



Toolmarks Examination Test No. 16-529 Summary Report

This test was sent to 238 participants. Each sample set contained a chisel (Item 1) and two wall plates containing questioned toolmarks (Items 2 and 3). Participants were requested to examine these items and report their findings. Data were returned from 194 participants (82% 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 chisel (Item 1) and two wall plates containing questioned toolmarks (Items 2 and 3). Participants were requested to determine which, if any, of the questioned toolmarks were made by the submitted tool. The Item 2 and Item 3 wall plates were not marked by the Item 1 chisel.

SAMPLE PREPARATION-

The Item 1 chisels were Smooth Handle Chisel 1/2" Blade WD, 6" LG Item # 3575A22. The Item 2 and Item 3 wall plates were TradeMaster® Nylon Blank Wallplate, Item # 7526K27. The Item 2 wall plates were painted with a blue dot on the back for item designation. The Item 3 wall plates were painted with a red dot on the back for item designation. The Item 1 chisels were used to strike spare wall plates several times to remove manufacturing residue. This process was done to break in the tools.

Items 2 and 3 (ELIMINATION): The chisel used to strike the Item 2 and Item 3 wall plates contained the same class characteristics, but was different from the chisel that was designated as Item 1. The Item 2 wall plate was inspected and secured in a jig. It was then struck at an angle by a chisel using a rubber mallet and packaged into a pre-labeled Item 2 envelope. The Item 3 wall plate was secured in a jig. It was then struck at an angle by the same chisel as Item 2 using a rubber mallet and packaged into a pre-labeled Item 3 envelope. This process was repeated until all of the elimination toolmarks had been prepared.

SAMPLE SET ASSEMBLY: The Item 1 chisel and the Item 2 and Item 3 wall plates were packaged into a pre-labeled sample set box. An additional unmarked wall plate was included for testing purposes. This process was repeated until all of the sample sets were prepared. Once verification was completed, the sample sets were sealed with evidence tape and initialed "CTS."

VERIFICATION: In addition to the sets examined by predistribution laboratories, 10 sample sets were examined by a qualified tool mark examiner who confirmed the expected results by eliminating the Item 2 and 3 wall plates as having been struck with the Item 1 chisel.

Summary Comments

This test was designed to allow participants to assess their proficiency at a toolmark examination involving striated type toolmarks. Each sample set consisted of one chisel (Item 1) and two wall plates (Items 2 and 3) containing the questioned toolmarks. Participants were requested to determine if the recovered chisel had created either of the questioned marks on the wall plates. The Item 2 and Item 3 wall plates were not struck by the Item 1 chisel, but both were struck by the same chisel that was not provided for examination. [Refer to Manufacturer's Information for preparation details.]

Of the 194 responding participants, 182 (94%) either eliminated (122) or were inconclusive (60) as to the Item 1 chisel being responsible for creating the marks on the Item 2 and Item 3 wall plates. The remaining twelve participants identified the Item 1 chisel as being responsible for creating the marks on both the Item 2 and Item 3 wall plates.

Several participants commented that the toolmarks produced by the Item 1 chisel and the questioned toolmarks on the Item 2 and Item 3 wall plates shared class characteristics, but insufficient corresponding individual characteristics were observed. [As a matter of policy, many labs will not eliminate without access to the tool, knowing the history of the tool or when class characteristics match.]

Examination Results

Did the questioned chisel from the suspect (Item 1) cause the damage to either of the wall plates containing questioned toolmarks (Items 2 and/or 3)?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
2KVAA4	Inc	Inc	6TT9F7	No	No
2LNVAL	Inc	Inc	6TWNT8	Inc	Inc
2XGGBB	No	No	6UPKFF	No	No
2Z443D	Inc	Inc	7GYA7F	Inc	Inc
3CFQQ4	Inc	Inc	7GZ8C6	Yes	Yes
3DPXVH	Inc	Inc	7TQZKR	No	No
3DRKEG	Inc	Inc	7U2KT2	No	No
3ELBFP	Inc	Inc	864HXG	No	No
3ENVC6	No	No	86Y3JV	Inc	Inc
3LJVNC	Inc	Inc	8AXA9Y	No	No
3UHMVK	No	No	8H7UMN	No	No
3V9QHZ	No	No	8JGV82	Inc	Inc
3XE8WJ	Inc	Inc	8JKFYB	No	No
3Z4G97	No	No	8P3Q97	No	No
3ZKRKJ	Inc	Inc	8QY8K3	Inc	Inc
4DKXB9	No	No	979C98	Yes	Yes
4RKRM3	No	No	986N7V	No	No
4XQ9CQ	Yes	Yes	9FF6H2	No	No
64VLF8	Inc	Inc	9K9BW4	No	No
67H833	No	No	9QZCJC	Inc	Inc
6RLT7F	No	No	9XVG97	Inc	Inc

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
A2DVFD	No	No	E78NAH	No	No
AC9CYM	No	No	E7NKYW	Inc	Inc
ADNBGQ	No	No	EJFCKZ	Yes	Yes
AUCNTX	No	No	FA4M6T	No	No
AYKAGV	No	No	FAKQTT	No	No
AYMRM7	No	No	FHEVPE	No	No
AZWW2U	Inc	Inc	FK9FW8	No	No
B8CWVX	Inc	Inc	FKNWR2	Inc	Inc
BBDQ7V	No	No	FQ9YVW	No	No
BC7YXC	No	No	G268AT	No	No
BHTQ3K	No	No	G2P63K	No	No
BHW7H7	Inc	Inc	G9A2C2	No	No
BNH7RR	No	No	GAGKRN	No	No
BZBTZ8	No	No	GJQVJN	Inc	Inc
C237Z6	No	No	GNKR7U	No	No
CBBFR6	Yes	Yes	GTENVK	Inc	Inc
CP8Y4L	Inc	Inc	GYGRKJ	Inc	Inc
CU69G9	No	No	GZEY96	No	No
CVW8V8	Inc	Inc	HAXYVR	No	No
CWUHTV	No	No	HKU6NQ	No	No
CWUKC9	Yes	Yes	HPN2BV	No	No
D49QM6	No	No	HT72TW	Yes	Yes
DUV2KQ	Inc	Inc	HTN8U9	Yes	Yes
DVFDRC	No	No	HZBW6	No	No

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
J8QWTU	Inc	Inc	NCN42K	Inc	Inc
J94Q9U	No	No	NDGZNT	No	No
JCGBB9	No	No	NEPEQR	Inc	Inc
JFFRLH	No	No	NL7RPR	Yes	Yes
K4LQQT	Inc	Inc	NMJFAQ	Inc	Inc
KBGUCG	No	No	NR2FQR	No	No
KHKUTY	Inc	Inc	NWP3HR	No	No
KJCXFE	No	No	NYDG4F	No	No
KN7M6X	Inc	Inc	P4MDN9	Inc	Inc
KP38PC	No	No	P6YV9D	No	No
KQVUPV	Inc	Inc	PDUTYM	No	No
KRTBJJ	No	No	PJ3ABW	No	No
KW2UJX	No	No	PRVPVU	No	No
L4FX46	No	No	PUJWKW	Inc	Inc
LA4D2N	No	No	PXJEDH	No	No
LBX9G7	Inc	Inc	Q3A4DL	No	No
LF6WTL	No	No	Q3Rxcb	Inc	Inc
LWWPLZ	No	No	Q8YJ3T	No	No
M8VRHG	No	No	Q9WWMZ	Inc	Inc
MBDRYH	Inc	Inc	Q9YGJG	No	No
MV6UYR	Inc	Inc	QAQD7P	Inc	Inc
MYGYBR	Inc	Inc	QFCDFB	No	No
N8QPAN	No	No	QGRP2L	No	No
N8RH8W	Inc	Inc	QMDPDT	No	No

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
R6TFRH	No	No	V6JHAH	No	No
R8GRQN	No	No	V6KH6C	No	No
R8UNRL	No	No	V9HYFK	Yes	Yes
REZDFL	No	No	V9JT3W	No	No
RLYM6Y	No	No	VDU4T7	No	No
RQ9ZNJ	Inc	Inc	VEL384	Inc	Inc
RR4JLD	No	No	VGEP8M	Inc	Inc
RXUXBK	No	No	VMHTWK	No	No
T4CNC7	No	No	VWMM8D	No	No
T6Q7FC	No	No	W3PFEE	No	No
T72VW3	No	No	WD9NLF	No	No
T74KYE	No	No	WMFK4R	Inc	Inc
TG7X4L	No	No	WNPHQG	Inc	Inc
TK6CNQ	No	No	WUFR2F	No	No
TMQ3U2	No	No	WUXZRV	No	No
TPCZ4D	No	No	WUZLNB	No	No
TUNPNL	Inc	Inc	X6TCXG	No	No
TXLBD4	Inc	Inc	XLUBNW	No	No
U4AB7P	Yes	Yes	XVPAGQ	No	No
U66RPD	Inc	Inc	Y7YBA2	No	No
U8QG6K	Inc	Inc	YAH7EE	Inc	Inc
U93HMC	No	No	YAWUCZ	No	No
UNTK4G	Yes	Yes	YHBLYC	No	No
UYFENQ	Inc	Inc	YLVNQH	Inc	Inc

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
YMPAJA	No	No			
Z7XTTH	No	No			
ZAX2YD	No	No			
ZJ22QZ	No	No			
ZKBBGC	No	No			
ZMJG3D	No	No			
ZXQWAK	Inc	Inc			
ZXZB9E	No	No			

Response Summary		Total Participants: 194	
<i>Did the questioned chisel from the suspect (Item 1) cause the damage to either of the wall plates containing questioned toolmarks (Items 2 and/or 3)?</i>			
Responses		<u>ITEM 2</u>	<u>ITEM 3</u>
	Yes	12 (6.2%)	12 (6.2%)
	No	122 (62.9%)	122 (62.9%)
	Inc	60 (30.9%)	60 (30.9%)

Conclusions

TABLE 2

WebCode	Conclusions
2KVAA4	Item 1 is a chisel with a blade width of approximately 1/2 inch. Items 2 and 3 are wall plates that each have a toolmarked defect that measures approximately 1/2 inch in width. Based on agreement of class characteristics, the Items 2 and 3 were compared to each other and to test toolmarks produced using the Item 1 chisel. The defects on Items 2 and 3 were identified as having been produced by the same tool. This identification is to the practical, not absolute, exclusion of all other tools. Due to insufficient agreement of individual characteristics, but not sufficient disagreement for elimination, the Item 1 chisel can neither be identified to nor eliminated as having been the tool that produced the defects to Items 2 and 3 wall plates
2LNVAL	The toolmarks in the wall plates (Items 2 & 3) were microscopically compared to test toolmarks made with the submitted chisel (Item 1) and to each other with the following result: The toolmarks in the wall plates were identified as having been made by a single tool. In its current condition, the chisel was eliminated as having made these tool marks.
2XGGBB	Damages on item 2 and 3 are not made with the item 1 (chisel).
2Z443D	Microscopic examination and comparison of the test tool marks produced by the chisel (item # 1) with the tool marks on the wall plates (items # 2 and 3) reveals that the test tool marks of the chisel (item # 1) cannot be identified nor eliminated as producing the tool marks found on the wall plates (items # 2 and 3). The results are therefore inconclusive. Microscopic examination and comparison of the tool mark on the wall plate (item # 2) with the tool mark on the wall plate (item # 3) reveals that these two tool marks were produced by the same tool. It is thought that the tool which produced these tool marks is a chisel. Neither of the tool marks on the wall plates (items # 2 and) can be matched with the test marks made with the chisel (item # 1), and they cannot be eliminated from being produced by the chisel (item # 1).
3CFQQ4	The damaged, tool-marked areas on Item 2 and Item 3 were caused by the same tool. I could not determine if the chisel, Item 1, did/did not produce the damaged, tool-marked areas on Item 2 and Item 3.
3DPXVH	I compared the individual and class characteristics markings on the wall plates mentioned in paragraph 3.1.2 with the test mentioned in paragraph 5 using a microscope and found: 6.1 The marks on the wall plates mentioned in paragraph 3.1.2 were produced by the same tool. 6.2 It cannot be determined if the marks on the wall plates mentioned in paragraph 3.1.2 were or were not produced by the chisel mentioned in paragraph 3.1.1.
3DRKEG	The toolmarks on the Items 01-02 and 01-03 wall plates were made by same unknown tool. The toolmarks on the Items 01-02 and 01-03 wall plates are unable to be identified or eliminated as having been made by the Item 01-01 chisel due to a lack of reproducible marks.
3ELBFP	Test tool marks produced from the chisel in Item 001-01 were microscopically examined in conjunction with the test tool marks present on Items 001-02 and 001-03. Based on these comparative examinations, the following was determined: The tool marks present on Items 001-02 and 001-03 bear similar class characteristics as test tool marks created using Item 001-01; however, no individual characteristics were observed to identify the tool marks on Items 001-02 and 001-03 as having been produced by the Item 001-01 chisel, based on its current condition.
3ENVC6	Item #2: The tool mark on the wall plate was compared to the test exemplars obtained from the chisel, Item #1. Differences in individual tool mark signatures were observed to conclude that the tool mark on the wall panel was not made by the chisel. Item #3: The tool mark on the wall plate was compared to the test exemplars obtained from the chisel, Item #1. Differences in individual tool mark signatures were observed to conclude that the tool mark on the wall panel was not made by the chisel.
3LJVNC	Test toolmarks from Item 1 were microscopically examined with the toolmarks on Item 2 and Item 3. Based on these comparative examinations it was determined that: A) The toolmarks on Item 2 and Item 3 had been produced by the same tool. B) The toolmarks on Item 2 and Item 3 bear the same

