics from diagonal cutter (item 1) were found only in wire piece (item 2). Conclusion: The wire piece (item 2) was cut with diagonal cutter (item 1) and the wire piece (item 3) was not cut with diagonal cutter (item 1).
C8UBUQ	1. Examination of Exhibit 1 disclosed Pittsburgh Pro brand diagonal cutters. Exhibit 1 was used to create test standards, Exhibit 1.1, which will be retained with Exhibit 1. 2. Examination of Exhibits 2 and 3 disclosed two pieces of copper wire. Each wire is damaged on one end. The damage present on Exhibits 2 and 3 is consistent with pinching type tools such as diagonal cutters, wire cutters, or other similar tools. 3. The damaged ends of Exhibits 2 and 3 were microscopically compared to test standards from Exhibit 1. a. The damage present on Exhibit 2 was identified as having been caused by Exhibit 1. b. Exhibit 1 could not be identified or eliminated as having caused the damage present on Exhibit 3.
CBCBCR	I observed agreement of all discernible class characteristics, and sufficient agreement of individual characteristics to conclude the tool marks present on Item 001-02 were produced by the submitted tool, Item 001-01. I observed disagreement in class characteristics between the tool marks present on Item 001-03 and the submitted tool, Item 001-01; therefore, I conclude the tool marks present on Item 001-03 were not produced by the submitted tool, Item 001-01.
CQ3DTV	Having conducted a tool mark comparison between wire cutters, item 1 and the two pieces of cut wire items 2 and 3. I am of the opinion that the wirecutters (item 1): Was responsible for cutting the piece of wire marked item 2. Can be excluded from having cut the piece of wire marked item 3.
CQ63V8	Item 1 - the tool was used to produce test toolmarks using the submitted copper wire and casts of the working surfaces were also produced. The test toolmarks and casts were compared to the Items 2 and 3 pieces of cut wire. Items 2 and 3 - the cut end of the wire was compared to the test toolmarks and casts produced by the Item 1 tool. The wire could not be identified or eliminated as having been cut by the Item 1 tool based on a lack of agreement or disagreement of individual characteristics observed during a microscopic comparison.
CWBU46	MICROSCOPIC COMPARISON EXAMINATION OF EVIDENCE CUT WIRES Q1 (ITEM 2) AND Q2 (ITEM 3) WITH TEST CUT WIRES FROM K1 CABLE CUTTERS (ITEM 1) REVEALED SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY Q1 (ITEM 2) AS HAVING BEEN CUT WITH K1 (ITEM 1). DUE TO AN INSUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS, Q2 (ITEM 3) COULD NOT BE IDENTIFIED OR ELIMINATED AS HAVING BEEN

TABLE 2

WebCode	Conclusions
	CUT WITH K1 (ITEM 1). "Sufficient agreement" exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility. Sufficient agreement is related to the significant duplication of random toolmarks as evidence by a pattern or combination of patterns of surface contours.
DDXFKP	Item 2 was cut by the Item 1 diagonal cutter. Item 3 was not cut by the Item 1 diagonal cutter based on differences in class characteristics.
DF2B4R	Item 2, the questioned cut end, was cut by item 1, the diagonal cutters. This identification was established by having sufficient agreement of unique surface contours. Item 3, the questioned cut end, was not cut by Item 1, the diagonal cutters. Sufficient difference were observed to eliminated the cutters as having made the cut.
DL3PM9	Item: 1 One diagonal cutter recovered from suspect. RESULTS: Item 1 was physically and microscopically examined and found to be in working order. Item: 1.1 Test specimens produced by Item 1 using Laboratory supplied test media. RESULTS: These test specimens were used for comparison purposes and were packaged for return with the other evidence. Item: 2 One cut copper wire piece recovered from scene (blue). Item: 3 One cut copper wire piece recovered from scene (red). RESULTS: Items 2 and 3 were physically examined and microscopically compared with test specimens cut by the Item 1 tool with the following conclusions: Matching individual identifying characteristics were found on Item 2 and test cuts made by the Item 1 tool to conclude that, Item 2 was cut by the Item 1 tool. Due to differences in general and individual characteristics, it was concluded that Item 3 was not cut by the Item 1 tool. Marks of value were found and it was concluded that, Item 3 may be suitable for identification with a specific tool.
DQMCN9	MICROSCOPIC COMPARISON EXAMINATION OF EVIDENCE CUT COPPER WIRE PIECES ITEM 2 AND ITEM 3 WITH TEST CUT PIECES FROM EVIDENCE DIAGONAL CUTTERS ITEM 1 REVEALED THE FOLLOWING: SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY ITEM 2 CUT COPPER WIRE PIECE AS HAVING BEEN CUT WITH ITEM 1 DIAGONAL CUTTER. CUT COPPER WIRE PIECE ITEM 3 WAS NOT CUT WITH ITEM 1 DIAGONAL CUTTER DUE TO DIFFERENCES IN THE INDIVIDUAL MICROSCOPIC MARKINGS PRESENT. SUFFICIENT AGREEMENT Sufficient agreement is related to the significant duplication of random toolmarks as evidence by a pattern or combination of patterns of surface contours. "Sufficient agreement" exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility.
DQYBFW	The cut on laboratory Item (001.B) (item 2) copper wire recovered from the scene is identified as having been made by Laboratory Item (001.A) (item 1) Pittsburgh pro brand diagonal cutters recovered from the suspect. The items are identified as to sharing a common source because there is agreement of all discernible class characteristics and sufficient agreement of a combination of individual characteristics where the extent of agreement exceeds that which can occur in the comparison of toolmarks made by different tools and is consistent with the agreement demonstrated by toolmarks known to have been produced by the same tool. The cut on laboratory Item (001.C) (item 3) copper wire recovered from the scene is inconclusive as being made by Laboratory Item (001.A) (item 1) Pittsburgh pro brand diagonal cutters recovered from the suspect. The inconclusive finding resulted from agreement of all discernible class characteristics, and some disagreement of individual characteristics, but insufficient for an elimination.
E2FE2Z	Toolmarks present on the copper wire (item 2) exhibit similar class characteristics as those produced with the diagonal cutters (item 1) however; because of the lack of sufficient suitable corresponding microscopic markings, it was not possible to determine whether or not the above diagonal cutters (item 1) produced the toolmarks on the copper wire (item 2). Because of a difference in class and individual characteristics, the toolmark on the copper wire (item 3) could not have been produced by the diagonal cutters (item 1).

