Collaborative Testing Services, Inc
Forensic Testing Program

P.O. Box 650820
Sterling, VA 20165-0820
e-mail: forensics@cts-interlab.com
Telephone: +1-571-434-1925
Web site: www.cts-forensics.com

Toolmarks Examination
Test No. 23-5282 Summary Report

Each sample set contained one cold chisel (Item 1) and two pieces of sheet metal containing questioned toolmarks (Items 2 and 3). Participants were requested to examine these items and report their findings. Data were returned from 134 participants and are compiled into the following tables:

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 one Irwin ½" cold chisel (Item 1) and two pieces of 2x2" aluminum sheet metal containing questioned toolmarks (Items 2 and 3). Participants were requested to determine if any of the questioned toolmarks were made by the submitted tool. The Item 2 sheet metal was marked by the Item 1 cold chisel. The Item 3 sheet metal was marked by a different cold chisel that was not provided for examination.

SAMPLE PREPARATION: Paint was applied to a corner of the questioned Item 2 (blue paint) and Item 3 (red paint).

ITEMS 1 & 2 (IDENTIFICATION MARKS): The Item 1 cold chisel was used to mark the Item 2 piece of sheet metal. The cold chisel was labeled Item 1 and packaged in bubble wrap. The Item 2 piece of sheet metal was placed into a pre-labeled envelope and sealed.

ITEM 3 (ELIMINATION MARKS): The Item 3 piece of sheet metal was marked by a cold chisel (not provided) and packaged into a pre-labeled envelope and sealed.

SAMPLE SET ASSEMBLY: The corresponding Item 1 cold chisel and the Item 2 and Item 3 pieces of sheet metal were packaged into a pre-labeled sample set box along with one additional piece of 2x4" aluminum sheet metal for testing purposes.

VERIFICATION: The predistribution laboratories reported the expected responses. In addition, ten randomly selected sample sets were verified by a qualified toolmark examiner who confirmed the expected results.

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Summary Comments

This test was designed to allow participants to assess their proficiency at a toolmark examination involving impression, striated type toolmarks. Each sample set contained one Irwin 1/2" cold chisel (Item 1) and two pieces of aluminum sheet metal containing questioned toolmarks (Items 2 and 3). Participants were requested to determine if any of the questioned toolmarks were made by the submitted tool. The Item 2 piece of sheet metal was marked by the Item 1 cold chisel. The Item 3 piece of sheet metal was marked by a different cold chisel that was not provided for examination. (Refer to Manufacturer's Information for preparation details).

Of the 134 responding participants, 132 (99%) identified Item 2 and eliminated or were inconclusive for Item 3 as having been marked by the Item 1 cold chisel. Of the remaining two participants, one participant eliminated Item 2 and identified Item 3 as having been marked by the Item 1 cold chisel and the last participant identified Item 2 and did not report a result for Item 3 but stated in Table 2: Conclusions, as not having been marked by the Item 1 cold chisel.

CTS is aware that some labs will not eliminate without access to the tool or when class characteristics match. Thus, responses of inconclusive are not indicated as outliers for elimination items.

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Examination Results

Did the suspect's cold chisel (Item 1) produce the questioned toolmarks on either of the submitted cut pieces of metal (Items 2 or 3)?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
22X4UV	Yes	No	8WAAKQ	Yes	No
27DBHU	Yes	No	8YFUAB	Yes	No
2CJ84F	Yes	No	96CV4A	Yes	No
2P88VH	Yes	No	9RU2WQ	Yes	No
2PLHPG	Yes		9WNVWD	Yes	No
3396HE	Yes	No	A4GQ8G	Yes	No
36DX98	Yes	No	A992X7	Yes	No
3AT7W7	Yes	No	A9CGED	Yes	No
3E4E2G	Yes	No	AEZ7QA	Yes	No
3H4M7R	Yes	No	AQRQFD	Yes	No
3JVHUL	Yes	No	AZWXVD	Yes	No
3L4VCM	Yes	No	AZZ84D	Yes	No
3MFB7N	Yes	No	B4WAQD	Yes	No
4H24YF	Yes	No	BDMR6L	Yes	No
4LDABF	Yes	No	BU4ZXA	Yes	No
4V6H4K	No	Yes	BV6QD6	Yes	No
4XWGHH	Yes	No	BWBHW7	Yes	No
6GGVAC	Yes	No	BY2JZ9	Yes	No
6U8RBB	Yes	No	BY637J	Yes	No
6VW3ZH	Yes	No	C233L8	Yes	No
6VZK7T	Yes	No	C7HBA8	Yes	No
74DWYK	Yes	No	C7XR3E	Yes	No
7GG6VG	Yes	No	C7XURJ	Yes	Inc
7KWPMN	Yes	No	D9JVBC	Yes	No
7MNLCH	Yes	No	DACRY7	Yes	No
7TQVJB	Yes	No	DNCQM3	Yes	No
7YWDVH	Yes	No	E9FVMG	Yes	No
8QZTB2	Yes	No	ECCERZ	Yes	No
8W8NNA	Yes	No	EG9398	Yes	No