TABLE 2

WebCode	Conclusions
	class characteristics and some individual characteristics as the test toolmarks from Item 1. However, these similarities are insufficient for a more conclusive examination.
3UHMVK	1) Examinations showed that the tool marks present on Item 2 were not made by Item 1 due to differences in individual characteristics. 2) Examinations showed that the tool marks present on Item 3 were not made by Item 1 due to differences in individual characteristics. 3) Examinations showed that the tool marks present on Items 2 and 3 were made by the same unknown tool.
3V9QHZ	As a result of the macroscopic and microscopic comparison it is certain that the questioned toolmarks present on both submitted wall plates (marked as "Item 2" and "Item 3") have not been produced by the questioned chisel recovered from suspect (marked as "Item 1").
3XE8WJ	Item 1 is a metal chisel, Mayhew brand, and is a bladed-type tool employing a cutting action. Test marks were produced using the Item 1 chisel and designated as 001-T1A 001-T2A 001-T1B, 001-T2B, 001-T3A and 001-T3B. Items 2 and 3 were examined for the presence of toolmarks, and toolmarks of value were found. These toolmarks were microscopically compared. There is an agreement of all discernible class characteristics and sufficient agreement of individual characteristics to identify the toolmarks on Exhibit 2 and 3 as having been produced by the same tool. Items 2 and 3 were microscopically compared to the Item 1 test marks. There is an agreement of all discernible class characteristics, however there is insufficient agreement of individual characteristics to identify or eliminate the Item 1 tool as having produced the toolmarks on Items 2 and 3.
3Z4G97	Item 1 did not produce the toolmarks noted on Items 2 and 3. The toolmarks noted on Items 2 and 3 were produced by the same tool.
3ZKRKJ	Microscopic comparison of the toolmark on Submission #2 to the toolmark on Submission #3 revealed sufficient corresponding individual characteristics to conclude an identification. Therefore, the toolmarks on Submissions #2 and #3 were created using the same tool. Microscopic comparison of the test toolmarks made with Submission #1 to the toolmarks in Submissions #2 and #3 revealed similar class characteristics but no identification was made. Therefore, Submission #1 could not be identified or excluded as the tool that made the marks on Submissions #2 and #3.
4DKXB9	A microscopic comparative examination of Item's #1, #2, and #3 disclosed that the toolmarks on Item #1 and Item #2 were made by the same tool. These toolmarks were not made by the Item #1 chisel.
4RKRM3	Based on a difference in class characteristics, Item 1 was eliminated as having been used to mark Items 2 & 3. Items 2 and 3 were identified as having been marked with the same unknown tool.
4XQ9CQ	After examining item2 and item3 with microscopes, they were found to have a correspondence in the blade mark. Wall plate in original packaging were made by the chisel(item1) in a test mark. The test mark compared with item2 and item3 repeatedly. As a result, it was concluded that all of them have a correspondence in the blade mark.
64VLF8	The Item 1 chisel could neither be identified nor eliminated, as having made the marks on Items 2 and 3.
67H833	Upon comparison, I found that the characteristic toolmarks on Item 2 and Item 3 were not match with those on the marks made by Item 1 (the chisel). Therefore, I am of the opinion that the toolmarks on Item 2 and Item 3 were not made by Item 1.
6RLT7F	3. On 2016-10-05 during the performance of my official duties I received a sealed evidence bag with number PA4001435111 from Case Administration of the Ballistics Section containing the following exhibits: 3.1 One (1) chisel marked by me "380284/16 1". 3.2 One (1) wall plate, marked with blue paint, marked by me "380284/16 2". 3.3 One (1) wall plate, marked with red paint, marked by me "380284/16 3". 4. The intention and scope of this forensic examination comprise of the following: 4.1 Examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the chisel mentioned in paragraph 3.1 and made replications for test purposes, which were marked "380284/16T1" and "380284/16T2" respectively. 6. I compared the individual and class

TABLE 2

WebCode	Conclusions
	characteristics markings on the wall plates mentioned in paragraphs 3.2 and 3.3 as well as the tests mentioned in paragraph 5 and found: 6.1 The marks on the wall plates mentioned in paragraphs 3.2 and 3.3 were produced by the same tool. 6.2 The marks on the wall plates mentioned in paragraphs 3.2 and 3.3 were not produced by the chisel mentioned in paragraph 3.1.
6TT9F7	Exhibits marked Item 2 and Item 3 are positive with each other, however they are negative with the tool marked Item 1.
6TWNT8	The toolmarks on the face of Items #2 and #3 were made by the same tool. Items #2 and #3 could not be associated with Item #1 by the use of toolmarks. Item #1 was submitted for comparison purposes with Items #2 and #3.
6UPKFF	Toolmarks on Items 2 and 3 were compared microscopically with test toolmarks made using Item 1. These comparison results are Eliminations due to the quantity and quality of differing individual characteristics. Thus, it is the opinion of this Examiner that toolmarks on Items 2 and 3 were not made by Item 1.
7GYA7F	Exhibit 1 consists of one (1) Mayhew brand chisel, designed to employ a cutting tool action and bears marks of value for comparison. Test marks were obtained from Exhibit 1 and designated 1-T1 and 1-T2. The Exhibit 2 and 3 wall plates each have a cut that was produced by a cutting tool action and contains marks of value for comparison. Microscopic comparisons were conducted between Exhibits 2 and 3, to the test marks produced by Exhibit 1 with the following results noted below: - There is agreement of all discernible class characteristics and a sufficient agreement of individual characteristics to identify the toolmarks on Exhibits 2 and 3 as having been produced by the same tool. - Although similar in class characteristics, Exhibit 1 could neither be identified nor eliminated as having produced the toolmarks on Exhibits 2 and 3, due to a lack of sufficient individual microscopic marks.
7GZ8C6	Microscopic studies have shown that the tested traces are suitable for individual identification tool from which they originate. The study found that the two traces were derived from comparative chisel.
7TQZKR	MICROSCOPIC COMPARISONS OF EVIDENCE TOOLMARKS PRESENT ON ITEMS 2 AND 3 (WALL PLATES) AGAINST EACH OTHER AND WITH TEST TOOLMARKS CREATED WITH K1 SUSPECT CHISEL (ITEM 1) REVEAL THAT FOLLOWING: SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY THE TOOLMARKS PRESENT ON ITEMS 2 AND 3 AS HAVING BEEN MADE WITH THE SAME UNKNOWN TOOL. THE TOOLMARKS PRESENT ON ITEMS 2 AND 3 WERE NOT CREATED WITH K1 SUSPECT CHISEL (ITEM 1) DUE TO THE DIFFERENCE IN BLADE SIZE AND THE LACK OF AGREEMENT OF THE INDIVIDUAL CHARACTERISTICS. 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.
7U2KT2	Item 1 is a chisel. The chisel, item 1 was used to produce reference toolmarks. These reference toolmarks that were made, were microscopically compared to the toolmarks on the wall plates, items 2 and 3 with the following results: The toolmarks on the wall plates items 2 and 3 do not possess similar characteristics as those exhibited by the reference toolmarks created by the chisel, item 1. There is also a lack of matching individual microscopic details. The toolmarks/damage on the wall plates items 2 and 3 were eliminated as having been produced by the chisel, item 1.
864HXG	Test marks (1-2) obtained from item #1 (KT-1) were microscopically compared to the tool mark impressions on item #2 (QT-1) and item #3 (QT-2). Item #1 (KT-1) was excluded as having damaged items 2 (QT-1) and 3 (QT-2) based upon differing individual characteristics.
86Y3JV	The tool marks on Items 2 and 3 bear class characteristics consistent with those produced by the chisel in Item 1. However, due to insufficient reproducible individual characteristics the test marks on Items 2 and 3 cannot be positively included or excluded as having been made by the chisel in Item 1 to the

TABLE 2

WebCode	Conclusions
	exclusion of all other tools bearing the same class characteristics.
8AXA9Y	The tool mark on Laboratory Item 001.B (Item 2) the first wall plate recovered from the garage is eliminated as being made by Laboratory Item 001.A (Item 1) Mayhew brand chisel recovered from the suspect. The items are eliminated as to sharing a common source, because there is significant disagreement of discernible class characteristics and(or) individual characteristics. The tool mark on Laboratory Item 001.C (Item 3) the second wall plate recovered from the garage is eliminated as being made by Laboratory Item 001.A (Item 1) Mayhew brand chisel recovered from the suspect. The items are eliminated as to sharing a common source, because there is significant disagreement of discernible class characteristics and(or) individual characteristics. The tool mark on Laboratory Item 001.B (Item 2) the first wall plate recovered from the garage is identified as being made by the same tool as the tool mark on Laboratory Item 001.C (Item 3) the second wall plate recovered from the garage. 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.
8H7UMN	It was determined utilizing the stereomicroscope at various magnifications that the partial toolmark impressions from item 2 and item 3 exhibit sufficient characteristics to enable a comparison with known tools. It was determined utilizing comparison microscopic examination that the questioned impressions from item 2 and item 3 were not made by the item 1 tool.
8JGV82	The chisel Item 1 is inconclusive to Item 2 & 3. Item 2 & 3 is positive to each other (made by same instrument).
8JKFYB	The conclusion that I came to was that the marks on the wall plates marked Item 2 and Item 3 were not produced by the chisel marked Item 1. I made test using the chisel and some material as exhibits. The two wall plates are however positive with each other but negative with the chisel.
8P3Q97	On the two incriminated wall plates (Item 2, blue paint / Item 3, red paint)from the garage there could be toolmarks from a chisel observed. Based on our examinations the two incriminated toolmarks (Item 2 and Item 3) could be differentiated from the toolmarks of comparison of the suspect's chisel(Item 1). It can be therefore excluded that those incriminated toolmarks (Item 2 and 3)originate from the suspect's chisel (Item 1). However the two incriminated toolmarks (Item 2 and 3) could not be differentiated based on our analysis. They could therefore originate from the same tool (sharp-edged flat tool such as a chisel).
8QY8K3	The two damaged switch plates were compared to multiple test marks made with the submitted chisel with the following results: the marks on items 2 and 3 match each other and were made by the same tool. Both marks have the same class character (size/appearance) as the submitted chisel; however, they could not be specifically matched to item 1. Due to the inability to identify the exact angle and force used on the unknowns, the submitted chisel cannot be conclusively eliminated and the result is inconclusive.
979C98	Striations of wall plate using item 1 are same as striations of item 2 and item 3
986N7V	The chisel of item #1 was microscopically eliminated as having made the toolmarks observed on the wall plates of #2 and #3. The toolmarks on items #2 and #3 were microscopically identified as having been made by the same unknown tool.
9FF6H2	The damage on item 2 is definitely not caused by item 1. The damage on item 3 is definitely not caused by item 1.
9K9BW4	The tool (chisel, Item1) in it's current condition can be excluded.
9QZCJC	Exhibit 1 is a chisel, Mayhew brand, which employs a cutting type action. Test toolmarks were produced using the Exhibit 1 chisel and designated 1T1, 1T2 and 1T3. Exhibits 2 and 3 consist of two plastic wall plates with impressed and striated marks. These marks were examined for the presence of