TABLE 2

WebCode	Conclusions
E4K68F	Examinations showed Item 2 was cut by Item 1. Examinations showed Item 3 was not cut by Item 1 due to differences in class characteristics.
E4KZT8	Item 1 was examined and tested. The toolmarks present on Item 2 were made by Item 1. The toolmarks present on Item 3 could not be identified or eliminated as having been made by Item 1.
E6YA4T	The toolmarks at the end of the wire in item 2 were made by the cutter in item 1. The toolmarks at the end of the wire in item 3 were not made by the cutter in item 1.
E9E2UL	The Item 1 diagonal cutter functioned as designed during testing. Item 1 made the tool marks on the cut surface of the Item 2 copper wire. Item 1 can neither be eliminated nor identified as having made the tool marks on the cut surface of the Item 3 copper wire based on individual and possible subclass characteristic differences due to possible material and usage variables; however, tool action and some individual characteristics are similar.
ENCPN9	Cuts on Item #2 were compared microscopically with tests from the submitted diagonal wire cutters, Item #1. There is agreement in all discernible class characteristics. Sub class characteristics are present but were not considered in the results of this examination. Sufficient individual characteristic agreement exists between the cut on Item #2 and tests from Item #1 for identification. Item #1 made the cut on Item #2. Item #3 is eliminated from being cut by #1 due to differences in class characteristics in the cuts between #1 (tests) and #2 compared with #3. There is also a lack of subclass characteristics on the Item #3 cut in comparison with copious amounts on tests from Item #1 and #2
FCAXBZ	The marks on the copper wire piece marked 'Item 2' were produced by the pair of diagonal cutters marked 'Item 1'. The marks on the copper wire piece marked 'Item 3' were not produced by the pair of diagonal cutters marked 'Item 1'.
FCF3W4	Results of Examinations: Toolmarks present on the Item 2 piece of wire were identified as having been produced by the Item 1 diagonal cutters. Due to a difference in class characteristics, (gross marks left from tool, cutting angle is different and a shearing/pinching action against a pinching action) the Item 3 wire was not cut by the Item 1 tool.
FEXJP9	The item 2 wire was identified as having been cut by the item 1 diagonal cutters. The item 3 wire was eliminated as having been cut by the item 1 diagonal cutters.
PPF7V4	Item 1.1 is a Pittsburgh Pro brand diagonal cutter. Test cuts were made using the provided material. Items 1.2 and 1.3 are two sections of cut wire. The areas of damage were microscopically compared to the tests from Item 1.1. Item 1.2 was identified as having been cut by Item 1.1. Item 1.3 can be eliminated as having been cut by Item 1.1.
FZD2W6	Our examination with a comparison light microscope leads us to the following conclusion: Item 2 The toolmarks on the copper wire (Item 2) and the comparison marks made by the cable cutter (Item 1) show numerous well matching marks with general and individual characteristics. The toolmarks (Item 2) were caused by the cable cutter (Item 1). Item 3 The toolmarks on the copper wire (Item 2) and the comparison marks made by the cable cutter (Item 1) show no matching marks. The toolmarks (Item 3) weren't caused by the cable cutter (Item 1).
G9NTV2	The evidence copper wires were examined and microscopically compared to test toolmarks made by the submitted diagonal cutters with the following results: The evidence wire (Item 2) was identified as having been cut by the submitted diagonal cutting tool (Item 1). The evidence wire (Item 3) was eliminated as having been cut by the submitted diagonal cutting tool (Item 1).
GJRJZX	The Item 2 piece of copper wire was compared to test cuts made with the Item 1 tool. The Item 2 piece of copper wire was determined to have been cut with the Item 1 tool. The Item 3 piece of copper wire was compared to test cuts made with the Item 1 tool. The Item 3 piece of copper wire was

TABLE 2

WebCode	Conclusions
	determined to have not been cut with the Item 1 tool due to differences in class characteristics.
GM992L	I compared the cut wires item 2 and 3 with test cuts made by the diagonal cutter item 1. I found correspondence of individual stria between item 2 and test cuts made by item 1. Item 1 cut the wire item 2. Item 1 test cuts have regular spaced subclass marks from the tool surface. Item 2 does not have the regular spaced marks. Item 1 is excluded as having cut the wire item 3.
H4TZJX	3. On 2017-05-15 during the performance of my official duties I received a sealed evidence bag with number PA4001476917 from Case Administration of the Ballistics Section, containing the following: 3.1 One (1) white carton box marked "2017 Forensic Testing Program Test No. 17-528 Toolmark Examination", containing the following exhibits: 3.1.1 One (1) diagonal cutter marked as "Item 1". 3.1.2 One (1) copper wire, with a blue end, marked as "Item 2". 3.1.3 One (1) copper wire, with a red end, marked as "Item 3". 4. The intention and scope of this forensic examination comprises of the following: 4.1 The examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the diagonal cutter mentioned in paragraph 3.1.1 and made replications for test purposes and marked item "T1" and "T2" respectively. 6. I compared the individual and class characteristic markings on the copper wires mentioned in paragraphs 3.1.2 and 3.1.3 with the test replications of the diagonal cutter mentioned in paragraph 5, using a comparison microscope and found: 6.1 The marks on the copper wire mentioned in paragraphs 3.1.2 and 5 were produced by the tool listed in paragraph 3.1.1. 6.2 The marks on the copper wire mentioned in paragraph 3.1.3 were not produced by the tool listed in paragraph 3.1.1.
HGTY8V	The marks on the wire marked Item 2 mentioned in 3.2 were produced by the diagonal cutter mentioned in 3.1. The marks on the wire marked Item 3 mentioned in 3.2 were not produced by the diagonal cutter mentioned in 3.1
HJZCT3	Item: 1 One set of Pittsburgh Pro brand diagonal pliers, listed as "...recovered from suspect." RESULTS: Item 1 was physically and microscopically examined and used to create test toolmarks for microscopic comparisons. Item: 1.1 Test specimens produced by Item 1 using Laboratory supplied test media. RESULTS: Item 1.1 was packaged for return with the other evidence. Item: 2 One piece of cut copper wire, listed as "...recovered from scene (blue)." Item: 3 One piece of cut copper wire, listed as "...recovered from scene (red)." RESULTS: Items 2 and 3 were physically examined and microscopically compared with each other and test toolmarks made by Item 1. From these examinations and comparisons, the following conclusions were reached: Matching individual identifying characteristics were found on Item 2 and test toolmarks made by Item 1, and it was concluded that Item 2 was cut by Item 1. Sufficient differences were found in the individual identifying characteristics of Item 3 and test toolmarks made by Item 1 to conclude that Item 3 was not cut by Item 1. Item 3 may be suitable for identification with a specific tool and/or other toolmarks.
HXMH67	The questioned cable cutter (Item 1), used to cut the copper wire - Item 2 and not used to cut the copper wire - Item 3.
HZQFDD	Exhibit K-1 (Diagonal Cutters) was utilized to obtain test cuts T-(1-6). T-(1-6) were compared to Exhibit Q-1 (Item 2) and Exhibit Q-2 (Item 3). Exhibit Q-1 was cut with K-1. Exhibit Q-2 was not cut with K-1.
HZRBY6	The cutter Exhibit 1 was used to make test cuts with the submitted copper wire. The section of copper wire Exhibit 2 was cut by the diagonal cutter Exhibit 1. The section of copper wire Exhibit 3 was not cut by the diagonal cutter Exhibit 1.
J3AUET	Item 1-01-AA: The submitted Pittsburgh® Pro diagonal cutter was functional. Item 1-02-AA: The submitted copper wire was identified as having been cut by the submitted Pittsburgh® Pro diagonal cutter due to consistent and reproducible marks. Item 1-03-AA: Unable to eliminate or identify the submitted Pittsburgh® Pro diagonal cutter as having been used to cut the submitted piece of copper wire due to an agreement of class characteristics but a lack of consistent and reproducible individual marks. Item 1-04: The copper wire was not used for testing purposes. Item 1-05: The copper wire was not used for testing purposes. Investigative Leads: Item 1-03-AA was cut with a pinching type cutting