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TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
EJGVMF	Yes	No	MXAH9Z	Yes	No
ELLNFT	Yes	No	N27LDR	Yes	No
EYRLG9	Yes	No	N2Q3TU	Yes	No
F42EV4	Yes	No	N93GBQ	Yes	No
F9CCG7	Yes	No	NCHXKU	Yes	No
FBWE9B	Yes	No	NE9YNX	Yes	No
FCCND6	Yes	No	NRXU94	Yes	No
FG6MR2	Yes	No	NVW764	Yes	No
FXCZ6C	Yes	No	PKRMXT	Yes	No
GBV6RY	Yes	No	PKU8U9	Yes	No
GPY8CT	Yes	No	PYFK7J	Yes	No
GRWTX4	Yes	No	QARALZ	Yes	No
GTWRGC	Yes	No	QUEXU7	Yes	No
H963JP	Yes	No	QUYJHQ	Yes	No
HBCHTG	Yes	No	QXW6AT	Yes	No
HJLM78	Yes	No	RBHRZ7	Yes	No
HKLPVC	Yes	No	RCRWEU	Yes	No
HWUP6A	Yes	No	RNAGXQ	Yes	No
J482W2	Yes	No	RUX227	Yes	No
J4N2VW	Yes	No	RW2YCY	Yes	No
JFXU6N	Yes	No	T9NLVZ	Yes	No
JQFF9X	Yes	No	TBGGKT	Yes	No
JQH24D	Yes	No	TRWVRQ	Yes	No
JX2837	Yes	No	TXU8XN	Yes	No
KBKCN8	Yes	No	U49D8Z	Yes	No
KP4442	Yes	No	UGXA9X	Yes	No
KXYWK9	Yes	No	ULQLZN	Yes	No
KYQT93	Yes	No	UQ7UNM	Yes	No
L37MME	Yes	No	V7BVH2	Yes	No
LJD497	Yes	No	VCJ42Q	Yes	No
LK6ZXZ	Yes	No	WEJPDT	Yes	No
LUVK2D	Yes	No	WGBL2M	Yes	No

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TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
WKBU7X	Yes	No			
WN8MVL	Yes	No			
WW4FCT	Yes	No			
WYVC2M	Yes	No			
X2B7EY	Yes	No			
XJRE8M	Yes	No			
YHGM2Q	Yes	No			
YLUMXH	Yes	No			
YNLN2L	Yes	No			
YTWLMM	Yes	No			
YV6PJJ	Yes	No			
Z8U9BU	Yes	No			

Response Summary

Total Participants: 134

Did the suspect's cold chisel (Item 1) produce the questioned toolmarks on either of the submitted cut pieces of metal (Items 2 or 3)?

	ITEM 2	ITEM 3
Yes	**133** *(99.3%)*	**1** *(0.7%)*
No	**1** *(0.7%)*	**131** *(97.8%)*
Inc	**0** *(0.0%)*	**1** *(0.7%)*
No Response	**0** *(0.0%)*	**1** *(0.7%)*