TABLE 2

WebCode	Conclusions
	toolmarks, and toolmarks of value for comparison are present. These toolmarks were microscopically compared and there is agreement of all discernible class characteristics and sufficient agreement of individual characteristic to determine that these toolmarks were produced by the same tool employing a cutting type action. The Exhibit 2 and 3 striated toolmarks were microscopically compared to test toolmarks produced by the Exhibit 1 chisel. There is agreement of all discernible class characteristics; however, there is insufficient agreement of individual characteristics to identify or eliminate the toolmarks present on Exhibits 2 and 3 as having been produced by the Exhibit 1 chisel.
9XVG97	Exhibits marked 403034/16 Item 2 and 3 the marks on both items were produced by the same tool. The marks on the test wall plate are inconclusive to the marks on the wall plate marked item 2 and item 3.
A2DVFD	The toolmarks located on the two wall plates (Items 2 and 3) were examined and microscopically inter-compared along with test toolmarks made by the chisel (Item 1). Based on these microscopic exams, the following results were determined: The toolmarks on the two wall plates had both been made by a single tool. The toolmarks on the two wall plates had not been made by the submitted chisel.
AC9CYM	The tool mark in the Item 2 wall plate and the tool mark in the Item 3 wall plate are both eliminated as having been created by the Item 1 chisel. The tool mark in the Item 2 wall plate and the tool mark in the Item 3 wall plate are identified as having been created by the same unknown tool.
ADNBGQ	The questioned chisel from the suspect (Item 1) did not cause the damage to either of the wall plates containing questioned toolmarks (Items 2 and 3).
AUCNTX	I found the damages on the first wall plate recovered from the garage, i.e. Item 2 and the second wall plate recovered from the garage, i.e. Item 3 to have not been caused by the chisel recovered from the suspect, i.e. Item 1. However, I found the damages on both Item 2 and Item 3 to have been caused by a same tool.
AYKAGV	A microscopic examination and comparison of items #01.02 and #01.03 revealed the damaged area on both of the submitted wall plates had been made by the same unknown tool. A microscopic examination and comparison of laboratory produced tests using items #01.01 and #01.04 to items #01.02 and #01.03 revealed the submitted chisel did not produce the damaged areas on the two (2) submitted wall plates.
AYMRM7	Examinations showed that the tool marks present within Item 2 were not made by Item 1 due to differences in individual characteristics. Examinations showed that the tool marks present within Item 3 were not made by Item 1 due to differences in individual characteristics. Examinations showed that the tool marks present within Item 2 and Item 3 were made by the same unknown tool.
AZWW2U	Item 2 and Item 3 were made by the same tool. Item 2 and Item 3 could have been made by the Item 1 chisel based on class characteristics; however, there were no significant similarities to suggest that it was.
B8CWVX	The toolmarks on Items 2 and 3 were identified as having been made by the same tool, based on microscopic comparison and the correspondence of individual characteristics. The Item 1 chisel could not be identified or eliminated as having made the toolmarks on Items 2 and 3; however, differences in individual characteristics indicate another tool was used.
BBDQ7V	Detail within the impressions present on items 2 and 3 was found to differ from the test impressions produced by the submitted chisel. Therefore it is my opinion that the impressions in question have not been made by the submitted chisel, Item 1. Detail within the impressions present on items 2 and 3 was found to correspond with each other and it is my opinion that the same tool which bears damage to the tip edge has made these impressions.
BC7YXC	Test toolmarks obtained from the Item 1 chisel were compared to the questioned toolmarks on the Items 2 and 3 wall plates. Differences of individual characteristics confirmed the questioned toolmarks had not been made by the chisel. Sufficient agreement of class and individual characteristics

TABLE 2

WebCode	Conclusions
	confirmed the questioned toolmarks on the Items 2 and 3 wall plates had been made by the same tool.
BHTQ3K	There were significant disagreement of individual characteristics between the questioned toolmarks on the wall plates marked "Item 2" and Item 3" and the test marks made by the chisel marked "Item 1". Hence, the questioned toolmarks on the wall plates marked "Item 2" and "Item 3" were not made by the chisel marked "Item 1".
BHW7H7	The toolmarks on the two brown wall plates (2, 3) were produced by the same tool. The cold chisel (1) was neither eliminated no identified as having produced the toolmarks on the two brown wall plates (2, 3). There is agreement in all discernible class characteristics, but insufficient agreement in the individual characteristics to establish an identification.
BNH7RR	On the wall plates of the items 2 and 3 there are toolmarks which don't correspond in individual characteristics with test marks made with tool of the item 1. Toolmarks on the items 2 and 3 are not left by the tool of item 1.
BZBTZ8	The significance of tool mark is related directly of individuality of the tool edge that made the mark. Increasingly difficulty may be encountered in establishing individuality among tools that have been made with same machine tool. It is seldom difficult to reach a definite decision about the match of two marks if they have been made in a similar manner on similar material by the impact of the corresponding tool surface in corresponding position. It is the phase of the investigation that requires almost all of the time and much careful attention in comparing the toolmarks.
C237Z6	On 2016-10-03 during the performance of my official duties I received a sealed evidence bag with number PA4001435115 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) chisel marked by me "380319/16 1". 3.2 Two (2) wall plates marked by me "380319/16 2" and "380319/16 3" respectively. 4. The intention and scope of this forensic examination comprise of the following: 4.1 Microscopic individualization of tool marks. 4.2 Examination of tools and tool mark related materials. 5. I compared the individual and class characteristic markings on the wall plates mentioned in paragraph 3.2 using the comparison microscope and found: 5.1 The marks on the wall plates mentioned in paragraph 3.2 were produced by the same tool. 5.2 The marks on the wall plates mentioned in paragraph 3.2 were not produced by the chisel mentioned in paragraph 3.1.
CBBFR6	The marks on the wall plates and replications mentioned in 5.1 , 5.2 was produced by the chisel mentioned in 3.1.
CP8Y4L	MICROSCOPIC COMPARISON EXAMINATIONS OF ITEM 2 (Q1) AND ITEM 3 (Q2) AND TEST MARKS FROM ITEM 1 (K1) REVEALED; SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY THE TOOL MARKS ON ITEM 2 (Q1) AND ITEM 3 (Q2) AS HAVING BEEN MADE WITH THE SAME UNKNOWN TOOL. THE TOOL MARKS ON ITEM 2 (Q1) AND ITEM 3 (Q2) COULD NOT BE IDENTIFIED OR ELIMINATED AS HAVING BEEN MADE BY ITEM 1 (K1) DUE TO INSUFFICIENT AGREEMENT OF MICROSCOPIC MARKS PRESENT ON ITEM 2 (Q1) AND ITEM 3 (Q2) WITH THE TEST MARKS MADE BY ITEM 1 (K1). THEY ALL BEAR SIMILAR CLASS CHARACTERISTICS. 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.
CU69G9	Exhibit 1 is a "Mayhew USA" cold chisel measuring approximately six inches in length and having a cutting edge of approximately one half inch in length. Exhibit 2 has an impressed and striated toolmark located approximately off center (left) on the wall plate measuring approximately one half inch in length. Exhibit 3 has an impressed and striated toolmark located approximately off center (left) on the wall plate measuring approximately one half inch in length. Exhibits 2 and 3 were microscopically compared to each other. Based on an agreement of class characteristics and sufficient agreement of individual characteristics, the toolmarks on Exhibits 2 and 3 were made by the same

TABLE 2

WebCode	Conclusions
	<p>tool. Using Exhibit 1, test toolmarks were made in laboratory supplied lead (Exhibit 1.T1) and in the exemplar wall plate (Exhibit 1.T1.1) and were retained with the evidence. Casts were made using laboratory supplied material and were labeled Exhibits 2.T1, 3.T1 and 1.T1.2. Exhibit 2.T1 was microscopically compared to Exhibit 1.T1.2 Based on an agreement of class characteristics but a disagreement of individual characteristics, the toolmarks on Exhibits 2 and 3 were not made by the Exhibit 1 tool.</p>
CVW8V8	<p>The defects found in the two submitted wall plates (Items 2 and 3) were made by the same tool. Due to a similarity of class characteristics and a lack of matching marks/pattern areas of individual characteristics, Items 2 and 3 were unable to be eliminated or identified as having been made by the submitted chisel (Item 1).</p>
CWUHTV	<p>1. Exhibits 2 and 3 (Wall plates) were visually examined, and damaged areas were microscopically compared to each other and to test toolmarks (Exhibit 1.1) from Exhibit 1 (Chisel). a. Exhibits 2 and 3 were damaged by the same tool which has characteristics of a single bladed prying or striking tool, such as a chisel. b. Exhibit 1 did not make the marks on Exhibits 2 and 3. c. Any single bladed tools recovered during the course of this investigation that can be associated with a suspect may be submitted with Exhibits 2 and 3 for comparison.</p>
CWUKC9	<p>The marks containing by Item 2 and Item 3 was indeed transfer by the chisel in question; on other words chisel (tool) was used to vandalised the commercial garage and damage two wall plates in question.</p>
D49QM6	<p>3. On 2016-09-28 during the performance of my official duties I received a sealed evidence bag with number PA4001435112 from Case Administration of the Ballistics Section, containing the following: 3.1 One (1) inner CTS-Evidence sealed white container box, containing the following: 3.1.1 One (1) black Mayhew-brand chisel, marked by me with "380305/16 T1". The chisel was received, wrapped with bubble wrap and not marked. 3.1.2 One (1) brown tape-sealed envelope, marked "Test No. 16-529" and "Item 2", containing the following exhibit: 3.1.2.1 One (1) brown wall plate, marked by me with "380305/16 Item 2". 3.1.3 One (1) brown tape-sealed envelope, marked "Test No. 16-529" and "Item 3". 3.1.4 One (1) wall plate in original packaging, marked by me with "380305/16". 4. The intention and scope of this forensic examination comprise the following: 4.1 Microscopic individualization of tool marks. 4.2 Examination of tools and tool mark related materials. 5. I examined the wall plates mentioned in paragraphs 3.1.2.1 and 3.1.3.1 using a comparison microscope and found microscopic comparable marks which can possibly be utilized for individualization. 6. I examined the chisel mentioned in paragraph 3.1.1 and made imprints, marked by me as "305T1.1" and "305T1.2" for test purposes. 7. I compared the individual and class characteristic markings on the imprints, exhibits and tool mentioned in paragraphs 3.1.1, 3.1.2.1, 3.1.3.1 and 6 using a comparison microscope and found: 7.1 The imprint marks on the brown wall plates mentioned in paragraphs 3.1.2.1 and 3.1.3.1 were produced by the same tool. 7.2 The imprint marks on the brown wall plates mentioned in paragraphs 3.1.2.1 and 3.1.3.1 were not produced by the chisel mentioned in paragraph 3.1.1.</p>
DUV2KQ	<p>Toolmarks observed on items #2 and #3 (blank wall plates) are identified as having been produced by the same tool. Toolmarks observed on items #2 and #3 exhibit similar class characteristics as those produced by item #1 (Mayhew chisel); however, they are not identified or eliminated (inconclusive) as having been produced by item #1. The individual characteristics present do not display agreement.</p>
DVFDRC	<p>The impressed toolmarks on items 2 and 3 in exhibit T2 were not caused by the chisel in item 1 of exhibit T2.</p>
E78NAH	<p>When comparing foreign toolmarks to each other on cover plate CP-1 (Item #2) and CP-2 (Item 3), CP-1 (Item #2) and CP-2 (Item #3) foreign toolmarks were created by the same tool, however not from chisel C-1 (Item #1) due to differences in class and individual characteristics.</p>
E7NKYW	<p>I compared the individual and class characteristics markings on the wall plates using a comparison microscope and found: It cannot be determined if the marks on the wall plates were produced or were</p>

TABLE 2

WebCode	Conclusions
	not produced by the chisel.
EJFCKZ	Striation marks on first and second scratched wall plates(Item 2 and Item 3) are coincident with striation marks on scratched wall plate generated by the chisel(Item 1).
FA4M6T	1) Exhibit 1 (Chisel) can be used as a striking and/or scraping tool. Exhibit 1.1 (Test Standards) was created for comparison and is being returned with Exhibit 1. 2) Exhibits 2 (Wall Plate) and 3 (Wall Plate) was visually examined and microscopically compared to test toolmarks from Exhibit 1. a) The Exhibit 1 chisel did not cause the damage on the Exhibits 2 and 3 wall plates. b) The damage on the Exhibits 2 and 3 wall plates was caused by the same tool, and is consistent with an object being used as a striking and/or scraping tool.
FAKQTT	1. I examined the wall plates marked Item 2 and Item 3 using a comparison microscope and found microscopic comparable marks which can possibly be utilized for individualization. 2. I examined the chisel marked Item 1 and made replications for test purposes. 3. I compared the individual and class characteristic markings on Item 2, Item 3 and test replications made with Item 1 using a comparison microscope and found: 3.1 The marks on the wall plates marked Item 2 and Item 3 were produced by the same tool. 3.2 The marks on the wall plates marked Item 2 and Item 3 were not produced by the chisel marked Item 1.
FHEVPE	Both items 2 and 3 bearing toolmarks have same cathegorical and individual qualifications. But the damages on the items 2 and 3 are not caused by Item 1.
FK9FW8	Examinations showed that the Item 1 chisel did not make the marks on either, of the wall plates, Item 2 or Item 3.
FKNWR2	Item 1: One chisel, described as "...recovered from suspect". RESULTS: The Item 1 chisel was physically and microscopically examined. Item 1 was used to produce the Item 1.1 test specimens. Item 1.1: Test specimens produced using the Item 1 chisel using Laboratory supplied materials. RESULTS: Test specimens will be retained for a period of time and will then be returned to your Agency for long term storage as evidence. Item 2: One wall plate, described as "...recovered from the garage (blue paint)". Item 3: One wall plate, described as "...recovered from the garage (red paint)". RESULTS: The Item 2 and 3 wall plates were physically examined. The toolmarks found on Items 2 and 3 were microscopically examined and compared with each other and with test toolmarks produced by the Item 1 chisel. From these examinations and comparisons, it was concluded that: The toolmarks found on Items 2 and 3 were produced by the same tool based on matching individual identifying characteristics. The toolmarks found on Items 2 and 3 may be suitable for identification with that specific tool. The results of comparisons with test toolmarks produced by Item 1 and the toolmarks found on Items 2 and 3 were inconclusive due to insufficient corresponding individual identifying characteristics. It could not be determined whether the toolmarks on Items 2 and 3 were produced by Item 1 or by another similar tool.
FQ9YVW	[No Conclusions Reported.]
G268AT	In my opinion tool 1 can be eliminated from having made the impression on wall plate 2 and that on wall plate 3.
G2P63K	Examination of item 1 revealed one (1) sealed bubble wrap container containing one (1) Mayhew brand 1/2" chisel. Examination of item 2 revealed one (1) sealed paper envelope containing one (1) Pass & Seymour brand wall plate (brown in color) with one (1) toolmark observed on its face. Examination of item 3 revealed one (1) sealed paper envelope containing one (1) Pass & Seymour brand wall plate (brown in color) with one (1) toolmark observed on its face. Test impressions were obtained using the chisel (item 1) and compared to the toolmarks observed on items 2 & 3 with the following results: Items 2 & 3 revealed a general correspondence in class characteristics to the chisel (item 1) however, due to differences in individual characteristics the toolmarks observed on items 2 & 3 were eliminated as being created by the chisel (item 1). It should be noted that the toolmarks observed on items 2 & 3 were compared to each other and found to have been created by the same unknown tool.