TABLE 2

WebCode	Conclusions
	tool with opposing blades. Such tools are, but not limited to: bolt cutters, diagonal cutters, and wire cutters.
JB6UV7	There were agreement of class characteristics and sufficient agreement of individual characteristics between the questioned toolmarks on the copper wire marked Item 2 and the test marks made by the diagonal cutter marked Item 1. Hence, Item 2 was found to have been cut by the diagonal cutter marked Item 1. There were differences in class characteristics between the questioned toolmarks on the copper wire marked Item 3 and the test marks made by the diagonal cutter marked Item 1. Hence, Item 3 was not cut by Item 1.
JBPBB9	Item 1, the submitted "PITTSBURGH PRO" brand diagonal cutter, was examined. The cutter is designed with opposing, straight-edged blades that cut materials using a pinching action. The cutter was used to make test cuts in lead and copper wire, which were then microscopically compared. Good reproducibility of the test marks was observed, including individual and subclass characteristics. The latter was in the form of coarse, parallel uniform striae. Items 2 and 3, the questioned pieces of cut copper wire, were examined. The cut ends of both items have class characteristics similar to the test cuts made by Item 1, as described above; however, Item 3 had some prominent impressed angular marks that were not present on Item 2. The test marks from Item 1 were microscopically compared to Items 2 and 3. Sufficient agreement of individual characteristics was observed between the test cuts from one side of one of the blades of Item 1 and the cuts on Item 2 to identify Item 2 as having been cut by Item 1. No agreement of individual characteristics was observed between the test cuts from either side of both blades of Item 1 and the cuts on Item 3. Furthermore, due to the observed consistent reproduction of copious subclass striae in the test marks produced by the blades of Item 1, it is reasonable to expect that any marks produced with these cutters will exhibit extensive agreement of subclass striae. The microscopic comparison revealed there was no agreement of the prominent subclass characteristics on Item 1 with Item 3. Based on the lack of agreement of individual and subclass characteristics, in addition to the differences observed in class characteristics, Item 3 was excluded as having been cut by Item 1. Identifications of toolmarks with a specific tool are made to the practical, not absolute, exclusion of all other tools. This is because it is not possible to examine all tools in the world, a prerequisite for absolute certainty. The conclusion that sufficient agreement for identification exists between two toolmarks means that the likelihood another firearm or tool could have made the questioned mark is so remote as to be considered a practical impossibility.
JDFGRY	Examinations showed that Item 1 was used to cut Item 2. Examinations showed that Item 1 was not used to cut Item 3.
JGDx4T	Item 1 was visually and microscopically examined. Test cuts were made using Item 1 and were retained in the laboratory. Item 2 could not be identified or eliminated as having been cut using Item 1. The cuts share class and possible individual characteristics with each other; however, there is sub-class characteristic influence present. Item 3 was not cut using Item 1 based on a difference in class characteristics. Items 2 and 3 were not cut using the same tool based on a difference in class characteristics.
JKVDAE	Test toolmarks created using the Pittsburgh Pro diagonal cutting pliers, Item 1, were microscopically compared to the toolmarks exhibited on the cut copper wire segments, Items 2 and 3. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks exhibited on the segment of cut copper wire, Item 2, were identified as having been created using the Pittsburgh Pro diagonal cutting pliers, Item 1. Based on significant disagreement of class characteristics the toolmarks exhibited on the segment of cut copper wire, Item 3, could not have been created using the Pittsburgh Pro diagonal cutting pliers, Item 1.
JNQ88F	The copper wire Item 2 was cut by Item 1.
JP82AB	SUMMARY/RESULTS: One of the copper wire pieces from the scene (Item 2) was cut with the diagonal cutters recovered from the suspect (Item 1). The remaining copper wire piece from the scene (Item 2)

TABLE 2

WebCode	Conclusions
	was not cut with the diagonal cutters recovered from the suspect (Item 1). EXAMINATION: Test marks made with the diagonal cutters recovered from the suspect (Item 1) were microscopically compared to the two cut pieces of copper wire (items 2 and 3). One of the copper wire pieces from the scene (Item 2) was identified as being cut with the diagonal cutters recovered from the suspect (Item 1) based on sufficient corresponding individual characteristics observed from one of the cutting edges. The remaining copper wire piece from the scene (Item 3) was eliminated from being cut with the diagonal cutters recovered from the suspect (Item 1) based on class characteristic differences observed.
JXYGYE	Item 1 is the source of the traces on Item 2. Item 1 was excluded to be the source of the traces on Item 3, due to the angle of the cut as well as the marks left on the wire.
K2JQN7	The cut ends of the copper wires submitted as Item #2 and Item #3, were microscopically compared with test-cuts made using the diagonal cutters submitted as item #1. There is agreement in all discernible class characteristics and sufficient agreement in individual characteristics to conclude that Item #1 was used to cut Item #2. There are significant discrepancies in most class characteristics to conclude that Item #1 was not used to cut Item #3.
KA9LGU	The marks on the wire marked 'Item 2' were produced by the diagonal cutter marked 'Item 1'. It could not be determined if the marks on the wire marked 'Item 3' were or were not produced by the diagonal cutter marked 'Item 1'.
KE8UUH	Item 2 was cut by the submitted diagonal cutters (Item 1). Item 3 was cut by a second tool, based on differences in class and individual characteristics.
KNQ76U	The submitted diagonal pliers, item 1, cut the submitted wire, item 2. The submitted diagonal pliers, item 1, did not cut the submitted wire, item 3.
KXHMUY	Items 2 and 3 were examined. The questioned cut ends of Items 2 and 3 were microscopically compared to tests made with the diagonal cutters submitted as Item 1. Item 2 was cut by Item 1. Item 3 was not cut by Item 1.
L2PUBT	Items 1, 2, and 3: Toolmarks present on the Item 2 and 3 pieces of copper wire exhibit the same discernible class characteristics as those produced by the Item 1 tool. Item 1 was compared to item 2. The Item 2 toolmarks were examined, compared microscopically, and identified as having been produced by the Item 1 diagonal cutters. Item 1 was compared to item 3. Toolmarks present on the Item 3 piece of copper wire exhibit the same discernible class characteristics as those produced by the Item 1 diagonal cutters; however, because of the lack of sufficient suitable corresponding microscopic markings, it was not possible to identify or eliminate the Item 1 diagonal cutters as having produced the toolmarks on the Item 3 piece of copper wire.
LA9VWX	Identification: Based on the agreement of discernible class characteristics and sufficient matching individual detail, the tool marks exhibited on the piece of wire, TE-1 (Item 2) were identified as having been created by the use of the diagonal cutters, T-1 (Item 1).
LAPWVU	Wires marked 254486/17 Item 2 & tests marked 254486/17 TA & TB are positive. Wire marked 254486/17 Item 3 was cut by the other tool.
LMUBXC	The evidence in items 1, 2, and 3 was analyzed by physical and microscopic examination. The toolmarks present on the cut copper wire piece in item 2 were determined to have been made by the diagonal cutter in item 1. The toolmarks present on the cut copper wire piece in item 3 were determined not to have been made by the diagonal cutter in item 1, and further analysis is pending submission of another tool for additional comparison.
LPW7JZ	The diagonal cutter Exhibit 1 was used to make tests in suitable materials. The section of copper wire Exhibit 2 was identified as having been cut by the diagonal cutter Exhibit 1. The section of copper wire Exhibit 3 was not cut by the diagonal cutter Exhibit 1.

TABLE 2

WebCode	Conclusions
LUR34K	The toolmarks present/observed on Item 2 were microscopically identified as having been made by the diagonal cutters of Item 1. The toolmarks present/observed on Item 3 were microscopically eliminated as having been made by the diagonal cutters of Item 1, based upon a difference in class characteristics.
M4EFKW	The cut marks found in the copper wire piece identified as ITEM 2 (Blue), were caused by the diagonal cutter. (Item 1). The cut marks found in the copper wire piece identified as ITEM 3, were not caused by the diagonal cutter (ITEM 1).
M6N9VX	Microscopic examination and comparison of the copper wire (Item 2) revealed sufficient agreement of individual characteristics to determine that it was cut with the Pittsburgh Pro diagonal cutters (Item 1). Microscopic examination and comparison of the copper wire (Item 3) revealed that due to differences in class and individual characteristics it can be eliminated as having been cut using the Pittsburgh Pro diagonal cutters (Item 1).
M9R2RH	ITEM 2 WAS CUT BY ITEM 1. ITEM 3 WAS NOT CUT BY ITEM 1 BASED ON DIFFERENCES IN CLASS CHARACTERISTICS.
MDZLDT	Toolmarks present on Item 2 were microscopically examined and identified as having been produced by Item 1. Toolmarks present on Item 3 were microscopically examined, compared and eliminated as having been produced by the Item 1 diagonal cutters due to differences in class characteristics.
MJCBBF	We observed a good correspondence of toolmarks between the cut surface of item2(wire piece) and the cut surface of the wire piece made by item1(cutter). The cut surface of item3(wire piece) did not match with that of item1. In our opinion, this correspondence means that item1 was used to cut item2.
MK4D3Q	The marks on the copper wire marked Item 2 were produced by the diagonal cutter marked Item 1. The marks on the copper wire marked Item 3 were not produced by the diagonal cutter marked Item 1.
MUM3JB	We observed an excellent correspondence of toolmarks between the cut surfaces of copper wire painted blue(Item 2) and diagonal cutter(Item 1), while there is no correspondence of toolmarks between the cut surfaces of copper wire painted red(Item 3) and diagonal cutter(Item 1). In our opinion, cable cutter(Item 1) was used to cut the copper wire painted blue(Item 2). But cable cutter(Item 1) was not used to cut the copper wire painted red(Item 3).
MZBPEG	The Item one (1) bolt cutter cut the Item two (2) copper wire. The Item one (1) bolt cutter did not cut the Item three (3) copper wire, based on differences in class characteristics.
N4T88L	The wires were examined and compared, on the comparison microscope, to tests generated using the diagonal cutters. A significant correspondence of class and individual characteristics was observed between the tests of item 1 and the cut on item 2. It is, therefore, the opinion of this examiner that item 2 was cut by item 1. A correspondence of class characteristics was observed between the tests of item 1 and the cut on item 3; however, no correspondence of individual characteristics was observed. Therefore, the examination between items 1 and 3 was inconclusive.
N6JDLQ	The exhibit marked Item 2 is positive with the diagonal cutter marked Item 1. The exhibit marked Item 3 is negative with the diagonal cutter marked Item 1.
N6K3UU	Examinations showed the tool marks within Item 2 were created by Item 1. Examinations showed the tool marks within Item 3 were not created by Item 1.
P63GXX	Test toolmarks produced by Item 1 were microscopically examined with the toolmarks present on Items 2 and 3. Based on these examinations, it was determined that Items 2 and 3 bear the same class characteristics as Item 1. However, no individual characteristics were observed that could identify or eliminate the test toolmarks from Item 1 to the toolmarks on Items 2 and 3. Examination of the