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Conclusions

TABLE 2

WebCode	Conclusions
22X4UV	Examinations showed that the toolmark contained on Item 2 (M-1) was produced by Item 1 (MAP-1).
27DBHU	The striated toolmark in the submitted piece of metal, Agency Exhibit 2, was eliminated as having been made by the same tool as the striated toolmark in the submitted piece of metal, Agency Exhibit 3. The striated toolmark in the submitted piece of metal, Agency Exhibit 2, was identified as having been made by the submitted cold chisel, Agency Exhibit 1. The striated toolmark on the submitted piece of metal, Agency Exhibit 3, was eliminated as having made by the submitted cold chisel, Agency Exhibit 1.
2CJ84F	Tool marks observed on Item 1B (piece of metal approximately 2" x 2" in size with a blue mark on it) are identified as having been produced by Item 1A (Irwin brand, ½" cold chisel). Tool marks observed on Item 1C (piece of metal approximately 2" x 2" in size with a red mark on it) are eliminated as having been produced by Item 1A (Irwin brand, ½" cold chisel). There are differences in class characteristics (length of the chisel edge).
2P88VH	The toolmark present on the item 1-2 metal piece is identified as having been created by the item 1-1 chisel. The toolmark present on the item 1-3 metal piece is eliminated as having been created by the item 1-1 chisel.
2PLHPG	The blue cold chisel, Item #1, was used to create test tool marks with material from the laboratory collection. The reference tool marks were microscopically compared to the metal plates containing tool marks, Items #2 (blue) and #3 (red). The following was determined: Item #2 possessed the same class characteristics as well as sufficient agreement of individual markings to the test reference material to determine that the tool mark from Item #2 (blue) was made by the submitted blue cold chisel, Item #1. Item #3 possessed similar class characteristics but significantly differing individual markings from the test reference material to determine that the tool mark from Item #3 was not made by the blue cold chisel, Item #1. All evidence will be returned to the Firearms Unit Vault upon completion of analysis.
3396HE	Tool marks observed on Item 2 (sheet metal with toolmark blue mark) are identified as having been produced by Item 1 (blue handle Irwin). Tool marks observed on Item 3 (sheet metal with toolmark red mark) are eliminated as having been produced by Item 1 (blue handle Irwin). There are differences in the class characteristics (toolmark length). Test marks from Item 1 will be returned to the submitting agency.
36DX98	The cold chisel (Item 1), was used to create the toolmark observed on the metal plate (Item 2, marked with blue paint). The toolmark observed on the metal plate (Item 3, marked with red paint), was not created by the cold chisel (Item 1).
3AT7W7	The item 2 mark was created by the item 1 tool. The item 3 mark was eliminated as being made by the item 1 tool. Identification is the strongest level of positive association.
3E4E2G	Microscopic examination and comparison of the tool mark on Item # 2 with the test tool marks produced by the chisel (item # 1) reveals sufficient corresponding striae evidence to conclude that the chisel (item # 1) produced the tool mark on Item # 2. Microscopic examination and comparison of the tool mark on Item # 3 with the test tool marks produced by the chisel (item # 1) reveals sufficient size difference evidence to conclude that the chisel (item # 1) did not produce the tool mark on Item # 3. The chisel (item # 1) is therefore excluded from producing the tool mark on Item # 3.
3H4M7R	Examinations showed Item 2 was created by Item 1. Examinations showed Item 3 was not created by Item 1.
3JVHUL	1. The toolmark present in piece of cut metal described in the item 2 (marked with blue paint), was produced by the cold chisel described in the item 1 (identification). [Initials] November/13/2023 2. The toolmark present in piece of cut metal described in the item 3 (marked with red paint), was not produced by the cold chisel described in the item 1. [Initials] November/13/2023
3L4VCM	1. Exhibit 1 consists of one Irwin brand chisel designed to be used as a prying/compression tool. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2. Exhibits 2 and 3 each consist of one

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TABLE 2

WebCode	Conclusions
	piece of non-ferromagnetic metal square displaying damage consistent with that caused by a prying/compression tool such as a chisel. Exhibits 2 and 3 are suitable for microscopic comparison. 3. Microscopic comparison revealed the damage on Exhibit 2 was caused by Exhibit 1 due to sufficient agreement of individual characteristics. 4. Microscopic comparison revealed the damage on Exhibit 3 was not caused by Exhibit 1 due to sufficient disagreement of individual characteristics.
3MFB7N	1. Examination of Exhibit 1 revealed One Irwin brand ½" (12 mm) steel cold chisel with blue shank. Exhibit 1 is designed to be used as a prying/scraping action tool. Exhibit 1 was used to create Exhibit 1.1 test standards. Test standards were created for microscopic comparison purposes. 2. Examination of Exhibits 2 and 3 revealed each is a non ferromagnetic gray in color metal sheet. Both exhibits display damage (toolmarks) consistent with that caused by a prying/scraping action tool such as a chisel or flat blade screwdriver. The toolmarks on these exhibits are suitable for microscopic comparison. 3. Microscopic Comparison of Exhibits 1 through 3 revealed: a. Toolmarks on Exhibit 2 were made by Exhibit 1 based on sufficient agreement of individual characteristics. b. Toolmarks on Exhibit 3 were not made by Exhibit 1 based on sufficient disagreement of individual characteristics. TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
4H24YF	Toolmarks present on the Item 2 cut metal sheet were identified as having been produced by the Item 1 chisel. Toolmarks present on the Item 3 cut metal sheet were excluded as having been produced by the Item 1 chisel.
4LDABF	The chisel (Item 1) caused the questioned toolmark on Item 2 but did not cause the toolmark on Item 3.
4V6H4K	Item 3 done by item 1. Item 2 do not by item 1.
4XWGHH	Our examination with a comparison light microscope leads us to the following conclusion: Item 2 (blue): The toolmark on the piece of metal (Item 2) and the comparison marks made by the cold chisel (Item 1) show numerous well matching marks with general and individual characteristics. The toolmark (Item 2) was caused by the cold chisel (Item 1). Item 3 (red): The toolmark on the piece of metal (Item 3) and the comparison marks made by the cold chisel (Item 1) show no matching marks. The toolmark (Item 3) wasn't caused by the cold chisel (Item 1).
6GGVAC	Based on microscopic comparisons, the toolmark on item 1-2-1 (CTS item 2) metal square was identified as having been produced by the item 1-1-1 (CTS item 1) chisel, in the opinion of the laboratory. Based on differences in class characteristics, the toolmark on item 1-3-1 (CTS item 3) metal square was eliminated as having been produced by the item 1-1-1 (CTS item 1) chisel.
6U8RBB	As a result of the microscopic comparsion it is definite, that the toolmarks on the piece of metal marked as "Item 2" have been produced with the chisel marked as "Item 1". It also can be excluded, that the toolmarks on the piece of metal marked as "Item 3" have been produced with the chisel marked as "Item 1".
6VW3ZH	The questioned toolmarks on the first piece of cut metal (Item 2, marked with blue paint) were made by the suspect's cold chisel (Item 1) and the questioned toolmarks on the second piece of cut metal (Item 3, marked with red paint) were made not by the suspect's cold chisel (Item 1) but by another tool.
6VZK7T	The toolmark present on Item 2 was examined microscopically and identified as having been produced by Item 1 based on corresponding class and individual characteristics. The toolmark present on Item 3 was examined microscopically and eliminated as having been produced by Item 1 due to differences in class characteristics.
74DWYK	The Irwin cold chisel Item 1 was microscopically identified as the tool that made the impressed and