TABLE 2

WebCode	Conclusions
G9A2C2	revealed two (2) plastic wall plates with toolmarks observed. Further examination of the toolmarks observed on Item #2 & #3 revealed they were created by the same tool. Examination of Item #4 revealed one (1) plastic wall plate in original packaging. Tests were obtained by using Item #1 & #4 and were compared to the toolmarks on Item #2 & #3 with the following results: Item #1 was not used to create the toolmarks on Item #2 & #3.
GAGKRN	The questioned toolmarks of the wall plates (Item 2 and 3) were not made by the questioned chisel from suspect (Item 1).
GJQVJN	Tool marks on the submitted wall plates (items 2 and 3) are identified as having been produced by a common source (slicing tool - possible chisel). Tool marks on the submitted wall plates (items 2 and 3) are not identified or eliminated (inconclusive result) as having been produced by the submitted chisel (item 1). The individual characteristics present do not display sufficient agreement.
GNKR7U	The marks on the wall plates marked 402990/16. Item 2 and Item 3 were produced by the same tool. The marks on the wall plates marked 402990/16. Item 2 and Item 3 were not produced by the chisel marked 402990/16 Item 1.
GTENVK	Tool marks observed on the two switch plates (Items 2 and 3) are identified as having been made by the same tool. Tool marks observed on the two switch plates (Items 2 and 3) are not identified or eliminated (Inconclusive) as having been produced by the submitted chisel (Item 1) the individual characteristics present do not display agreement. The identifiable individual characteristics present on items 2 and 3 suggest they were made by a different tool than item 1.
GYGRKJ	Item 1 is a Mayhew ½ inch taper-bladed edge chisel that employs a cutting/prying action. Item 2 and Item 3 are wall plates that contain toolmarks. Toolmarks present on the Item 2 and Item 3 wall plates were identified as having been produced by the same bladed tool. Due to a lack of sufficient corresponding microscopic marks of value, no conclusion could be reached as to whether the blade of the Item 1 chisel produced the toolmarks present on the Item 2 and Item 3 wall plates. Toolmarks present on the Item 2 and Item 3 wall plates share similar class characteristics to those produced by the Item 1 chisel and other similar tools that employ a cutting/prying/compressive action.
GZEY96	The tool marks on Items 2 and 3 were not made by Item 1. There is sufficient disagreement of surface contours to eliminate. Items 2 and 3 were made by the same tool as there is sufficient agreement of surface contours to identify to one another.
HAXYVR	3.1 Two wall plates and marked them 403000/16 (2) and (3) respectively. 3.2 One chisel and marked it 403000/16 (1). 4. The intention and scope of this forensic examination comprise the following: 4.1 Microscopic individualization of toolmarks. 4.2 Examination of tools and toolmark related materials. 5. I examined the chisel mentioned in 3.2 and made replications for test purposes and marked them 000T(1)A and 000T(1)B respectively. 6. I compared the individual and class characteristic markings on the wall plates mentioned in 3.1 and the tests mentioned 5 using a comparison microscope and found: 6.1 The marks on the wall plates mentioned in 3.1 were produced by the same tool. 6.2 The marks on the wall plates mentioned in 3.1 were not produced by the chisel mentioned in 3.2.
HKU6NQ	The marks on the wall plates marked 403028/16 Item 2 and Item 3 were produced by the same or one tool. The marks on the wall plates marked 403028/16 Item 2 and Item 3 were not produced by the chisel marked 403028/16 Item 1.
HPN2BV	The chisel, Item 1, was not used to make the marks on Item 2 or Item 3.
HT72TW	This lad made test marks by item 1 on the wall plate. The item 2 and item 3 are the same with test marks, these are same size, shape and striation. So, Item 2 and item 3 were made by item 1.
HTN8U9	The item 1 received, has been the tool used to cause the damage of plates codified as item 2 and item 3.
HZBW6	Examinations showed that the tool marks on Item 2 and on Item 3, were not produced by the Item 1 chisel.

TABLE 2

WebCode	Conclusions
J8QWTU	Tool Mark Analysis: Methodology - Comparison Microscopy. Comparisons between the tool mark on Items 2 and 3, the wall plates, and test marks made with Item 1, the chisel, were inconclusive due to insufficient corresponding individual microscopic characteristics. The tool mark on Item 2 and the tool mark on Item 3, the wall plates, were produced using the same tool based on corresponding class and individual microscopic characteristics.
J94Q9U	Item 1 had not caused the damage present in items 2 and 3. The same tool was identified as having made the damage in items 2 and 3, however it was not the tool of item 1.
JCGBB9	The chisel Item 1 did not cause the toolmarks on the wallplates Item 2 and Item 3. The toolmarks on Item 2 and Item 3 were probably caused by the same tool.
JFFRLH	#1 - #3 Test marks were made with Item #1. These tests were compared microscopically with the defects on Items #2 and #3. There is agreement in all discernible class characteristics. There is sufficient disagreement in individual characteristics for elimination. The defects on Items #2 and #3 were not made by the submitted tool, Item #1. Items #2 and #3. The defects on these (2) two items were compared microscopically with each other. There is agreement in all discernible class characteristics. There is sufficient agreement in individual characteristics for identification. The defects on Items #2 and #3 were made by the same tool however it was not the submitted tool, Item #1.
K4LQQT	Toolmark Analysis: Methodology - Comparison Microscopy. The toolmarks on Items 2 and 3, the wall plates, were made with the same tool, based upon corresponding class and individual microscopic characteristics. Comparisons between Items 2 and 3, the wall plates, to Item 1, the chisel, were inconclusive due to insufficient corresponding individual microscopic characteristics.
KBGUCG	The Item 2 and Item 3 toolmarks were not made by the Item 1 tool. This elimination is based on differences in individual characteristics. The Item 2 and Item 3 toolmarks were made by the same unknown flat blade action tool. This identification is based on sufficient agreement of the combination of individual characteristics and all discernible class characteristics. Any recovered tools of similar class may be submitted to the laboratory for comparison purposes.
KHKUTY	1.) The Item 2 & Item 3 toolmarks were made by the same tool. 2.) Due to a similarity in class characteristics between the Item 1 test toolmarks and the Item 2 and Item 3 toolmarks, but lacking in corresponding pattern areas of individual characteristics, the Item 2 and Item 3 toolmarks could neither be identified nor eliminated as having been made by the Item 1 tool.
KJCXFE	Upon comparison, I found that the characteristics toolmarks on item 2 (First wall plate recovered from the garage) and item 3 (second wall plate recovered from the garage) to be different with the characteristics toolmarks made by the item 1 (chisel recovered from suspect). Hence, I am of the opinion that the toolmarks on item 2 and item 3 were not made by the item 1.
KN7M6X	The toolmarks observed on items 2 and 3 were made by the same tool. The submitted cold chisel, item 1, was unable to be identified or eliminated as having made the toolmarks on items 2 or 3 due to insufficient corresponding individual characteristics and similar class characteristics.
KP38PC	Toolmarks observed on both wall plates, items # 2 and # 3, were produced by the same tool. However, these toolmarks have not been produced by the chisel, item # 1.
KQVUPV	The toolmarks present on Items 2 and 3 were microscopically examined in conjunction with one another, and with test toolmarks produced by Item 1. Based on these comparative examinations, it was determined that: A. The toolmarks present on Items 2 and 3 had been produced by the same tool. B. The toolmarks present on Items 2 and 3 bear the same class characteristics as test toolmarks produced by Item 1, but bear insufficient similar markings to identify them as having been produced by Item 1 (chisel). This is an inconclusive result.
KRTBJJ	Microscopic comparison was conducted of Item #1 (chisel) against Items #2 & #3 with the following results: Item #1 did not produce the toolmarks on Items # 2 & 3, however, the toolmarks on Items 2 & 3 were produced by the same tool (not submitted).

TABLE 2

WebCode	Conclusions
KW2UJX	<p>number PA4001435114 from Case Administration of the Ballistics Section, containing the following: 3.1 One (1) sealed cardboard box marked "Test No. 16-529: Toolmarks Examination", containing the following: 3.1.1 One (1) chisel marked "Test No. 16-529 Item 1" marked by me "380292/16 1". 3.1.2 One (1) envelope marked "Test No. 16-529 Item 2", containing the following exhibit: 3.1.2.1 One (1) wall plate with blue paint marked by me "380292/16 2". 3.1.3 One (1) envelope marked "Test No. 16-529 Item 3", containing the following exhibit: 3.1.3.1 One (1) wall plate with red paint marked by me "380292/16 3". 3.1.4 One (1) unmarked wall plate marked by me "380292/16 Test 1". 4. The intention and scope of this forensic examination comprise of the following: 4.1 Examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the chisel mentioned in paragraph 3.1.1 and made replications for test purposes using the wall plate mentioned in paragraph 3.1.4 which were marked by me "380292/16" each and Test "1" to "12" respectively. 6. I compared the individual and class characteristic markings on the wall plates mentioned in paragraphs 3.1.2.1, 3.1.3.1 and paragraph 5 using a comparison microscope and found: 6.1 The marks on the wall plates mentioned in paragraphs 3.1.2.1 and 3.1.3.1 were produced by the same tool. 6.2 The chisel mentioned in paragraph 3.1.1 is not the same tool that produced the marks on the wall plates mentioned in paragraphs 3.1.2.1 and 3.1.3.1.</p>
L4FX46	<p>In my opinion, the marks on items 2 and 3 were not made by the chisel, Item 1.</p>
LA4D2N	<p>The toolmarks observed in the two plastic backing plates (Item 2 & 3) were not made by the submitted chisel (Item 1).</p>
LBX9G7	<p>Items 001-02 and 001-03 were microscopically examined for the presence of toolmarks which were found. Toolmarks are consistent with those commonly encountered as a flat bladed tool such as a chisel. Test toolmarks from 001-01 (chisel) were produced and microscopically examined in conjunction with toolmarks from Items 001-02 and 001-03. Based on these comparative examinations it was determined that: A. Items 001-02 and 001-03 toolmarks were produced by the same tool. B. Test toolmarks from Item 001-01 have similar class characteristics as toolmarks from Items 001-02 and 001-03, however, there are no markings found to link Item 001-01 as having produced the markings on Items 001-02 and 001-03 wall plates.</p>
LF6WTL	<p>The marks on the wall plates marked 403006/16 (2) & (3) were produced by the same tool. The marks on the wall plates marked 403006/16 (2) & (3) were not produced by the chisel marked 403006/16 (1).</p>
LWWPLZ	<p>The toolmarks on Exhibits 2 and 3 were microscopically compared, and they were identified as having been made by the same tool. The toolmark on Exhibit 2 was microscopically compared with the test toolmarks from Exhibit 1 and there is significant disagreement of individual characteristics. Therefore, the toolmarks on Exhibit 2 and 3 were not produced by Exhibit 1, the Mayhew chisel.</p>
M8VRHG	<p>Microscopic comparison was conducted with the following results: Wall plate WP1 (Item #2) and wall plate WP2 (Item #3) were damaged by the same tool, not tool T1 (Item #1).</p>
MBDRYH	<p>Tool marks observed on the submitted wall plates (Items 2 and 3) are identified as having been made by the same tool. Tool marks observed on the submitted wall plates (Items 2 and 3) are not identified or eliminated (inconclusive) as having been made by the submitted chisel (Item 1). The individual characteristics present do not display sufficient agreement.</p>
MV6UYR	<p>I examined casts made from toolmarks on Items 2 and 3 and compared them to toolmarks made on exemplar material using Item 1 (Chisel). All three Items possess similar class characteristics. Items 2 & 3 are matched to each other and were produced by the same working edge of the same tool. Item 1 could not be matched to Items 2 & 3 and I report an inconclusive conclusion. Although there is no matching of individual characteristics I cannot rule out that the working surface of the chisel (Item 1) has been altered between the time of the offence and the time it was seized.</p>
MYGYBR	<p>The wall plates in Items 2 and 3 were examined with test marks produced using the chisel in Item 1. Based on these examinations it was determined that: A) The marks on Items 2 and 3 were produced by the same tool. B) Test marks from Item 1 bear the same class characteristics and some similar</p>