TABLE 2

WebCode	Conclusions
	toolmarks on Items 2 and 3 revealed them as having the same class characteristics as one another. However, no individual characteristics were observed that could identify or eliminate the toolmarks on Items 2 and 3 as having been produced by the same tool.
P876GU	Toolmarks present on item2 were made by item1. It's impossible to decide whether or not item 1 is the source of the traces present on item3.
P8MK6V	Marks present on the cut ends of the Item 2 and Item 3 pieces of copper wire were compared to test cuts made using the Item 1 set of cutters. The Item 2 piece of copper wire was cut using the Item 1 set of cutters. The Item 3 piece of wire was neither identified nor eliminated as having been cut using the Item 1 set of cutters due to inconsistent individual characteristics but similarities in class characteristics.
P9H7YL	Item 2 was identified as having been cut by Item 1 based on sufficient agreement of class and individual characteristics. Item 3 was eliminated as having been cut by Item 1 based on significant disagreement of class and individual characteristics. Test tool marks produced with Item 1 were retained and returned with Item 001.
PLQPWG	Item 1 - One (1) pair of diagonal cutters. Item 2 - One (1) cut copper wire piece (blue paint). Item 3 - One (1) cut copper wire piece (red paint). The submitted specimen marked as Item 1 was examined and identified as a pair of diagonal cutters. The submitted specimens marked as Items 2 and 3 were examined and identified as two (2) sections of cut copper wire exhibiting toolmarks. Toolmarks exhibited on Items 2 and 3 were microscopically compared to test toolmarks created using Item 1. As a result of microscopic comparison, Item 2 could not be identified or eliminated as having been marked by Item 1 due to lack of sufficient agreement of individual characteristics. Item 3 was eliminated as having been marked by Item 1 due to differences in class characteristics.
PQJNBC	The cut surface on Test Item 2 was examined when its general characteristics were noted. The cut surface was compared to test cuts made by the submitted tool (Test Item 1) when they were found to show agreement in class, sub-class and individual characteristics such that, in our opinion, the submitted tool (Test Item 1) is responsible for the cut surface on Test Item 2. The cut surface on Test Item 3 was examined when its general characteristics were noted. The cut surface was compared to test cuts made by the submitted tool (Test Item 1) when they were found to be different in sub-class and individual characteristics such that the submitted tool (Test Item 1) could not have made the cut.
PTLP9N	The copper wire (Item 01-02) was cut by the diagonal cutter (Item 01-01). The toolmarks on the copper wire (Item 01-03) were not produced by the diagonal cutter (Item 01-01); this elimination is due to individual differences. The toolmarks on the copper wire (Item 01-03) were produced by a pinching class tool, including but not limited to those produced by a diagonal cutter or bolt cutters.
QP229N	The cut copper wire (Item 2, blue) was cut by the diagonal cutter (Item 1), but the cut copper (Item 3, red) was not cut by the diagonal cutter (Item 1). In other words Item 2 (blue) is positive to Item 1 cable cutter but Item 3 (red) is negative to Item 1 cable cutter.
QPLXFG	Tool Mark Analysis: Test marks were collected from Item 1, the diagonal cutters, using submitted testing media during laboratory examination. Item 1A, the test marks, was sealed in a manila envelope and will be retained in the laboratory for possible future analysis. Methodology - Comparison Microscopy: The tool mark on Item 2, the copper wire, was made with Item 1, the diagonal cutters, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 3, the copper wire, was not made with Item 1, the diagonal cutters, based upon different individual microscopic characteristics.
QUE8JN	The diagonal cutting pliers received was used to cut the exhibit copper wire marked Item 2. Class characteristics marks and individual characteristics marks match.
QVN4X6	In my opinion, the wire in Item 2 was cut by the submitted cable cutter, Item 1 (conclusive association). In my opinion, the wire in Item 3 was NOT cut by the submitted cable cutter, Item 1 (conclusive

TABLE 2

WebCode	Conclusions
	elimination).
R3K7TP	I compared the individual and class characteristic markings on the cut copper wire pieces (item 2 and item 3) and cut copper wire piece tests cut with the provided diagonal cutter (item 1) using a comparison microscope and find: 2.1 The marks on the blue cut copper wire piece (item 2) were produced by the provided diagonal cutter (item 1). 2.2 The marks on the red cut copper wire piece (item 3) were not produced by the provided diagonal cutter (item 1).
R3RBET	Item 1- The diagonal cutter can function as designed and test cuts were made. Item 2- The questioned toolmarks on the copper wire were caused by the cutting blades of the Item 1 diagonal cutter. Item 3- The questioned toolmarks on the copper wire were not caused by the cutting blades of the Item 1 diagonal cutter.
R8L82Y	Materials Submitted: Item #01.01- A Suspect Tool - Pittsburgh Pro Diagonal Cutter. Item #01.02- Questioned toolmark - Cut copper wire piece recovered from scene (Blue). Item #01.03- Questioned toolmark - Cut copper wire recovered from scene (Red). Results and Conclusions: Item #01.01- The submitted tool is a Pittsburgh Pro brand Diagonal Cutter, an opposed blade cutting tool. Using the submitted test material and additional laboratory supplied test material; known test toolmarks were generated for comparison purposes. The known test toolmarks specimens will be retained at the laboratory for future comparisons. Item #01.02- Examination of the submitted piece of wire (with a blue end) revealed the presence of a questioned toolmark consistent with the use of an opposed blade cutting tool. Microscopic examination and comparison of this submitted questioned toolmark with the known test toolmarks revealed the following: Item #01.02 displayed sufficient agreement of individual characteristics to conclude that it had been cut by the submitted Pittsburgh Pro Diagonal Cutter, Item #01.01. Item #01.03- Examination of the submitted piece of wire (with a red end) revealed the presence of a questioned toolmark consistent with the use of an opposed blade cutting tool. Microscopic examination and comparison of this submitted questioned toolmark with the known test toolmarks revealed the following: Item #01.03 displayed sufficient disagreement of individual characteristics to conclude that it had not been cut with the use of the Pittsburgh Pro Diagonal Cutter, Item #01.01.
R8Y2EE	As a result of microscopic comparison, it was concluded that Exhibit 2 was identified as having been cut by Exhibit 1. Exhibit 3 was eliminated as having been cut by Exhibit 1.
R9QX2M	The submitted copper wire, Item 2, was cut by the submitted diagonal cutter, Item 1. Due to class characteristics and toolmark carryover differences, it was determined the submitted copper wire, Item 3, was not cut by the submitted diagonal cutter, Item 1.
RBY8W6	Item 2 (cut copper wire) was identified as having been caused by item 1 (diagonal cutter tool). Item 3 (cut copper wire) was eliminated from having been caused by item 1 (diagonal cutting tool) due to differences in class characteristics.
RCVN93	The diagonal cutter (Item 1) was used to cut one of the pieces of wire (Item 2). The diagonal cutter (Item 1) was not used to cut the second piece of wire (Item 3).
RFU2VR	[No Conclusions Reported.]
RMAHN2	With the questioned diagonal cutter (item 1) test marks were made in lead. Casts of the mentioned test marks were made and compared with casts of the questioned marks on item 2 and item 3 to investigate similarities and dissimilarities of the toolmarks. The microscopical examination revealed that the surface structures of the test marks caused by item 1 correspond with the surface structures of the toolmarks on item 2 and are different from the toolmarks on item 3. On the surface of the diagonal cutter are grooves from various shape cutting manufacturing processes. The alignment and combination of the different manufacturing marks are unique in their shape, position and size. Therefore the diagonal cutter labeled as item 1 is identified as the tool that caused the toolmarks on item 2. The marks on item 3 were caused by a different tool.