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TABLE 2

WebCode	Conclusions
	striated markings on the cut metal sheet Item 2. The impressed and striated markings on the cut metal sheet Item 3 were not made by the Item 1 cold chisel.
7GG6VG	Results of Examinations: Item 1 is an Irwin brand ½ inch cold chisel, which uses a compression tool action. Items 2 and 3 are pieces of sheet metal which each contain a toolmark that was produced using a compression action. The toolmark present on the Item 2 piece of sheet metal was identified as having been produced by the Item 1 cold chisel. The toolmark present on the Item 3 piece of sheet metal was eliminated from having been produced by the Item 1 cold chisel, due to a difference in class characteristics.
7KWPMN	The impressed toolmark present on the submitted metal sheet, Item 2, was identified as having been produced by the submitted chisel, Item 1. The impressed toolmark present on the submitted metal sheet, Item 3, was eliminated as having been produced by the submitted chisel, Item 1.
7MNLCH	The tool mark from item 2 has significant matching microscopic detail that supports it was created by the source chisel (item 1). The amount of matching detail meets the AFTE criteria for the conclusion of "identification" to the source chisel (item 1) The tool mark from item 3 is longer than the profile exhibited by the chisel (item1) and it is therefore eliminated as having been created by an impact from the sharp edge of the source chisel (#1).
7TQVJB	The marks in Items 2 and 3 have been examined and compared microscopically with each other and test marks made with Item 1. Based on the observed agreement of their class characteristics and sufficient agreement of individual characteristics, the mark in Item 2 was identified as having made by Item 1. The mark in Item 3 was not made by Item 1 based on a difference of class and individual characteristics.
7YWDVH	Item 1" Cold chisel" recovered from the apprehended suspect was using to scratch (Item) first piece of cut metal with questioned toolmark (marked with blue paint).
8QZTB2	Tool Mark Analysis: Methodology: Physical (Visual Examination), Microscopy (Comparison Microscope). Test marks were made with Item 1, the chisel, using submitted testing media. Item 1A, the test marks, was sealed in a manila envelope and will be returned with the evidence to the submitting agency. The tool mark on Item 2, the aluminum sheet, was made with Item 1, the Irwin chisel, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 3, the aluminum sheet, was not made with Item 1, the Irwin chisel, based upon different class and individual microscopic characteristics.
8W8NNA	The blue cold chisel, Item #1, was used to create test tool marks with material from the laboratory collection. The reference tool marks were microscopically compared to the metal plates containing tool marks, Items #2 (blue) and #3 (red). The following was determined: Item #2 possessed the same class characteristics as well as sufficient agreement of individual markings to the test reference material to determine that the tool mark from Item #2 (blue) was made by the submitted blue cold chisel, Item #1. Item #3 possessed similar class characteristics but significantly differing individual markings from the test reference material to determine that the tool mark from Item #3 was not made by the blue cold chisel, Item #1. All evidence will be returned to the Firearms Unit Vault upon completion of analysis.
8WAAKQ	The Item 2 toolmark was made by the Item 1 cold chisel. This identification is based on sufficient agreement of the combination of individual characteristics and all discernible class characteristics. The Item 3 toolmark was not made by the Item 1 cold chisel. This elimination is based on differences in class characteristics (different class width) and different individual characteristics.
8YFUAB	Item 1 is identified as having created the toolmark displayed on item 2. Item 1 is eliminated from having created the toolmark displayed on item 3.
96CV4A	Standards were made using the Irwin 1/2" cold chisel marked #1 and compared to the toolmark appearing upon the cut metal marked #2 with positive results. (Identification) The toolmark appearing upon the cut metal marked #2 was identified as having been made by the blade of the 1/2 " Irwin cold chisel marked #1. Standards were made using the Irwin 1/2" cold chisel marked #1 and compared to the toolmark appearing upon the cut metal marked #3 with negative results. (Elimination) The toolmark appearing upon the cut metal marked #3 was eliminated as having been