TABLE 2

WebCode	Conclusions
	individual characteristics as Items 2 and 3. However, the lack of sufficient individual characteristics precludes a more conclusive identification.
N8QPAN	Tools, like the submitted chisel, have individual surface-features, due to their manufacturing process and use. These surface-features can be transferred onto objects that are worked with the tool. If toolmarks shows sufficient details that were caused by the corresponding Individual structures of the tool, the tool can be identified to have caused the toolmarks. Due to Individual features in the submitted toolmarks, it can be excluded that the toolmarks on Item 2 and Item 3 were caused by the chisel Item 1.
N8RH8W	Exhibits 2 and 3 each contains an impression produced by a beveled bladed cutting tool(s) with class characteristics similar to those contained in Exhibit 1. The Exhibit 2 and 3 impressions as well as impressions taken of Exhibit 1, designated 1-T1 and 1-T2, were microscopically inter-compared. These comparisons determined that the impressions in Exhibits 2 and 3 were produced by the same tool. However, due to the lack of sufficient, corresponding individual toolmarks of value, no conclusions could be made as to whether or not the Exhibit 2 and 3 impressions were produced by Exhibit 1.
NCN42K	The toolmarks in Item 2 and Item 3 were made by the same tool. The specific type of suspect tool is unknown at this time. Items 2 or 3 could not be identified or eliminated to the submitted chisel (Item 1).
NDGZNT	Item: 1 One chisel described as "...recovered from suspect". RESULTS: Item 1 was physically and microscopically examined. Item 1 was used to produce the Item 1.1 test specimens. Item: 1.1 Test specimens produced using the Item 1 chisel using Laboratory supplied materials. RESULTS: The Item 1.1 test specimens will be retained for a period of time and will then be returned to your Agency for long term storage as evidence. Item: 2 One wall plate described as "...recovered from the garage (blue paint)". Item: 3 One wall plate described as "...recovered from the garage (red paint)". RESULTS: Items 2 and 3 were physically and microscopically examined and microscopically compared with each other and with test specimens produced using the Item 1 chisel with the following conclusions: Matching individual identifying characteristics were found and it was concluded that the tool marks present on Items 2 and 3 were made by the same tool. These tool marks may be suitable for identification. Sufficient differences in individual identifying characteristics were found to conclude that the tool marks present on Items 2 and 3 were not made by the Item 1 chisel.
NEPEQR	Item 2 & 3 are inconclusive to each other and also inconclusive to tests 403033/16 A & B. Reason insufficient marks.
NL7RPR	We observed an excellent correspondence of tollmarks between the cut surfaces of the submitted two wall plates(Item2, 3) and the cut surface of the wall plate made by the chisel(Item1). In our opinion, this correspondence means that the chisel recovered from the suspect(Item1) was used to cut the wall plates(Item2, 3).
NMJFAQ	Examination of Items #2 and #3 revealed the presence of striated toolmarks that had been produced by a single-bladed cutting/prying tool. Using the chisel in Item #1, test toolmarks were produced. These test toolmarks were microscopically examined in conjunction with the toolmarks present on Items #2 and #3. Based on these comparative examinations, it was determined that: A. The toolmarks present on Items #2 and #3 had both been produced by the same unknown tool. B. The toolmarks present on Items #2 and #3 bear the same class characteristics as test toolmarks produced by Item #1. However no similar individual characteristics were found to link these toolmarks as having been produced by the chisel in Item #1.
NR2FQR	1. Examinations showed the tool marks present on Item 2 and Item 3 were made by the same unknown tool. 2. Examinations showed the tool marks present on Item 2 and Item 3 were not made by Item 1.
NWP3HR	[No Conclusions Reported.]
NYDG4F	Microscopic comparison was conducted with the following results: Defect toolmarks noted on (Items

TABLE 2

WebCode	Conclusions
	#2 & 3) Brown Plastic Blank wall plates were produced by the same tool, however not the submitted chisel (Item #1).
P4MDN9	Item 1 is a steel chisel displaying the trade name "Mayhew", which uses a scraping, impressed and/or prying type action. The Items 2 and 3 are plastic wall plates. The toolmarks present on the wall plates were identified as having been produced by the same tool. Due to a lack of sufficient corresponding microscopic marks of value, no conclusion could be reached as to whether the toolmarks present on the Items 2 and 3 wall plates were created by the Item 1 chisel.
P6YV9D	Item 1 was eliminated as having made the toolmarks found on Items 2 and 3 based on differences in individual characteristics.
PDUTYM	compression microscope examination revealed that: 1- the wall plates in item 2 and item 3 has the same definite tool marks and one tool used in making them. 2- the chisel recovered from the suspect not use in making damage in any of wall plates submitted in items 2 & 3.
PJ3ABW	The toolmarks on Exhibits 2 and 3 were microscopically compared, and they were identified as having been made by the same tool. The toolmark of Exhibit 2 was microscopically compared with the test toolmarks from Exhibit 1, and the toolmarks were significantly different. Therefore, the toolmarks on Exhibits 2 and 3 were eliminated having been made by Exhibit 1.
PRVPVU	The marks on the wall-plates marked as Item 2 (blue paint) and Item 3 (red paint), were not produced by the chisel marked as Item 1 (recovered from suspect).
PUJWKW	Examination of Exhibits 2 and 3 disclosed a damaged area near the center of each wall plate. The damage is consistent with being produced by a flat bladed striking tool, such as a chisel or similar type tool. Microscopic examination disclosed toolmarks with sufficient individual characteristics for comparison purposes. Casts of the toolmarks were created and designated 2.T1 and 3.T1, respectively. Microscopic comparison disclosed sufficient agreement of class and individual characteristics to conclude that the toolmarks on Exhibits 2 and 3 were produced by the same tool. Exhibit 1 is a Mayhew brand cold chisel. Using Exhibit 1, multiple test toolmarks were created in lead sheet material (designated 1.T1) and a wall plate supplied as exemplar material (designated 1.T2). Casts of the test toolmarks in the wall plate were also created and designated 1.T2.1 through 1.T2.4. The toolmarks on Exhibits 2 and 3 were microscopically compared to test toolmarks from the Exhibit 1 chisel. Based on an agreement of class characteristics, but disagreement of individual characteristics, Exhibit 1 could not be identified, nor eliminated, as having produced the questioned toolmarks on Exhibits 2 and 3. Should additional tools similar in design to Exhibit 1 be seized during the course of this investigation, submit the questioned tool along with Exhibits 2 and 3 for a comparison examination.
PXJEDH	On examination and comparison, I found that the characteristic marking of both 'Item 2' and 'Item 3' to be dissimilar with the characteristic marking produced by chisel 'Item 1'. Hence, I am of the opinion that both marks 'Item 2' and 'Item 3' were not produced by the chisel 'Item 1'.
Q3A4DL	The chisel (item 1) did not produce the questioned tool marks on item 2 and item 3 (wall plates)
Q3RXC B	Tool marks observed on the submitted switchbox covers, (Items 2 & 3) are identified as having been produced by the same tool. Tool marks observed on the submitted switchbox covers, (Items 2 & 3) are not identified or eliminated (Inconclusive) as having been produced by the submitted chisel (Item 1). The individual characteristics present do not display sufficient agreement.
Q8YJ3T	3. On 2016-10-10 during the performance of my official duties I received a sealed evidence bag with number PA4001435113 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) Mayhew manufactured chisel marked by me "380279/16 Item 1". 3.2 Two (2) Pass & Seymour manufactured wall plates marked by me "380279/16 Item 2" and 380279/16 Item 3" respectively. 4. The intention and scope of this forensic examination comprise of the following: 4.1 Microscopic individualization of tool marks. 4.2 Examination of tools and tool mark related materials. 5. On 2016-10-10 during the examination I made repliset-castings of the marks in question on the wall plates mentioned in paragraph 3.2 and also made tests with the chisel mentioned in paragraph

TABLE 2

WebCode	Conclusions
	3.1 for microscope comparison purposes. 6. I compared the individual and class characteristic markings the repliset-castings mentioned in paragraph 5 using a comparison microscope and found: 6.1 The marks on the wall plates mentioned in paragraph 3.2 were produced by the same tool. 6.2 The marks on the wall plates mentioned in paragraph 3.2 were not produced by the chisel mentioned in paragraph 3.1
Q9WWMZ	The toolmarks from the Item 001-02 and Item 001-03 wall outlet covers were microscopically compared in conjunction with test toolmarks from the Item 001-01 tool. Based on these microscopic comparisons it was determined that the toolmarks on Items 001-02 and 001-03 were inconclusive as having been made by the Item 001-01 tool. Inconclusive based on insufficient agreement or disagreement of individual characteristics.
Q9YGJG	Elimination: The toolmark on Lab Item 2 was not made by the chisel Lab Item 1, based on microscopic comparison and significant disagreement of individual characteristics. Elimination: The toolmark on Lab Item 3 was not made by the chisel Lab Item 1, based on microscopic comparison and significant disagreement of individual characteristics. Identification: The toolmarks on Lab Items 2 & 3 were made by the same unknown tool, based on microscopic comparison and agreement of discernible class characteristics and sufficient matching individual detail.
QAQD7P	Examination of the blank wall plates in Items 2 and 3 revealed the presence of toolmarks consistent with having been produced by a single-bladed cutting tool such as a chisel. Test toolmarks from the chisel in Item 1 were microscopically examined in conjunction with the toolmarks on Items 2 and 3. Based on these comparative examinations and observed class and individual characteristics, it was determined that: A) The toolmarks present on Items 2 and 3 had both been produced by the same unknown tool. B) The toolmarks present on Items 2 and 3 bear the same class characteristics as test tool marks from the chisel in Item 1. However, there were insufficient similar individual characteristics on Items 2 and 3 to link them as having been produced by the chisel in Item 1.
QFCDFB	The chisel item 1 has not made the damage found in items 2 and 3
QGRP2L	The toolmarks on the wall plates in items 2 and 3 were not made by the chisel in item 1.
QMDPDT	Chisel Item 1 marked as 454779/16A1 was used to produce marks on the tests made by my self-using the wall plate which was marked by me 454779/16B1 and B2 and the Item 1 (chisel) was marked 1 and 2 on the sides. The exhibits item 2 and item 3 were marked as 454779/16A2 & A3. Under the microscope there were striated marks on the wall plate which was made by the impressed chisel. Exhibit Item 2 marked 454779/16 A2 and item 3 marked 454779/16A3 shows that they were produced by the same tool other than chisel (item 1) marked 454779/16A1.
R6TFRH	The toolmarks on the two plates were made by the same tool. However they were not made with de suspect's chisel. The recovered chisel can be excluded and is not the tool who made the damage on the plates.
R8GRQN	[No Conclusions Reported.]
R8UNRL	The questioned toolmarks on items 2 and 3 were produced by the same tool. The chisel, item 1, did not produce the questioned marks on items 2 and 3.
REZDFL	I conducted a comparative microscopic examination between the striated/impressed toolmarks present in the plastic wall plates (Items 2 and 3) and test toolmarks I prepared using the chisel (Item 1) in a similar plastic material. The results of my examination were as follows: The characteristics of the questioned toolmarks were of the same class as those that could be made by the submitted chisel in that they were thin, approximately 13mm wide and had been applied at an angle to the wall plate. Striations were present on one side of the impression which led into an impression, with displaced plastic material present in the direction the tool had moved towards during the creation of the mark. I then compared the individual characteristics present in the striated toolmarks leading into both the questioned marks and in the test made marks. During my comparison, I could find no correspondence of striated features beyond random matching, which might indicate either side of the chisel blade may