TABLE 2

WebCode	Conclusions
RYMK8E	Item 1 (a diagonal cutter) produced the toolmarks on Item 2 (copper wire). Item 1 did not produce the toolmarks on Item 3 (copper wire).
RZWUXQ	1) Examinations showed Item 1 was used to cut Item 2. 2) Examinations showed Item 1 was not used to cut Item 3 due to sufficient differences in class and individual characteristics.
TAJB2K	Item #1 (diagonal cutter), Item #2 (cut wire – blue), and Item #3 (cut wire – red) were examined and microscopically compared between 4/21/2017 and 4/25/2017. Based on agreement of all discernable class characteristics and sufficient agreement of individual characteristics, Item #2 (cut wire –blue) was positively identified as having been cut by Item #1 (diagonal cutters). Based on disagreement of class and individual characteristics, Item #3 (cut wire –red) was eliminated as having been cut by Item #1 (diagonal cutters).
TCAEVR	Test tool marks produced by Item #1 were microscopically examined in conjunction with the tool marks found on Items #2 and #3. Based on these comparative examinations, it was determined that: A. The tool marks present on Item #2 had been produced by the blades of Item #1. B. Item #3 bears no individual characteristics to linking it as having been cut by the blades of Item #1.
TRYGF2	The diagonal cutter (Item 1) was used to cut Item 2. The diagonal cutter (Item 1) was not used to cut Item 3.
TY3L6Z	Both wire piece are cutted with diagonal cutter Item 1
UGWGF3	Striation of copper wire piece using item 1 is same as striation of item 2.
UGXDLR	Examination of the cut wires in ITEMS 2 and 3 revealed the presence of toolmarks that are consistent with being made by a double bladed cutting tool. Test toolmarks produced using the diagonal cutters in ITEM 1 were microscopically examined in conjunction with the toolmarks present on ITEMS 2 and 3. Based on these comparative examinations and observed class, subclass, and individual characteristics, it was determined that: A. ITEM 2 had been cut by ITEM 1 diagonal cutter. B. ITEM 3 bears similar class characteristics as test cuts made with ITEM 1. However, insufficient individual characteristics were found for either identification or elimination.
VAWGHL	The Item 2 copper wire was identified as having been cut by the Item 1 diagonal cutter. Due to a difference in class characteristics the Item 3 copper wire was excluded as having been cut by the Item 1 diagonal cutter.
VCLRDL	Toolmarks present on Item 2 were microscopically examined and exhibit similar class characteristics as those produced by the Item 1 tool; however, the result of the microscopic comparison was inconclusive due to the lack of sufficient suitable corresponding microscopic markings. It was not possible to identify or eliminate the toolmark on Item 2 as having been produced by the Item 1 tool. Toolmarks present on Item 3 were microscopically examined, compared and eliminated as having been produced by the Item 1 tool due to differences in class characteristics. Six (6) tests produced using Item 1 are being returned as Item 1T in sample pack container and should be maintained for possible future examinations.
VCZC2P	Item #1 was used to make test marks for comparison to Items #2 and #3. Toolmarks on Item #2 were made by Item #1. Toolmarks on Item #3 were not made by Item #1.
VN92VK	3. On 2017-05-17 during the performance of my official duties I received a sealed evidence bag with number PA4001476915 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) Pittsburgh Pro manufacturer Diagonal cutter marked by me "232511/17 Item 1". 3.2 Two (2) cut copper wire pieces marked by me "232511/17 Item 2" and "232511/17 Item 3" respectively. 3.3 Two (2) cut copper wire samples not marked by me. 4. The intention and scope of

TABLE 2

WebCode	Conclusions
	<p>this forensic examination comprise the following: 4.1 The examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the Pittsburgh Pro Diagonal cutter mentioned in paragraph 3.1 and made replications for tests purposes. The tests were marked "232511/17 Test 2" and "232511/17 Test 3" respectively. 6. I compared the individual and class characteristics markings on the copper wire pieces mentioned in paragraph 3.2 and the tests mentioned in paragraph 5 using a comparison microscope and found: 6.1 The marks on the copper wire marked "232511/17 Item 2" mentioned in paragraph 3.2 were produced by the Diagonal cutter mentioned in paragraph 3.1. 6.2 The marks on the copper wire marked "232511/17 Item 3" mentioned in paragraph 3.2 were not produced by the Diagonal cutter mentioned in paragraph 3.1.</p>
VUYCAP	Item 1 is a 7 1/2" diagonal cutter, Pittsburgh Pro. brand. Item 2 and Item 3 are two (2) small lengths of copper wire with a suspected cut to one end. Item 3 was identified as having been cut by the Item 1 tool. Item 2 is inconclusive in that it could not be identified or eliminated as having been cut by the Item 1 tool.
VW7M7T	Item 2 copper wire piece was cut with Item 1 diagonal cutter. Item 3 copper wire piece was not cut with Item 1 diagonal cutter.
YRGYM	3. On 2017-05-23 during the performance of my official duties I received a sealed evidence bag with number PA4001476914 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) Pittsburgh Pro diagonal cutter which I marked "231754/17 Item 1". 3.2 One (1) piece of copper wire with blue tip which I marked "231754/17 Item 2". 3.3 One (1) piece of copper wire with red tip which I marked "231754/17 Item 3". 3.4 Two (2) pieces of copper wires to be used for examination purposes. 4. The exhibit evidence bag mentioned in paragraph 3, is not mentioned in the letter received with it, with reference Test No. 17-528: Toolmarks Examination. 5. The intention and scope of this forensic examination comprises of the following: 5.1 Microscopic individualization of toolmarks. 5.2 Examination of tools and toolmark related materials. 6. I examined the Pittsburgh Pro diagonal cutter mentioned in paragraph 3.1 and made replications for test purposes, using the exhibits mentioned in paragraph 3.4 which I marked as "231754/17" each and "1" to "12" individually. 7. I compared the individual and class characteristics markings on the Pittsburgh Pro diagonal cutter mentioned in paragraph 3.1 using a comparison microscope and found: 7.1 The marks on exhibit marked "231754/17 Item 2" mentioned in paragraph 3.2 were produced by the Pittsburgh Pro diagonal cutter mentioned in paragraph 3.1. 7.2 It cannot be determined if the marks on exhibit marked "231754/17 Item 3" mentioned in paragraph 3.3 were or were not produced by the Pittsburgh Pro diagonal cutter mentioned in paragraph 3.1.
YUY6X	In my opinion, the findings demonstrate conclusively that the submitted pliers (Item 1) have been used to cut the copper wire (Item 2). In my opinion, the findings demonstrate conclusively that the submitted pliers (Item 1) have NOT been used to cut the copper wire (Item 3).
W7A2P6	The known tool, item 1, is identified as the source of the questioned toolmark on item 2. The known tool, item 1, is excluded as a possible source of the questioned toolmark on item 3.
W826CK	Copper wire marked Item 2 which was blue at the end was cut by the diagonal cutter Item 1. Copper wire marked Item 3 which was red at the end was not cut by the diagonal cutter Item 1.
WG86RE	The tool marks on the Item 2 copper wire were microscopically identified as having been made by the Item 1 diagonal cutter tool. The tool marks on the Item 3 copper wire were microscopically eliminated as having been made by the Item 1 diagonal cutter tool.
WH3HGR	The findings of the comparison between Item 1 and Item 2 are extremely more probable if Item 2 is cut by the cutter Item 1 than if Item 2 is cut by another cutter. The findings of the comparison between Item 1 and Item 3 are extremely more probable if Item 3 is cut by another cutter than if Item 3 is cut by cutter Item 1.
WL24ZH	It could not be determined if the marks on the wire marked 'Item3' were or were not produced by the