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TABLE 2

WebCode	Conclusions
	made by the blade of the 1/2" Irwin cold chisel marked #1.
9RU2WQ	The toolmark/impression on the Item 01-02 piece of metal was identified as having been made by the Item 01-01 chisel. The toolmark/impression on the Item 01-03 piece of metal was eliminated as having been made by the Item 01-01 chisel.
9WNVWD	Test toolmarks created using the cold chisel, Item 1, were microscopically compared to the toolmarks exhibited on the cut metal, Items 2 and 3 with the following results: 1. The toolmarks exhibited on Item 2, were identified as having been created using the cold chisel, Item 1, based on agreement of discernible class characteristics and sufficient agreement of individual characteristics. 2. The toolmarks exhibited on Item 3 were eliminated as having been created using the cold chisel, Item 1, based on disagreement of class and individual characteristics.
A4GQ8G	1. Examination of Exhibit 1 revealed one ferromagnetic Irwin brand steel cold chisel designed to be used as a striking/compression, prying or scraping action tool. Test standards, sub-exhibited as Exhibit 1.1, were created using Exhibit 1 and will be retained with evidence. 2. Examination of Exhibit 2 revealed one nonferromagnetic cut metal piece displaying damage consistent with that caused by a striking and scraping type of tool. Toolmarks are suitable for microscopic comparison. 3. Examination of Exhibit 3 revealed one nonferromagnetic cut metal piece displaying damage consistent with that caused by a striking and scraping type of tool. Toolmarks are suitable for microscopic comparison. 4. Exhibit 1.1 (test standards) and Exhibits 2 and 3 (unknown) were microscopically compared to each other. a. The damage on Exhibit 2 was caused by the Exhibit 1 (tool) due to sufficient agreement of individual characteristics. b. The damage on Exhibit 3 was not caused by the Exhibit 1 (tool) due to sufficient disagreement of individual characteristics. TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote. Exhibits discussed in the forensic discipline reports were examined; all results are accredited and formed using accepted scientific and professional practices. The Forensic Exploitation Department is accredited under ISO/IEC 17025. See certificate number [Number] issued by American Association for Laboratory Accreditation (A2LA).
A992X7	Test tool marks produced from the Chisel in Item 001-01 were microscopically examined and compared with the tool marks present on Items 001-02 and 001-03. Based on these comparative examinations, the following was determined: The tool mark present on Item 001-02 was identified as having been made by the Item 001-01 chisel. The tool mark present on Item 001-03 was eliminated as having been made by the Item 001-01 chisel. No examination performed on Item 001-04.
A9CGED	Item 2: the piece of cut metal with questioned toolrnark (marked with blue paint) HAS BEEN DONE with the cold chisel recovered from the apprehended suspect (Item 1). Item 3: Second piece of cut metal with questioned toolmark (marked with red paint) HAS NOT BEEN DONE with the cold chisel recovered from the apprehended suspect (Item 1).
AEZ7QA	It is concluded that the tool mark on the blue colored find (Item 2) was made with a suspicious tool (chisel).
AQRQFD	When comparing traces ITEM 2 and 3, no matching features could be found. It strongly suggests that the two tracks were caused by different tools. The seized tool (flat chisel) ITEM 1 was compared with both tracks (ITEM 2 and 3). Comparison traces were created with the tool for the comparison. When comparing ITEM 2 with the tool in question ITEM 1, numerous matching, individual characteristics were found, which provide extremely strong support for the suggests that the trace ITEM 2 was caused by the tool ITEM 1 rather than that the trace ITEM 2 was caused by an unknown tool. ITEM 3 shows a different trace pattern. Strongly suggests that the trace was caused by an unknown, rather sharp tool.
AZWXVD	The suspect's cold chisel (Item 1) WAS used to produce the toolmarks in the cut piece of metal labeled