TABLE 2

WebCode	Conclusions
	have been responsible for making the marks in Items 2 and 3. The patterns of striae observed differed between the questioned marks and my test made marks. Given what was observed and taking into consideration the good condition of the chisel blade which had no defects or damage present, it is my opinion that the probability of this evidence given the chisel (Item 1) made the toolmarks in Items 2 and 3 is so low, I consider it a practical impossibility. Conversely, the probability of the evidence given another tool made the toolmarks is extremely high. Therefore in my opinion, the chisel (Item 1) did not make the toolmarks in Items 2 and 3. There was an overwhelming agreement of striated information in the same relative positions leading into the impressed toolmarks when Items 2 and 3 were compared. In my opinion, the probability of this evidence given the toolmarks in Items 2 and 3 were made by the same tool, is extremely high. Conversely, the probability of the evidence given different tools were used to make the toolmarks in Items 2 and 3 is so low I consider it a practical impossibility. Therefore in my opinion, the same tool was used to make the toolmarks in Items 2 and 3.
RLYM6Y	Comparison of the questioned marks on the Items 2 and 3 wall plates disclosed that both plates were damaged by the same tool. Test marks were made using the Item 1 chisel and they were compared to the questioned marks on Items 2 and 3. Item 1 in its present condition did not make the questioned marks on Items 2 and 3.
RQ9ZNJ	Toolmarks present in the Item 2 and Item 3 wall plates were identified as having been produced by the same tool. The Item 1 chisel produces the same class characteristics as seen in the toolmarks present in the Item 2 and Item 3 wall plates. However, due to a lack of sufficient corresponding microscopic marks of value, no conclusion could be reached as to whether the toolmarks present in the Item 2 and Item 3 wall plates were produced by the Item 1 chisel.
RR4JLD	Methodology: Tool Examination, Tool Marks Examination, Microscopic Examination and Microscopic Comparison Examination. Results: 1. The tool marks found in the wall plates, described in items 2 and 3, were produced by the same tool. Nov/10/2016 2. The tool mark found in the wall plate (blue paint), described in item 2, was not produced by the chisel described in item 1. Nov/10/2016 3. The tool mark found in the wall plate (red paint), described in item 3, was not produced by the chisel described in item 1.
RXUXBK	The tool-marks in the submitted wall plates (Items #2 & #3) were not made by the submitted chisel (Item #1)
T4CNC7	The detail on the wall plates items 2 + 3 was not made by the chisel item 1. There was a very significant degree of correspondence between the detail in items 2 + 3. This detail was made by the same tool but not the chisel item 1.
T6Q7FC	Sub#001-2 & 001-3 toolmarks were microscopically compared and identified as having been made by the same tool. Sub#001-2 & 001-3 toolmarks were microscopically compared to toolmarks made by the Sub#001-1 cold chisel and were eliminated as having been made by the Sub#001-1 cold chisel based on a difference in individual characteristics.
T72VW3	Item 1 is eliminated from having created the toolmarks on items 2 and 3. The toolmarks on items 2 and 3 are identified as having been created by the same unknown tool.
T74KYE	Based on the examination conducted, I found that the toolmarks on Item 2 and Item 3 (the wall plates) were not made by Item 1 (the chisel).
TG7X4L	Items 2 and 3 were made by the same tool, however a different tool was used on item 1
TK6CNQ	Items #1 (chisel with black oxide finish), #2 (item with toolmark) and Item #3 (item with toolmark) were examined and microscopically compared on 09/20/2016. Based on significant disagreement of discernible class characteristics and individual characteristics, Item #2 (brown wall plate with toolmark) and Item #3 (brown wall plate with toolmark) were eliminated as having been produced by Item #1 (chisel with black oxide finish). Items #2 (item with toolmark) and Item #3 (item with toolmark) were examined and microscopically compared on 09/20/2016. Based on agreement of all discernible class characteristics and sufficient agreement of individual characteristics, Item #2 (brown wall plate with toolmark) and Item #3 (brown wall plate with toolmark) were positively identified as

TABLE 2

WebCode	Conclusions
	having been produced by the same tool.
TMQ3U2	1. The toolmark on item 2 and 3 are valid for identification. 2. The toolmark on item 2 and 3 were created with the same tool (chisel). 3. The toolmark on item 2 and 3 are not created with chisel recovered from suspect.
TPCZ4D	The plastic wall plates (Item 2 and Item 3) were examined. One toolmark on each wall plate was observed. The toolmarks on Item 2 and Item 3 were microscopically compared to each other. Sufficient agreement in class and individual characteristics was observed to conclude that the toolmarks on the wall plates were made by the same tool. The chisel (Item 1) was examined. The chisel was used to make test toolmarks in lead and on a plastic wall plate. The test toolmarks were microscopically compared to the toolmarks on the wall plates (Item 2 and Item 3). Significant disagreement in individual characteristics was observed to conclude that the toolmarks on the wall plates (Item 2 and Item 3) were not made by the chisel, Item 1.
TUNPNL	Items #2 and #3 are two(2) brown wall plates which both have damage in the center area. The damage was caused by the same tool.
TXLBD4	Item 2 and Item 3, when compared to each other exhibit tool marks from the same tool, however, when compared against Item #1 exhibit insufficient corresponding microscopic markings for an identification
U4AB7P	I compared the individual and class characteristics markings on the wall plates mentioned in 3.2 and 3.3 with the replications made on the test sample mentioned in 5 using a comparison microscope and found: The marks on the wall plates mentioned in 3.2 and 3.3 were produced by the chisel mentioned in 3.1.
U66RPD	Exhibit 1 is a Mayhew brand chisel having a toolworking surface that is 1/2" in length. Test toolmarks were made using Exhibit 1 and laboratory supply lead sheets. An additional set of test toolmarks were made in the exemplar wall plate that was provided. The tests were retained with the evidence as Exhibits 1.T1 thru 1.T3. Both wall plates (Exhibits 1 and 2) have striated and impressed toolmarks, approximately 1/2" in length, located on their surface. The toolmarks on Exhibits 2 and 3 were microscopically intercompared. Based on an agreement of class characteristics and sufficient agreement of individual characteristics, Exhibits 2 and 3 were made by the same tool. A test toolmark from Exhibit 1 was microscopically compared to the toolmarks on Exhibits 2 and 3. The class characteristics of the submitted chisel agreed with the toolmarks on Exhibits 2 and 3. Some disagreement of individual characteristics was observed; however, the amount of disagreement was insufficient to eliminate the submitted chisel as having made the toolmarks on Exhibits 2 and 3.
U8QG6K	A microscopic comparative examination of the toolmarks on Item #2 and Item #3 disclosed that the markings were produced by the same unknown tool. A microscopic comparative examination of Item #1 against Item #2 and Item #3 disclosed that there were insufficient corresponding microscopic markings to permit a positive identification (Inconclusive).
U93HMC	All items were microscopically compared and upon comparison, I found that the characteristic marks on both damages to the wall plates (item 2 and 3) were not match with the characteristic marks on the test mark made from recovered chisel (item 1). Hence, I am of the opinion that both damages (item 2 and 3) were not from the questioned chisel (item 1).
UNTK4G	The signals of the ITEM 2 and ITEM 3 have been produced by the tool ITEM 1.
UYFENQ	Exhibit 1 is a flat chisel designed to cut with an approximately 1/2-inch wide cutting edge. Test toolmarks were produced using the Exhibit 1 chisel and designated 1-T1 through 1-T4. Exhibits 2 and 3 were microscopically examined for the presence of comparable toolmarks. Both Exhibits 2 and 3 were found to have toolmarks in the center area of each wall plate consistent with having been produced by a flat bladed tool with a tip approximately 1/2-inch wide. Microscopic comparisons were conducted between the toolmarks observed on the Exhibit 2 and 3 wall plates and the test toolmarks produced using the Exhibit 1 chisel, with the following results: - The toolmarks on Exhibits 2 and 3 were identified as having been produced by the same tool. - Though there is agreement of all

TABLE 2

WebCode	Conclusions
	discernible class characteristics, the Exhibit 1 chisel could not be identified or eliminated as having produced the toolmarks on the Exhibit 2 and 3 wall plates based on a lack of sufficient agreement or disagreement of individual characteristics.
V6JHAH	Examination of chisel from suspect revealed the impress of toolmark compared with Item 2 and Item 3, displayed no match founded tool mark impress.
V6KH6C	The questioned chisel from suspect (Item 1) did not cause the damage to either of the wall plates containing questioned toolmarks (Item 2 and 3).
V9HYFK	We observed an excellent correspondence of toolmarks between the cut surfaces of the submitted wall plates (Item 2, 3) and the cut surface of the wall plate made by chisel (Item 1). In our opinion, this correspondence means that the chisel was used to cut the wall plates (Item 2, 3).
V9JT3W	1) Once analyzed and compared the marks of items 2 and 3 we observe matches individualizing marks between them (2 and 3). It is for this reason that we determine that the marks observed in items 2 and 3 have been made by the same tool. 2) We observed similarities in class characteristics between the tool (item 1) and marks produced in items 2 and 3. 3) Analyzed and compared the marks of items 2 and 3 with the item studied as tool 1 we observe differences in the individualizing marks. For this reason we determine that the item studied as tool 1 has not produced marks in items 2 and 3.
VDU4T7	The toolmark on both wall plates (items 2 and 3) were produced by the same tool. Because of a difference in individual characteristics, the toolmark on both wall plates (items 2 and 3) could not have been produced by the chisel (item 1).
VEL384	Item 1 is a steel chisel displaying the trade name "Mayhew", which uses a scraping, impressed and/or prying type action. The Items 2 and 3 are plastic wall plates. The toolmarks present on the wall plates were identified as having been produced by the same tool. Due to a lack of sufficient corresponding microscopic marks of value, no conclusion could be reached as to whether the toolmarks present on the Items 2 and 3 wall plates were created by the Item 1 chisel.
VGEP8M	The submitted chisel was not identified or eliminated as having created the defects observed in the two submitted wall plates (1-02-AA and 1-03-AA) due to agreement in available class characteristics but a lack of consistent and repeatable marks. The defect observed in this wall plate (1-02-AA) was identified as having been made by the same tool as the defect observed in the other submitted wall plate (1-03-AA) due to consistent and repeatable marks; however, the defect was not identified or eliminated as having been created by the submitted chisel (1-01-AA) due to agreement in available class characteristics but a lack of consistent and repeatable marks. The defect observed in this wall plate (1-03-AA) was identified as having been made by the same tool as the defect observed in the other submitted wall plate (1-02-AA) due to consistent and repeatable marks; however, the defect was not identified or eliminated as having been created by the submitted chisel (1-01-AA) due to agreement in available class characteristics but a lack of consistent and repeatable marks.
VMHTWK	Examinations showed that Item 1 did not cause the damage present on Item 2 or Item 3.
VWMM8D	1. I examined the chisel marked Item 1 and made replication marks for test purposes. 2. I compared the class and individual characteristic markings on the wall plates marked Item 2 and Item 3 and test marks produced by Item 1 using a comparison microscope and found: 2.1 The marks on the wall plates marked Item 2 and Item 3 were not produced by the chisel marked Item 1. 2.2 The marks on the wall plates marked Item 2 and Item 3 were produced by the same tool.
W3PFEE	The evidence in items 1 - 3 was analyzed by physical and microscopic examination. The toolmarks present on the two (2) wall plates in items 2 and 3 were determined not to have been made by the chisel in item 1. The toolmarks present on the two (2) wall plates in items 2 and 3 were made by the same tool and further analysis is pending submission of another tool for additional comparison.
WD9NLF	The results of the examination extremely strongly support that the damage to wall plate Item 2 was not made by the chisel Item 1 (Level -4). The results of the examination extremely strongly support that the damage to wall plate Item 3 was not made by the chisel Item 1 (Level -4).