TABLE 2

WebCode	Conclusions
	diagonal cutter marked 'Item 1'.
WMXCET	The diagonal cutter from suspect (Item 1) was used to create test cuts in lead and copper wire (Item 1-1). Comparative examination of toolmarks on Item 2 (a copper wire with blue paint) against test cuts created using Item 1 showed the presence of matching features. This means that Item 1 was used to cut Item 2. Comparative examination of toolmarks on Item 3 (a copper wire with red paint) against test cuts created using Item 1 showed the presence of different class characteristics. This means that Item 1 did not cut Item 3.
WPHL4K	Item 1 is a pair of Pittsburgh Pro brand diagonal cutters that use a pinching action. The toolmarks present on the Item 2 copper wire were identified as having been produced by the Item 1 diagonal cutters. Due to differences in class characteristics, the toolmarks present on the Item 3 copper wire were excluded as having been produced by the Item 1 diagonal cutters. The toolmarks present on the Item 3 copper wire were produced by a pinching action or shearing action tool.
X2TE7K	Results of Examinations: Item 1 is a Pittsburgh Pro brand diagonal cutter that uses a pinching-type action. The Item 1 diagonal cutters were identified as having cut the Item 2 wire. Due to a lack of sufficient corresponding microscopic marks of value, it could not be determined if the Item 1 diagonal cutters cut the Item 3 wire.
X4EZY8	1. Exhibit 1 is a pair of Pittsburgh Pro brand diagonal pliers with black and red handles. 2. Exhibit 2 and 3 are two pieces of cut copper wire that were visually and microscopically examined and compared to test standards from Exhibit 1. 3. Exhibit 2 was cut by Exhibit 1. 4. Exhibit 3 was not cut by Exhibit 1.
X7JQ2G	Toolmarks present on Item 2 were microscopically examined and identified as having been produced by the Item 1 tool. Toolmarks present on Item 3 were microscopically examined and eliminated as having been produced by the Item 1 tool, due to differences in class characteristics. Item 3 was cut by an opposing blade shearing type tool. Three (3) tests produced using Item 1 and laboratory stock material are being returned as Item 1T in container 1 and should be maintained for possible future examinations.
XA2R6F	Exhibit wire marked Item 2 (blue) was cut with exhibit tool marked Item 1. Exhibit wire marked Item 3 (red) was not cut with exhibit tool marked Item 1.
XA78J2	The questioned cable cutter, Item 1 was used to cut the copper wire piece, Item 2. A different cutter was used to cut copper wire piece, Item 3.
XNLAXJ	3. On 2017-05-09 during the performance of my official duties, I received a sealed evidence bag with number PA4001476919 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) Pittsburgh Pro manufactured red and black handle Diagonal cutter marked by me as "232530/17 Item 1". 3.2 Two (2) cut copper wire pieces marked by me as "232530/17" each and "Item2" and "Item3" respectively. 3.3 Two (2) cut copper wire pieces for sample purposes not marked by me. 4. The intention and scope of this forensic examination comprises of the following: 4.1 Examination of tools and toolmark related materials. 4.2. Microscopic individualization of toolmarks. 5. I examined the Diagonal cutter mentioned in paragraph 3.1 and made replications for test purposes, using a small quantity of the copper wire pieces mentioned in paragraph 3.3 and marked them as "232530/17" each and "Test1" and "Test2" respectively. 6. I compared the individual and class characteristic markings on the copper wire pieces mentioned in paragraph 3.2 and tests mentioned in paragraph 5 using a comparison microscope and found: 6.1 The marks on the copper wire piece marked "232530/17 Item2" mentioned in paragraph 3.2 were produced by the Diagonal cutter mentioned in paragraph 3.1. 6.2 The marks on the copper wire piece marked "232530/17 Item3" mentioned in paragraph 3.2 were not produced by the Diagonal cutter mentioned in paragraph 3.1.
YA33HX	*Comparing the scratch on the section of the copper: The scratch of the sample cut by Item 1 is

TABLE 2

WebCode	Conclusions
	matched with Item 2(Blue)'s scratch on the section, but it isn't matched with Item 3(Red)'s scratch on the section. In conclusion, Item 2(Blue) was cut by Item 1.
YGHL2X	1. The cutters, Item 1, were identified as having cut the copper wire, Item 2. 2. The cutters, Item 1, were eliminated from having cut the copper wire, Item 3.
YGJGMN	The Exhibit 1 cutter was used to make tests using the submitted copper wire. The Exhibit 2 cut copper wire was cut by the Exhibit 1 cutter. The Exhibit 3 cut copper wire was NOT cut by the Exhibit 1 cutter.
YHVFFC	The Item 2 copper wire was not cut by the Item 1 diagonal cutters. The Item 3 copper wire was cut by the Item 1 diagonal cutters.
YKKLZA	Toolmark Analysis: Methodology - Comparison Microscopy: Test marks were made with Item 1, the diagonal cutters, using laboratory testing media. The tool mark on Item 2, the copper wire, was made with Item 1, the diagonal cutters, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 3, the copper wire, was not made with Item 1, the diagonal cutters, based upon different individual microscopic characteristics.
YM9ZNJ	1. Examinations showed Item 2 was cut by Item 1. 2. Examinations showed Item 3 was not cut by Item 1.
YVFVHC	The cut end of the Item 2 copper wire was microscopically compared to test cuts made with the Item 1 wire cutters with positive results. The Item 2 copper wire was cut by the Item 1 wire cutters. The cut end of the Item 3 copper wire was microscopically compared to test cuts made with the Item 1 wire cutters with negative results. The Item 3 copper wire was eliminated as having been cut by the Item 1 wire cutters.
YYZR6G	3. On 2017-05-12 during the performance of my official duties I received a sealed evidence bag with number PA4001476916 from Case Administration of the Ballistics Section, containing the following item: 3.1 One (1) sealed white cardboard box, marked "2017 CTS Forensic Testing Program Test No. 17-528: Toolmark Examination Sample Pack: T1", containing the following exhibit: 3.1.1 One (1) sealed envelope marked "Test No. 17-528 Item 1", containing the following exhibit: 3.1.1.1 One (1) Pittsburgh Pro manufactured diagonal cutter, marked by me "232460/17 1". 3.1.2 One (1) sealed envelope marked "Test No. 17-528 Item 2", containing the following exhibit: 3.1.2.1 One (1) piece of copper wire, painted blue on one (1) end, marked by me "232460/17 2". 3.1.3 One (1) sealed envelope marked "Test No. 17-528 Item 3", containing the following exhibit: 3.1.3.1 One (1) piece of copper wire, painted red on one (1) end, marked by me "232460/17 3". 3.1.4 Two (2) pieces of copper wire, not marked by me. 4. The intention and scope of this forensic examination comprise the following: 4.1 Examination of tools and tool mark related materials. 4.2 Microscopic individualization of tool marks. 5. I examined the diagonal cutter mentioned in paragraph 3.1.1.1 and made replications for test purposes using the pieces of copper wire mentioned in paragraph 3.1.4, which I marked 460T1 and 460T2 respectively. 6. I compared the individual and class characteristic markings on the pieces of copper wire mentioned in paragraphs 3.1.2.1 and 3.1.3.1 with the test replications mentioned in paragraph 5 using a comparison microscope, and found: 6.1 The marks on the piece of copper wire mentioned in paragraph 3.1.2.1 marked "232460/17 2" were produced by the diagonal cutter mentioned in paragraph 3.1.1.1. 6.2 The marks on the piece of copper wire mentioned in paragraph 3.1.3.1 marked "232460/17 3" were not produced by the diagonal cutter mentioned in paragraph 3.1.1.1.
ZAJFL2	Item 2: In our report we would give a level 4 - may be - in this case with the definiton: This expression is used when some confimaty has been demonstrated, but the level of individual characteristics is to low. The basis for stating a certain degree of identity is absent, and the conclusion is subject to some dubt. Item 3: This item we would givea level 5 - definetely not. This expression is used when concistent discrepanis heve been proven. A hypothesis of identity or connection can be excluded.
ZRXU2B	The Item 1 tool was microscopically identified as having cut the Item 2 copper wire. The Item 1 tool