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TABLE 2

WebCode	Conclusions
	Item2. The suspect's cold chisel (Item 1) WAS NOT used to produce the toolmarks in the cut piece of metal labeled Item3.
AZZ84D	Results of Examinations: Item 1 is a ½ inch/12mm Cold Chisel manufactured by Irwin tools. Item 2 is a piece of metal bearing a toolmark. The toolmark present on the Item 2 piece of metal was identified as having been produced by the Item 1 cold chisel. Item 3 is a piece of metal bearing a toolmark. The Item 1 cold chisel was excluded as having produced the toolmark present on Item 3 due to a difference in class characteristics.
B4WAQD	The suspect's cold chisel (Item 1) produce the questioned toolmark from the piece of cut metal with (Item 2) The suspect's cold chisel (Item 1) did not produce the questioned toolmark from the piece of cut metal with (Item 3)
BDMR6L	Examinations showed Item 2 was produced by Item 1. Examinations showed Item 3 was not produced by Item 1 due to differences in the class characteristics.
BU4ZXA	RESULTS: 1. Class and individual characteristcs were in agreement between test toolmarks made using the chisel, Item 1, and the toolmark in the cut metal, Item 2. 2. Class characteristcs were not in agreement between test toolmarks made using the chisel, Item 1, and the toolmark in the cut metal, Item 3. CONCLUSIONS: 1. The chisel, Item 1, was identified as having made the toolmark in the cut metal, Item 2. 2. The chisel, Item 1, was eliminated as having made the toolmark in the cut metal, Item 3.
BV6QD6	It speaks extremely strongly for trace Item 2 being caused by the chisel (Item 1). Trace Item 3 was caused by another tool that is not available to us.
BWBHW7	Toolmarks on items 001-02 and 001-03 were microscopically compared to test tool marks produced from the item 001-01 Irwin Cold Chisel with the following results: The item 001-02 toolmark was identified as having been produced by the item 001-01 tool. The item 001-03 toolmark was eliminated as having been produced by the item 001-01 tool due to differences in class characteristics. Item 001-04 was submitted as reference material.
BY2JZ9	Item 1 is a 0.5 inch cold chisel that was identified as having produced the toolmark present on the Item 2 cut metal. Due to a measurable difference in class characteristics, the toolmark present on the Item 3 cut metal was excluded as having been produced by the Item 1 chisel.
BY637J	Lab Items #1 (Irwin 1/2 inch cold chisel), #2 (piece of sheet metal containing toolmarks), and #3 (piece of sheet metal containing toolmarks) were examined and microscopically compared between 09/20/2023 and 09/21/2023. Based on agreement of all discernable class characteristics and sufficient agreement of individual characteristics, the toolmark on Lab Item #2 (piece of sheet metal) was positively identified as having been created using Lab Item #1 (Irwin 1/2 inch cold chisel). Based on disagreement of class characteristics, the toolmark on Lab Item #3 (piece of sheet metal) was eliminated as having been created using Lab Item #1 (Irwin 1/2 inch cold chisel).
C233L8	The toolmark on the Item 2 piece of sheet metal is identified as having been made by the Item 1 chisel. The toolmark on the Item 3 piece of sheet metal is eliminated as having been made by the Item 1 chisel.
C7HBA8	Upon comparison, I found that: i. The characteristics toolmarks on the first piece of cut metal with questioned toolmark (marked with blue paint), Item 2 to be similar to the characteristics toolmarks produced by the cold chisel recovered from the apprehended suspect, Item 1. ii. The characteristics toolmarks on second piece of cut metal with questioned toolmark (marked with red paint), Item 3 to be different to the characteristics toolmarks produced by the cold chisel recovered from the apprehended suspect, Item 1. Therefore, I am of the opinion that: i. Questioned toolmarks on the first piece of cut metal with questioned toolmark (marked with blue paint), Item 2 was produced by the cold chisel recovered from the apprehended suspect, Item 1. ii. Questioned toolmarks on second piece of cut metal with questioned toolmark (marked with red paint), Item 3 was not produced by the cold chisel recovered from the apprehended suspect, Item 1.
C7XR3E	Sufficient agreement in class and individual characteristics was observed between test toolmarks and the toolmarks on Item 2 to conclude that the chisel (Item 1) was used to make the tool marks on the cut piece of metal (Item 2). Significant disagreement in class characteristics was observed to conclude