TABLE 2

WebCode	Conclusions
WMFK4R	Item 1.1 is a chisel. Items 1.2 and 1.3 are two wall plates with damage. The damage to Items 1.2 and 1.3 was microscopically compared to the tests made using Item 1.1 and to each other. The damage to Items 1.2 and 1.3 was identified as having been caused by the same tool. Item 1.1 could neither be identified nor eliminated as having caused the damage to Items 1.2 and 1.3 due to a lack of corresponding individual characteristics.
WNPHQG	Questioned tool marks on Items 2 and 3 wall plates were made by one tool. Item 1 chisel can neither be eliminated nor identified as having made the questioned tool marks on Items 2 and 3 due to a lack of reproducing individual characteristics; however, some class and individual characteristics were similar. The force and angle used in the making of the evidence marks could not be duplicated.
WUFR2F	Test toolmarks created using the Mayhew chisel, Item 1, were microscopically compared to the toolmarks exhibited on the wall plates, Items 2 and 3. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks exhibited on Items 2 and 3 were identified as having been created using the same tool. Based on significant disagreement of individual characteristics, the toolmarks exhibited on Items 2 and 3 could not have been created using the chisel, Item 1.
WUXZRV	The toolmarks on items 2 and 3 appeared to be set by a large screwdriver or similar tool. The toolmarks showed similarities with the chisel regarding shape and width. However, a closer microscopic comparison between both toolmarks (item 2 and 3) and marks made by item 1 revealed significant differences. These differences are in our opinion excluding. The marks on items 2 and 3 were however made by the same tool.
WUZLNB	The toolmarks on Items 2 and 3 were not produced using the Item 1 chisel. The toolmarks on Items 2 and 3 were identified as having been produced using the same unknown tool.
X6TCXG	meDefinitely not This expression is used when consistens discrepanciens have been proven. A hypotesis of identity or connection can be excluded.
XLUBNW	The chisel from the suspect (Item 1) is to eliminate (exclusion) for the both questioned toolmarks on the wall plates (Item 2 and Item 3).
XVPAGQ	Test impressions made from Item 1 were microscopically compared to Item 2 & Item 3. Item 1 was eliminated to Item 2 & Item 3 due to sufficient differences of individual characteristics in the striations.
Y7YBA2	Known test standards created with Item 1 (chisel) were microscopically compared to the tool marks on Items 2 and 3 (wall plates). It was determined that Item 1 (chisel) did not produce the tool marks on Items 2 and 3 (wall plates) due to agreement of class characteristics but disagreement of individual characteristics. The tool marks on Items 2 and 3 (wall plates) were created by the same tool due to sufficient agreement of class and individual characteristics.
YAH7EE	Test toolmarks produced by the chisel in item 001-01 were microscopically examined in conjunction with the toolmarks on the wall plates in items 001-02 and 001-03. Based on these comparative examinations it was determined that the toolmarks on items 001-02 and 001-03 could not be identified as having been produced by the chisel in item 001-01. Microscopic examination of the toolmarks on the wall plates in items 001-02 and 001-03 revealed insufficient matching individual characteristics to the test toolmarks from the chisel in item 001-01. Similar class characteristics indicate the toolmarks on the wall plates in items 001-02 and 001-03 could have been produced by the chisel in item 001-01 or any other tool with similar class characteristics. The toolmarks on the wall plates in items 001-02 and 001-03 were identified as having been produced by the same unknown tool. The wall plate in item 001-04 was submitted as test media.
YAWUCZ	Observed toolmarks on Item 2 and 3 have been produced by the same tools. Observed toolmarks on Item 2 and 3 have not been produced by chisel Item 1.
YHBLYC	Test toolmarks were created using the chisel, Item 1, and microscopically compared to the toolmarks exhibited on the plastic cover plates from Items 2 and 3. Based on a significant disagreement of individual characteristics, the toolmarks exhibited on the plastic cover plates, Items 2 and 3, could not

TABLE 2

WebCode	Conclusions
	have been created using the chisel, Item 1.
YLVNQH	The toolmark on each of the wall plates (items 01-02 and 01-03) were produced by a single unknown tool having class characteristics consistent with but not limited to those produced by chisels and screwdrivers. They were not identified to nor eliminated from having been produced by the chisel (item 01-01) due to class characteristic agreement without sufficient agreement of individual characteristics.
YMPAJA	The toolmarks on Item #2 and Item #3 were made by one tool based on class and individual characteristics. The specific type of suspect tool is unknown at this time; however, any suspect tool should be submitted to this laboratory for examination. Item #1 (blade A and blade B) did not make the toolmark on Item #2 or Item #3 based on differences in individual characteristics.
Z7XTTH	Item #1 (chisel), Item #2 (tool marked wall plate), and Item #3 (tool marked wall plate) were examined and microscopically compared on 09/23/2016. The toolmarks on Items #2 and #3 (two wall plates) were identified as having been created using the same tool. Based on agreement of class characteristics, but disagreement of individual characteristics, Item #1 (chisel) was eliminated as having created the toolmarks on Items #2 and #3 (two wall plates).
ZAX2YD	1. In the present condition of item 1 (chisel) as received for examination, item 2 was eliminated from having been struck by item 1 (chisel). 2. In the present condition of item 1 (chisel) as received for examination, item 3 was eliminated as having been struck by item 1 (chisel). 3. Item 2 and item 3 were identified as having been struck by the same chisel which was not submitted for examination.
ZJ22QZ	Item 1 is a chisel that bears the manufacture name of Mayhew. Due to a discernable difference in class characteristics, the Item 1 chisel was eliminated as having produced the toolmarks present in the Item 2 and Item 3 wall plates. However, due to sufficient agreement in the individual characteristics, the toolmarks present in the Item 2 and Item 3 wall plates were identified as having been produced by the same tool.
ZKBBGC	The toolmarks on items 2 and 3 were compared to test standards made using the item 1 chisel. Agreements of class characteristics were observed. However, sufficient disagreements of individual characteristics confirmed the toolmarks on items 2 and 3 were not made by the item 1 chisel.
ZMJG3D	1.A microscopic comparison revealed that the chisel (Item 1) recovered from the suspect was not used to create the toolmarks observed on either of the wall plates recovered from the garage (Item 2 and Item 3). 2.A microscopic comparison of the wall plates recovered from the garage (Item 2 and Item 3), revealed that the same unknown tool was used to create the toolmarks observed on both wall plates (Item 2 and Item 3).
ZXQWAK	Item 1 - One (1) Chisel Item 2 - One (1) Wall Plate (blue paint) Item 3 - One (1) Wall Plate (red paint) The submitted specimen marked as Item 1 was examined and identified as a chisel. The submitted specimens marked as Items 2 and 3 were examined and identified as two (2) brown wall plates 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, Items 2 and 3 could not be identified or eliminated as having been marked by Item 1 due to a lack of sufficient agreement of individual characteristics.
ZXZB9E	The toolmark damage to the items 2 and 3 wall plates were made by the same tool. The toolmarks on the items 2 and 3 wall plates were not made by the item 1 chisel.

Additional Comments

TABLE 3

WebCode	Additional Comments
2KVAA4	The comparison of the test toolmarks produced by the Item 1 chisel in comparison to the toolmarks present on Items 2 and 3 meet Criteria C from the Association of Firearm & Tool Mark Examiners definition of inconclusive. "Agreement of all discernible class characteristics and disagreement of individual characteristics, but insufficient for elimination."
2LNVAL	Not knowing the history of the chisel between the time the toolmarks were made and when the chisel was recovered, it can only be eliminated as it is in its submitted condition. Hence the inconclusive result.
2XGGBB	Damages on item 2 and 3 are made with the same tool.
2Z443D	The test tool marks produced by the chisel (item # 1) are the same general class characteristics as the tool marks on the wall plates (items # 2 and 3). However, the striae produced with the chisel (item # 1) do not exhibit the same striae pattern as the tool marks on the two wall plates. There are no class characteristics or size characteristics exhibited which would allow the chisel (item # 1) to be eliminated as the tool which produced the marks on the wall plates. Therefore, the results of this microscopic comparison test are inconclusive.
3CFQQ4	The toolmarks I created with Item 1 did not possess sufficient similarities/dis-similarity compared to the toolmarks on Item 2 and Item 3 for me to make an identification or elimination.
3DRKEG	Differences in patterns of individual characteristics were observed between the test marks made from the Item 01-01 chisel and the patterns within the toolmarks present on the Items 01-02 and 01-03 wall plates; however, the extent of these differences was insufficient for elimination.
3ELBFP	Test tool marks produced by the chisel bear similar class characteristics to the tool marks on the evidence wall plates. History of the chisel is unknown (alterations to working surface/use/abuse/etc), therefore, it can not be conclusively eliminated from having made the tool marks on Items 001-02 and 001-03 based on individual characteristics only.
3LJVNC	The individual characteristics present on Item 2 and Item 3 were sufficient to identify them as being produced by the same tool. Item 2 and Item 3 bear the same class characteristics as Item 1. However, there was not sufficient disagreement of individual characteristics to eliminate Item 1.
3V9QHZ	Toolmarks of the chisel for comparison have been produced using hard modeling wax. The comparison-toolmarks produced with the chisel ("Item 1") and the questioned toolmarks on the wall plates ("Item 2" and "Item 3") have been moulded using "AccuTrans" moulding material. The comparison has been performed with a comparative microscope.
3ZKRKJ	Due to the possibility of alteration on Sub. 1 from the time of the incident to the time of recovery, it can not be conclusively excluded. In the current condition, there is no indication Sub. 1 made the toolmarks on Subs. 2 & 3.
64VLF8	Subsequent use, misuse, improper handling or preservation of a tool or marked object may result in changes to the individual characteristics of the tool or marked surfaces, as imparted at the time of use, which may affect the possibility of future identification.
6TWNT8	The identification between Items #2 and #3 were made using impressed striated detail. Items #2 and #3 could not be associated with Item #1 by the use of toolmarks. A different tool may have been used. This examination is an Inconclusive C per AFTE. (Agreement of all discernable class characteristics and disagreement of individual characteristics, but insufficient for an elimination).
6UPKFF	Toolmarks on Items 2 and 3 were compared microscopically with each other. This comparison result is an Identification due to the sufficient quantity and quality of matching individual characteristics. Thus, it is the opinion of this Examiner that Items 2 and 3 were made by the same tool (that is not yet identified).
7GZ8C6	The research conducted using a stereo-microscope Leica M80 and a comparison microscope Leica

TABLE 3

WebCode	Additional Comments
	DMC.
7U2KT2	The damage to the wall plates items 2 and 3 were produced by the same tool.
864HXG	Items 2 and 3 were damaged by the same unknown tool.
86Y3JV	It was noted that the tool marks on Items 2 and 3 were made by the same tool. It is the policy of the [Laboratory] not to exclude on individual characteristics.
8AXA9Y	It would have been nice to have two wall plates to use for test marks instead of only one. That would have allowed for test to test microscopic comparisons using material similar to the submitted evidence.
8JGV82	See striae that corresponds but cannot line up all markings.
8QY8K3	Due to the inability to identify the exact angle and force used on the unknowns, the submitted chisel cannot be identified or eliminated and the result is inconclusive.
9K9BW4	The too marks (Item2, Item3) were made by the same tool.
ADNBGQ	The damage to either of the wall plates containing questioned toolmarks (Items 2 and 3) caused by the same chisel which is not the suspect chisel.
B8CWVX	The consistency in markings seen between Items 2 and 3 and from test to test strongly indicate that the Item 1 chisel was not the tool to make the evidence marks. However, all class characteristics are the same, and an elimination based solely on individual characteristics is not generally possible in tool mark analysis, especially when the time frame between crime and tool seizure is unknown.
BHTQ3K	There were agreement of discernible class characteristics (length and appearance) with no significant differences, and sufficient agreement of individual characteristics between the questioned striated toolmarks on the wall plates marked "Item 2" and "Item 3". Hence, they were very likely made by the same tool, such as a chisel.
BHW7H7	The Standard Operation Procedures for the Firearms and Toolmarks Section FTM-06-06, 7, 2 states: An insufficient correspondence of individual characteristics but a correspondence of class characteristics will lead the examiner to the conclusion that no identification or elimination was made with respect to the items examined.
BZBTZ8	If a tool has been used to move an object, scratch or injure a surface or to make any kind of impression on the object, there is at least a good chance that the tool can be identified.
CWUKC9	Chisel is in great condition; and was used to vandalise two wall plates.
DUV2KQ	In reference to the inconclusive statement pertaining to Items #2 and #3, [Laboratory] policy strictly prohibits elimination of evidence based solely on differences in individual characteristics. [Laboratory] policy only allows elimination of evidence when it exhibits differences in class characteristics.
E7NKYW	Although some marks correspond, there are also differences in the markings. Couldn't find good follow-up marks.
FKNWR2	The toolmarks found on Items 2 and 3 could be identified with each other based on matching individual identifying characteristics found in the marks themselves, but the results of comparisons with tests produced by the Item 1 chisel and the toolmarks found on Items 2 and 3 were inconclusive due to insufficient corresponding individual identifying characteristics found in the marks. Although some similarities were found in the marks found on Item 2, Item 3, and the Item 1 test specimens, there were not enough corresponding individual identifying characteristics to make an identification. By the same token, there were enough similarities so that Item 1 could not be readily negated from the possibility that it produced the toolmarks found on Items 2 and 3. Comparing the individual test specimens with each other was much more involved due to having only one wall plate submitted for the purpose of

TABLE 3

WebCode	Additional Comments
	producing test specimens. It would have been practical to have at least two wall plates for producing test specimens.
G268AT	Though the impressions on wall plate 2 and 3 were not made by tool 1, the impressions were, in my opinion, both made by the same tool.
GJQVJN	Laboratory procedures only allow for eliminations due to differences in class characteristics. Test marks from item 1 produced similar class characteristics as compared with items 2 and 3. Therefore, no elimination could be made.
GTENVK	Laboratory protocol prohibits eliminations being made on differing individual characteristics. The class characteristics are the same for the submitted tool (Item 1) and the damage sustained on the submitted switch plates (Items 2 and 3) although there is insufficient individual matching characteristics for identification. Also, elimination could not be made due to the fact that the tool may have been re-sharpened after the tool marks were made on items 2 and 3.
GYGRKJ	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 Laboratory's 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 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.
HKU6NQ	Marks on both exhibits wall plates are horizontal e.g. [participant provided a picture description that could not be reproduced in the report]. Marks on test wall plates are sloping or pointed slightly up e.g. [participant provided a picture description that could not be reproduced in the report].
HPN2BV	The same chisel was used to make the marks on Item 2 and Item 3.
J8QWTU	Test marks were made with Item 1, the chisel, using submitted and laboratory standard testing materials. The time of event to time of analysis factor was not provided in scenario.