TABLE 2

WebCode	Conclusions
ZTU9QN	did not cut the Item 3 copper wire. Toolmarks present on item #2 were identified as having been made by item #1. Toolmarks present on item #3 could not be identified or eliminated as having been made by item #1.
ZZPBPE	Toolmarks present on Item 2 were microscopically examined and identified as having been produced by Item 1. Toolmarks present on Item 3 were microscopically examined, compared, and eliminated as having been produced by Item 1 due to differences in class characteristics. Three (3) tests produced using Item 1 are being returned as Item 1T and should be maintained for possible future examinations.

Additional Comments

TABLE 3

WebCode	Additional Comments
26GYLC	Item 3 was more than likely not made by Item 1 but without another piece to compare to I would be reluctant to exclude it given that it is the same class.
44W37H	When Item 1 was examined using a stereoscope, the manufacturing marks that were observed had the possibility of being subclass characteristics from the CNC milling process. The striations made by the tool on the copper wire were consistent with the marks from the tool, i.e possibility of subclass marks that may have been present on consecutively manufactured tools. Therefore, since the possibility of subclass characteristics could not be excluded and minimal striations that were considered individual in nature were observed, an inconclusive conclusion was reached.
4LGNVE	The use of a tool with a high possibility of having sub-class characteristics may put this exercise in the grey area. Good test.
4QCM3H	Because of the limited surface area of the toolmark on Item #3 and the fact that both Item #2 and Item #3 had been cut by an opposed blade cutting tool, I chose not to exclude Item #1 as being the source of the marks on Item #3.
7MPHNK	The comparison marks of the cutting pliers ("Item 1") and the questioned toolmarks on the copper wire pieces ("Item 2" and "Item 3") have been moulded using "AccuTrans" moulding material. The comparison has been performed with a comparative microscope.
83CKGT	Sub-class possibilities, however, damage found for individual identification.
8CKRJN	There were inconsistence reduplication of marks and more movement occurred during the cuttings which might have had negative impact on the reduplication of prominent marks.
8RFCZC	<p>Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the reference library may be used to make determinations. When a microscopic comparison is necessary using a questioned tool, test samples are created using a test material that is softer or similar in quality to the item being compared. Toolmark Examination</p> <p>Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the Laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Tool: The results of tool examinations describe type</p>

TABLE 3

WebCode	Additional Comments
	and/or operating condition of the tool as it was received. Toolmark Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.
8X26CB	Methods: Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the Laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Toolmark Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.
8XXMA7	The copper wire (Item 3) was deemed inconclusive as having been severed by the Pittsburgh Pro diagonal cutter (Item 1) due to insufficient corresponding individual and matching class characteristics.
9K98JC	Due to the poor condition of the cut on Item 2 as well as the small surface area of the wire (with respect to the blade itself), a more definitive conclusion could not be reached.
A6EZ6B	Regarding the inconclusive finding for the comparison of Exhibits #1 and #3, a microscopic comparison was performed. Though the toolmarks on Exhibit #3 most resemble a shearing-type cut when viewed in profile (versus the pinching-type cutting surface of Exhibit #1), some test toolmarks made by Exhibit #1 showed a similar profile in comparison to Exhibit #3. As a whole, there is insufficient detail of the class and/or individual characteristics for an identification or elimination finding.
C8UBUQ	Exhibit 1 tests and Exhibit 3 share class characteristics (same tool type), however Exhibit 1 could not be identified or eliminated as having caused the damage present on Exhibit 3 due to the following: a)the presence of diagonal marks on Exhibit 3 which were not reproducing on Exhibit 1 tests, b)the diagonal marks being of unknown origin and unclear as to whether or not they were reproducing, and c) some agreement of individual characteristics between different areas of the Exhibit 1 tests to the same areas of Exhibit 3.
CQ63V8	The Item 1 tool showed strong class/subclass marks on the casts and test toolmarks. the quality/quantity of potential individual characteristics observed on the Items 2 and 3 wires were poor. Did observe some agreement of Item 2 with Item 1, but unsure if class/sub class/individual.

TABLE 3

WebCode	Additional Comments
DQYBFW	The cut on laboratory Item (001.C) (item 3) copper wire recovered from the scene is inconclusive as being made by Laboratory Item (001.A) (item 1) Pittsburgh pro brand diagonal cutters recovered from the suspect. The inconclusive finding resulted from agreement of all discernible class characteristics, and some disagreement of individual characteristics, but insufficient for an elimination.
E2FE2Z	Because of the lack of sufficient suitable corresponding individual microscopic markings, it was not possible to determine whether or not the above diagonal cutters (item 1) produced the toolmarks on the copper wire (item 2).
E4KZT8	There was not enough detail to identify or eliminate Item 3 from Item 1.
E9E2UL	The tool marks on the two evidence items were likely made by two different tools as they exhibit apparent differences in grinding mark characteristics; however, we cannot prove reproducibility with only one cut made by the second tool and remain conservative in our conclusions due to the many variables inherent in tool mark cases (i.e., tensile strength of metal, angle in which cut was made, strength of individual using the tool, etc.).
FCF3W4	Methods: Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the Laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Toolmark Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.
HZQFDD	Exhibit Q-2 appears to have been cut by a cutting tool consistent with a diagonal cutter.
JB6UV7	The test marks were made with Item 1 on lead sheets and at various locations of the cutting edge of Item 1 on the submitted control copper wires. Item 2 was found to have been cut with item 1 at about 17 millimetres from the tip of the cutting jaws.
JBPBB9	The submitted tool has extensive subclass characteristics everywhere on the cutting blade surfaces except the actual cutting edges. When wire is cut with this tool, the subclass toolmarks are impressed into the beveled cut surfaces. This same pattern of toolmarks could be found to exist on other cutting plier jaws and cannot, therefore, be used for identification purposes. Since CTS does not require photographs of toolmark identifications, it will be unknown how many of the participating examiners based their