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TABLE 2

WebCode	Conclusions
	that the toolmarks on the cut piece of metal (Item 3) were not made by the chisel, Item 1. The toolmarks on Item 2 and Item 3 were microscopically compared to each other. Sufficient disagreement in class characteristics was observed to conclude that the toolmarks on the cut pieces of metal were made by different tools.
C7XURJ	The toolmark on the Item 01-02 piece of sheet metal was identified as having been made by the Item 01-01 Irwin cold chisel. The toolmark on the Item 01-03 piece of sheet metal was unable to be identified or eliminated as having been made by the Item 01-01 Irwin cold chisel due to a lack of reproducible marks.
D9JVBC	1. Exhibit 1 is an Irwin brand 6-inch cold chisel. a. Examination disclosed that it is designed as a single bladed tool and could be used as a compression or striking tool. b. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2. Exhibit 2 and Exhibit 3 each contain one piece of metal. a. Examination disclosed damage that is consistent with a single bladed tool such as a screwdriver, pry bar, chisel or similar tool. b. Microscopic comparison disclosed sufficient agreement of class and individual characteristics to conclude that Exhibit 2 was damaged by Exhibit 1. c. Microscopic comparison disclosed sufficient disagreement of individual characteristics to conclude that Exhibit 3 was not damaged by Exhibit 1.
DACRY7	The laboratory examinations concerned of the cold chisel from the apprehended suspect (item 1) and two pieces of cut metal with questioned toolmark (item 2 and 3). As a results of the performed examinations with application of the comparison microscope Leica FS C and Lucia Forensic programme it could be conclude the toolmark on the metal (item 2) come from cold chisel (item 1) and the toolmark on the metal (item 3) come not from cold chisel (item 1).
DNCQM3	#2- This toolmark was compared microscopically with test toolmarks made using the submitted chisel, Item #1. There is agreement in class characteristics and sufficient agreement in individual characteristics for identification. This toolmark was made by the cold chisel, Item #1. #3- This toolmark was compared microscopically with test toolmarks made using the submitted chisel, Item #1. Based on agreement of class characteristics and sufficient disagreement in individual characteristics, this toolmark is eliminated as having been made by Item #1.
E9FVMG	EXAMINATIONS SHOWED ITEM 2 WAS MADE BY ITEM 1. EXAMINATIONS SHOWED ITEM 3 WAS NOT MADE BY ITEM 1.
ECCERZ	Item #01.01- the submitted tool is a chisel Item #01.02- the item is a piece of cut metal with a questioned toolmark (blue) Microscopic examination and comparison of the submitted toolmark (Item #01.02) with the test toolmark made with Item #01.01 revealed sufficient agreement of class and individual characteristics to conclude that it had been made by Item #01.01, the submitted chisel. Item #01.03- the item is a piece of cut metal with a questioned toolmark (red) Microscopic examination and comparison of the submitted toolmark (Item #01.03) with the test toolmarks made with Item #01.01 revealed sufficient disagreement of class characteristics to conclude that it had not been made by Item #01.01, the submitted chisel.
EG9398	The chisel hand tool, Item 1, was examined. The tool was used to make test toolmarks on the supplied metal sheets and lab-provided lead sheets. The toolmarks on the pieces of sheet metal (Items 2 and 3) were examined and microscopically compared to the test toolmarks. The class characteristics were similar between the toolmark on Item 2 and the test toolmarks; based on a sufficient amount of agreement of individual characteristics in the striated toolmarks, Item 2 was identified as having been marked using the chisel hand tool (Item 1). Item 3 was compared to the test toolmarks; due to differences of individual characteristics in the striated toolmarks, Item 3 was not marked using the chisel hand tool (Item 1).
EJGVMF	A microscopic comparison was conducted between Items 2 and 3. The examinations determined Items 2 and 3 were made by two different tools, due to a disagreement of discernable class characteristics. A microscopic comparison was conducted between test toolmarks, Item 1 (1, 2, 3, 4) made by the recovered tool and Items 2 and 3. The examinations determined that the striations on Item 2 were made by the tool used to produce test toolmarks, Item 1 (1, 2, 3, 4) due to a sufficient agreement between impressions. The examinations determined that Item 3 was not made from the tool, Item 1 (1, 2, 3, 4) due to a disagreement of discernable class characteristics. Disposition: Items 1, 2, and 3 will