TABLE 3

WebCode	Additional Comments
KJCXFE	However, the characteristics toolmarks on item 2 (First wall plate recovered from the garage) and item 3 (second wall plate recovered from the garage) to be similar to each other. Hence, I am of the opinion that the toolmarks on item 2 and item 3 were made by the same tool.
KN7M6X	For inconclusive reason, see section 2 opinion [Table 2: Conclusions].
KQVUPV	Because Item 1 had the same class characteristics as the toolmarks on Items 2 and 3, and the differences in individual characteristics were not sufficient to eliminate Item 1 from producing those toolmarks, and due to not knowing the history of Item 1, the reporting of an inconclusive result is conservative and in agreement with laboratory policy.
LA4D2N	The toolmarks observed in the two plastic backing plates (Item 2 & 3) were made by the same unknown tool.
LBX9G7	Similar class characteristics but with no individual characteristics observed from items 001-02 and 001-03 to the item 001-01 test toolmarks, a more conclusive identification could not be determined. The fact that the history of item 001-01 chisel's working surface can't be scientifically established an elimination could not stated.
LF6WTL	The marks on the wall plates are straight and curving while the marks on the tests are waving.
MBDRYH	Items 2 and 3 are identified as having been made by the same tool. However, toolmarks observed on Items 2 and 3 are inconclusive as having been made by Item 1 (chisel). The individual characteristics do not display sufficient agreement. Test marks could be identified to each other and there was some similarity observed in the toolmarks made with Item 1 between the toolmarks observed in Items 2 and 3. However, there was not sufficient agreement observed in order to make an identification. Casts were also made of all tool marks and compared to casts of the evidence. The conclusions were the same.
MV6UYR	Matching class characteristics and an unknown period of time between the offence and discovery of the tool must be reported as inconclusive.
MYGYBR	The individual characteristics on Items 2 and 3 were more than sufficient to identify them as being made from the same tool. Because Item 1 bears the same class characteristics as Items 2 and 3 and there was not a sufficient disagreement of individual characteristics, Item 1 could not be eliminated.
N8RH8W	Microscopic inter-comparisons determined that the impressions in Exhibits 2 and 3 were produced by the same tool. However, due to the lack of sufficient, corresponding individual toolmarks of value, no conclusions could be made as to whether or not the Exhibit 2 and 3 impressions were produced by Exhibit 1.
NCN42K	I do not think that this test is an accurate real world toolmark scenario. The light/wall plate is a poor substrate to reproduce toolmarks on. I had difficulty making test toolmarks in the substrate provided. The ones that I was able to make had poor detail. In the future provide additional wall plates.
NDGZNT	In order to perform this examination it is necessary to compare test specimens to each other to evaluate if the tool is marking consistently. It is also important to create test specimens varying the angle at which the tool is being applied as this can change the tool marks the tool produces. Also, since differences in the composition of the plastic can and does change the way the tool marks, it is important to use the same brand and line of wall plate for testing/comparison purposes. It would have been extremely helpful if: 1) CTS would have provided more than one wall plate for creating test specimens. 2) CTS would have selected a brand of wall plate that can readily be purchased at any local hardware store nationwide. In this participant's state, the Pass & Seymour Legrand line of wall plates can only be purchased at Lowes...as a special order. Since CTS also chose to use a brown in color wall plate, this makes it even more difficult to locate a similar wall plate to purchase since brown is not a popular color for stores to carry.
NMJFAQ	Items #2 and #3 were reported as inconclusive due to them bearing the same class characteristics as

TABLE 3

WebCode	Additional Comments
	the chisel in Item #1. Although no marks were found to link the toolmarks present on Items #2 and #3 as having been produced by the chisel in Item #1, this was insufficient for an exclusion.
P4MDN9	<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 FBI Laboratory's 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 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.</p>
P6YV9D	Items 2 and 3 were inter-compared and found to have been damaged by the same unknown tool, based on agreement of individual and class characteristics.
PUJWKW	<p>Considerations regarding not eliminating based on observed differences in individual characteristics: no known time-span between damage to Ex #2 & #3 wall plates and recovery of Ex #1 tool ; unknown if the raised "burr" on the apex of the tool working surface on Ex #1 has been worn through use -- this area appears to be a somewhat "fragile" and has a potential to rapidly change with use of the tool. Changes to this area would be expected to have a significant effect on the toolmark patterns it produces ; unknown if current surface finish is "original" or has been altered -- alteration to tool's working surfaces would be a relatively straightforward process ; As there is no basis for determining the likelihood that the tool was or was not altered between the time the wall plates were damaged and the recovery of the suspected tool, a change to the tool cannot be discounted. note: It is generally common knowledge that CTS does not alter tools subsequent to making "Questioned" toolmarks. However, to be "worked as normal casework" one must attempt to ignore this potentially biasing external information and not let it influence a conclusion based on the evidence. On an actual case, an elimination based on differences in individual characteristics would not be warranted.</p>
PXJEDH	On examination and comparison, I found that the characteristic marking of 'Item 2' to be similar to 'Item 3'. Hence, I am of the opinion that both marks 'Item 2' and 'Item 3' were produced by the same tool.

TABLE 3

WebCode	Additional Comments
Q3RXC	Test impressions obtained using Item 1 displayed good, consistent individual characteristics for identification to each other. Although the class characteristics observed with Item 1 and those present on Items 2 & 3 were consistent with each other, the individual characteristics present on test impressions from Item 1 and those present on Items 2 & 3 did not display sufficient agreement for identification. [Laboratory] Procedure does not allow an elimination based on individual characteristics alone.
Q9WWMZ	Inconclusive based on insufficient agreement or disagreement of individual characteristics.
QAQD7P	Although my report is inconclusive, I would tell the investigator/detective that my inclination was that this is not the chisel and he/she should keep looking for another chisel. I would also tell them that I couldn't say that for certain due to the lack of multiple toolmarks (I only have 2 chisel marks and would really need more toolmarks to get a good idea of what features are repeating and how the tool was used). For all of these reasons, my report would be written as inconclusive instead of an outright elimination for the chisel in Item 1.
QMDPDT	The marks produced by the impressed tool, were difficult to reproduce, depending on the amount of pressure, angle used and force applied on it. So this exercise was not that helpful because we don't know if the force applied was made by a hammer or what and which size?
R6TFRH	The chisel has "diagonal stress marks" on the top, while the toolmarks on the two plates were probably made by a tool with "vertical stress marks".
R8UNRL	Comparison of questioned marks to test marks-class characteristics agree, individual characteristics disagree.
REZDFL	I decided to try my hand at using the Likelihood Ratio approach to the assessment and reporting of this evidence. I've never done this before in casework or in a Proficiency Test. In other words, I assessed competing mutually exclusive probabilities of one hypothesis against the other: 1. The chisel Item 1 made the marks in Items 2 and 3. 2. The chisel Item 1 did not make the marks in Items 2 and 3. I worded the report accordingly and think I have the wording right. In the traditional way of reporting I would have said something like: The chisel (Item 1) was not responsible for making either of the two toolmarks (in Items 2 and 3). A different tool with the same class characteristics as the chisel (Item 1), was responsible for creating both of the toolmarks in Items 2 and 3.
RQ9ZNJ	Same class characteristics. Insufficient microscopic marks of value for ID. Lab SOP's require a definitive class difference for exclusion
RR4JLD	The tool marks found in the wall plates, described in items 2 and 3, are a combination of impression and striated tool marks type.
TUNPNL	I was not able to produce sufficient individual marks to allow for a positive identification of the face plates to the chisel
TXLBD4	Insufficient corresponding markings.
U93HMC	Item 2 has similar characteristics as item 3 but not similar with the characteristic marks on the test mark made from recovered chisel (item 1).
V6JHAH	(1) For more examination. The wall plate (blank sample should have more than 2 pieces. (2) Item 2 and Item 3 revealed the same individual microscopies marking.
V6KH6C	The questioned toolmarks of the both plates (Item 2 and 3) were made by the same object or tool.
V9JT3W	a) The first conclusion is reached by comparin the main mark of item 2 with the chip cutting of item 3 and also comparin the main marks of item 3 with the item 2 chip cutting. b) The third conclusion is reached because it is observed that marks of items 2 and 3 are produced with a tool that has a number of flaws in the edge of the tool (loss of material). Since the tool item 1 does not have these imperfections we understand that is not a logical mutation wear and therefore dismiss this tool that has

TABLE 3

WebCode	Additional Comments
	produced marks in item 2 and 3. Note: We thing that is a difficult test.
VEL384	<p>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.</p>
VGEP8M	<p>When creating the test toolmarks the angles of the striated marks varied depending on the technique used to create the test toolmarks. Therefore, the differences in the angles of the striated marks between the test toolmarks and the toolmarks on the submitted wall plates were not used for elimination.</p>
WMFK4R	<p>Inconclusive due to a lack of corresponding individual characteristic.</p>
WNPHQG	<p>Varying the force and angle used to make the test marks resulted in differences in the IC and sometimes class characteristics; however, marks were still able to be identified.</p>
X6TCXG	<p>Chisel 1 has certain characteristics that can, with a certain degree of similarity, be seen in the tool marks on wall plate 2 and 3. These characteristics are staggered relative to those on chisel 1. However, what may be damages in tool marks 2 and 3 can not be found in a test mark from chisel 1. Chisel 1 and the chisel that has caused the tool marks on the wall plate 2 and 3 may come from the same manufacturer. Thus, the chisels may come from the same production batch, and the similarities can be systematic marks.</p>
YAH7EE	<p>Some minor agreement in striations visible, however, overall insufficient quality and quantity of matching individual characteristics for identification. Both unknown toolmarks easily identified to each other, and test marks from the chisel in both the wall plate and in lead lined up easily to each other. Since test marks and evidence toolmarks were very similar in class characteristics, I did not eliminate.</p>
YHBLyc	<p>Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks exhibited on the plastic cover plates, Items 2 and 3, were created using the same tool.</p>
ZJ22QZ	<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 Laboratory's 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</p>

TABLE 3

WebCode	Additional Comments
	<p>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 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.</p>
ZXQWAK	<p>Toolmarks exhibited on Items 2 and 3 were microscopically inter-compared. As a result of microscopic comparison, Items 2 and 3 were identified as having been marked by the same tool.</p>

Appendix: Data Sheet

Collaborative Testing Services ~ Forensic Testing Program **Test No. 16-529: Toolmarks Examination**

DATA MUST BE RECEIVED BY November 14, 2016 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 vandalism in a commercial garage. The owner noticed toolmarks on two wall plates. A former disgruntled employee was questioned and police seized a chisel from his personal tool kit. They are requesting that you examine the toolmarks on each wall plate and determine if either or both were made by the recovered chisel.

Please note the following:

- The chisel is a sharp object, and all precautions should be taken to handle it in a safe manner.
- Each Item is in a labeled envelope, it is suggested that when the Items are removed from their labeled envelopes, they be marked sufficiently using laboratory procedure. To assist in distinguishing the two submitted wall plates, each back has been marked with paint as indicated next to their item description.
- One wall plate in original packaging included for possible test mark purposes.

Items Submitted (Sample Pack T2):

- Item 1: Chisel recovered from suspect.
- Item 2: First wall plate recovered from the garage.(blue paint)
- Item 3: Second wall plate recovered from the garage.(red paint)

1.) Did the questioned chisel from the suspect (Item 1) cause the damage to either of the wall plates containing questioned toolmarks (Items 2 and/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.

Participant Code:

WebCode:

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

3.) Additional Comments

<p>Return Instructions: Data must be received via online data entry, fax (please include a cover sheet), or mail by November 14, 2016 to be included in the report. Emailed data sheets are not accepted.</p> <p>QUESTIONS? TEL: +1-571-434-1925 (8 am - 4:30 pm EST) EMAIL: forensics@cts-interlab.com www.ctsforensics.com</p>	<p>Participant Code:</p> <p>ONLINE DATA ENTRY: www.cts-portal.com</p> <p>FAX: +1-571-434-1937</p> <p>MAIL: Collaborative Testing Services, Inc. P.O. Box 650820 Sterling, VA 20165-0820 USA</p>
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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. **16-529: Toolmarks Examination**

This release page must be completed and received by **November 14, 2016** 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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