TABLE 3

WebCode	Additional Comments
	reported identification on matching impressed subclass characteristics (thus potentially getting the right answer for the wrong reason). In this proficiency test, it was easy to quickly match the subclass characteristics. It was possible to match individual test cutting edge marks with questioned Item 2, but this required more time and effort than just using the subclass toolmarks. I sincerely hope that the results reported by other examiners were based on matching individual, and not subclass, toolmarks.
JGDX4T	There was subclass characteristic influence which showed consistent agreement when the "segments" were moved up and down after in agreement.
JP82AB	Potential subclass characteristics were observed on three working surfaces of the tool (Item 1). Potential subclass carryover was eliminated from one working surface of Item 1 and this working surface was used in obtaining an identification with Item 2.
KA9LGU	Item 3 is inconclusive due to insufficient marks. (on the exhibit.)
LA9VWX	Elimination: Based on the significant disagreement of class and/or individual characteristics, the tool marks exhibited on the piece of wire, TE-2(Item 3) were eliminated as having been created by the use of the diagonal cutters, T-1 (Item 1).
N4T88L	Inconclusive is due to similar class characteristics but no similar individual characteristics.
P63GXX	Results are inconclusive because the toolmarks present on Items 2 and 3 were produced by an opposed blade cutting tool (pinching). Item 2 bears the same subclass characteristics; however, the lack of sufficient individual characteristics precludes a more conclusive examination. Because Item 1 is an opposed blade cutting tool an elimination result was not rendered for Item 3.
P876GU	There are not enough individual characteristics (microstries) to decide. The diameter of the copper wire is small.
P8MK6V	An exclusion of Item 3 may be possible if another piece of evidence to which it could be identified were received. Without confirmation of the reproducibility of the individual differences observed on Item 3 compared to tests made using the Item 1 cutters, a more definitive conclusion could not be reached.
P9H7YL	HEAVY subclass influence on Items 1 and 2.
PLQPWG	*Reason for inconclusive result: Item 2 could not be identified or eliminated as having been marked by Item 1 due to lack of sufficient agreement of individual characteristics.
PQJNBC	Additional evidence types would have been considered if this was submitted as a real case i.e. copper coloured metal deposits on the submitted tool edge may have been sampled, DNA and Fingerprints would have been considered.
R3RBET	The gross parallel toolmarks on the sides of the Item 1 blades could be sub-class characteristics. These details were evaluated on the test cuts as well as on the tool. Although an identification was made, the individual characteristics (random imperfections, irregularities) were used in the identification process.
R8Y2EE	Exhibit 1 displayed areas of subclass characteristics, which were not used in the microscopic comparison.
TCAEVR	Item #3 bears the same type class characteristics (double-bladed cutting tool) as test toolmarks from Item #1, however, there is insufficient agreement or disagreement of individual characteristics found between Item #3 and test toolmarks produced by Item #1.

TABLE 3

WebCode	Additional Comments
UGXDLR	Per [Laboratory] policy, ITEM 3 is inconclusive due to the fact that while the class characteristics agree (double bladed cutting tool) insufficient agreement or disagreement of individual characteristics was found between ITEM 3 and test toolmarks created by ITEM 1.
VCLRDL	*Item 2 inconclusive due to presence of subclass marks and lack of sufficient suitable corresponding individual marks.
VUYCAP	Conclusion was Inconclusive based on there was agreement of class characteristics (similar tool) however there was little to no agreement (insufficient) of individual markings.
VW7M7T	Possible sub-class influence noted on Item 1.
VYRGYM	Item 3 has the same class characteristics as tests cut with Item 1. But the similarities in the individual marks is not enough to include or exclude if Item 3 was cut or was not with item 1.
W7A2P6	Results: Microscopic examination of the test cuts from the known tool, item 1, and the questioned toolmarks on items 2 and 3 revealed: The questioned toolmark on item 2 exhibits sufficient agreement of the corresponding class, subclass and individual characteristics for a positive identification. The questioned toolmark on item 3 exhibits disagreement of the class, subclass and individual characteristics for a positive identification.
WG86RE	Subclass influence was found on all four cutting blades of Item 1. The identification made between Item 1 and Item 2 was based on sufficient agreement of unique shapes found when viewing the cut surfaces perpendicular to the direction of blade travel.
WL24ZH	Differences in individual marks were noted but it was not sufficient enough to make a conclusive finding. (as there were also similarities noted.)
X2TE7K	<p>Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Unit reference library may be used to make determinations. When a microscopic comparison is necessary using a questioned tool, test samples are created using a test material that is softer or similar in quality to the item being compared. Toolmark Examination Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the Laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Tool: The results of tool examinations describe type and/or operating condition of the tool as it was received in the</p>

TABLE 3

WebCode	Additional Comments
	Firearms/Toolmarks Unit. Toolmark Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such
ZAJFL2	There are similarities in striation marks from the cable cutter (item 1) and in the cut copper wire (item 2). However, the cable cutter seems to be new, and individual marks cannot be found - only systematic marks. Therefore, other cable cutters of the same production cannot be excluded.
ZRXU2B	I thought this test was poorly designed given the fact that a correct answer could be achieved for the wrong reasons. The tool I was given had tremendous subclass present on 3 of the 4 sides of the tool cutting surface. The subclass was so persistent that even though I had the tool to evaluate I would not be able to make an identification on 3 of the 4 sides. Only 1 blade edge left individual and sufficient individual for an identification. It is feasible that a test taker could make an identification, correctly answering the question posed on this test, but they have made the "identification" on subclass instead of actual individual characteristics.
ZTU9QN	Similarities in class characteristics were noted between the toolmarks present on item #3 and test cuts made using item #1, although a sufficiently complex individual characteristic pattern was not observed for an identification. Differences in class characteristics were also present; however, those differences were not pronounced enough based on a microscopic examination to support an elimination finding. Thus, an inconclusive finding was chosen.

Appendix: Data Sheet

Collaborative Testing Services ~ Forensic Testing Program Test No. 17-528: Toolmarks Examination

DATA MUST BE RECEIVED BY June 12, 2017 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

Accreditation Release Section

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB, and 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 on the last page must be completed and submitted.)
- This participant's data is **NOT** intended for submission to ASCLD/LAB, ANAB or A2LA.

Scenario:

Police are investigating a theft at a construction site. Two spools of copper wire were believed to be cut and large sections taken. A suspect was apprehended later that day and a pair of diagonal cutters were recovered from his possession. Investigators have removed the cut end of each spool and are requesting that you examine the wire sections and determine if any were cut using the suspect's diagonal cutter.

Please note the following:

- The ends of the copper wire which were cut to remove the questioned sections are not to be used in the examination and have been painted on the end and the colors are indicated next to their item description.
- Additional pieces of copper wire have been included for possible test mark purposes.

Items Submitted (Sample Pack T1):

- Item 1: Diagonal cutter recovered from suspect.
- Item 2: Cut copper wire piece recovered from scene. (blue)
- Item 3: Cut copper wire piece recovered from scene. (red)

1.) Was the questioned cable cutter (Item 1) used to cut either of the copper wire pieces (Items 2 or 3)?

Item 2	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inconclusive*	<input type="checkbox"/>
Item 3	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inconclusive*	<input type="checkbox"/>

*Should an item(s) be marked "Inconclusive", please document the reason in the Additional Comments section of this data sheet.

Please return all pages of this data sheet.

Page 1 of 3

Participant Code:

WebCode:

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

Horizontal lines for writing conclusions.

3.) Additional Comments

Horizontal lines for writing additional comments.

Return Instructions: Data must be received via online data entry, fax (please include a cover sheet), or mail by June 12, 2017 to be included in the report. Emailed data sheets are not accepted. QUESTIONS? TEL: +1-571-434-1925 (8 am - 4:30 pm EST) EMAIL: forensics@cts-interlab.com www.ctsforensics.com PARTICIPANT CODE: ONLINE DATA ENTRY: www.cts-portal.com FAX: +1-571-434-1937 MAIL: Collaborative Testing Services, Inc. P.O. Box 650820 Sterling, VA 20165-0820 USA

Please return all pages of this data sheet.

Participant Code:

WebCode:

Collaborative Testing Services - Forensic Testing Program

RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **17-528: Toolmarks Examination**

This release page must be completed and received by **June 12, 2017** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

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

ASCLD/LAB Certificate No. _____

ANAB Certificate No. _____

A2LA Certificate No. _____

Step 2: Complete the Laboratory Identifying Information in its entirety

Signature and Title _____

Laboratory Name _____

Location (City/State) _____

Accreditation Release

Return Instructions

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

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

Please return all pages of this data sheet.

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