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TABLE 2

WebCode	Conclusions
	be forwarded to the Property Custody Section. All comparison examinations were conducted using the AFTE's (Association of Firearm & Tool Mark Examiners) Theory of Identification. Identifications are the opinion of a qualified examiner that two tool marks were made by the same tool based on sufficient agreement of individual characteristics. The agreement of individual characteristics is of a quantity and quality that the likelihood another (different) tool could have made the mark is so remote as to be considered a practical impossibility. All exclusions and inconclusive findings were based upon exemplars available at the time of the examinations. Firearms Examiner [Name]
ELLNFT	Tool Mark Analysis: Methodology: Physical (Visual Examination), Caliper, Microscopy (Comparison Microscopy). Test marks were made with Item 1, the Irwin chisel, using submitted testing media. Item 1A, the test marks, was sealed in a manila envelope and will be returned with the evidence to the submitted agency. The tool marks on Item 2, the aluminum sheeting, were made with Item 1, the Irwin chisel, based upon corresponding class and individual microscopic characteristics. The tool marks on Item 3, the aluminum sheeting, were not made with Item 1, the Irwin chisel, based upon different class and individual microscopic characteristics.
EYRLG9	The results extremely strongly support that the toolmark on Item 2 was made with the cold chisel Item 1 (Level +4). The results extremely strongly support that the toolmark on Item 3 was made with a "hitting tool"(cold chisel, hammer, axe etc.) other than the cold chisel Item 1 (Level -4).
F42EV4	It is with great certanity that Item 1 has been used to leave traces on Item 2.
F9CCG7	In my opinion the mark on item 2 was made by item 1 - (CONCLUSIVE ASSOCIATION) In my opinion the mark on item 3 was not made by item 1 - (CONCLUSIVE ELIMINATION)
FBWE9B	The toolmark present in Item 2 was microscopically identified as having been made by the Item 1 tool. The toolmark present in Item 3 was eliminated as having been made by the Item 1 tool.
FCCND6	the tool marks on the metal pieces obtained from the scene and highlighted in blue and red by the investigative units were examined under a macroscope. comparative tool marks were then generated with the tool obtained from the suspect.
FG6MR2	1. A microscopic comparative examination of Item#2 (cut metal toolmark blue) against Item#1 (cold chisel), disclosed that the toolmark on Item#2 was produced by Item#1. 2. Item#3 (cut metal toolmark red) was not produced by Item#1 (cold chisel), due to differences in class characteristics (length).
FXCZ6C	Item 1.1 is an Irwin brand ½" chisel. Tests were made in material from the laboratory supply. Items 1.2 and 1.3 are two sections of metal with a questioned toolmark in each. The questioned toolmark from Items 1.2 and 1.3 were microscopically compared to the test made using Item 1.1. Based on agreement of all discernible class characteristics and corresponding individual detail, Item 1.1 was identified as having caused the damage to Item 1.2. Based on disagreement of all discernible class characteristics and disagreement of individual detail, Item 1.1 was eliminated as having caused the damage to Item 1.3. Comments: The identification of a toolmark is made to a practical, not absolute, exclusion of all other tools. It is not possible to examine all tools which is a prerequisite for absolute certainty. Sufficient agreement for an identification exists between toolmarks when the likelihood another tool could have made the toolmark is so remote as to be considered a practical impossibility.
GBV6RY	identification
GPY8CT	Test impressions were made using the exhibit cold chisel (Item 1). These impressions were compared with the exhibit toolmarks (Items 2 and 3). In regards to the comparison with Item 2 I submit that there was sufficient agreement in individual striae present in both the exhibit and test impression to say that they were both formed by the same tool (Item 1). In regards to the comparison with Item 3 I further submit that the lack of any agreement in individual striae present in the both the exhibit and test impression was strong enough to say they were not formed by the same tool.
GRWTX4	An observation have been conducted between Item 2 and Item 3 with stereomicroscope, and we found obvious difference in class characteristic, like width and striation pattern, between each of them. Then we produced test marks on metal plate with the suspected cold chisel, and compared it to Item 2 with comparison microscope. When test marks produced with the chisel's label upward, we found sufficient agreement of individual characteristic between the test mark and Item 2. Since Item 3 is

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TABLE 2

WebCode	Conclusions
	different from Item 2 in class characteristic, a conclusion had been made that Item2 was produced by the suspect's cold chisel(Item1), but Item 3 was not.
GTWRGC	1. Examination of Exhibit 1 revealed one IRWIN brand chisel with a tool working surface measuring 12.37mm in length, consistent with being used as a prying or compression type tool. a. Exhibit 1 was used to create Exhibit 1.1 test standards and will be retained in the laboratory for future comparisons. 2. Examination of Exhibits 2 and 3 revealed each contains one piece of aluminum sheet with one toolmark that is suitable for comparison. Both toolmarks are consistent with damage from a prying type tool, such as a chisel or screwdriver. The length of the tool working surface for Exhibit 2 and Exhibit 3 are 12.47mm and 13.27mm, respectively. 3. Microscopic comparison revealed the toolmark on Exhibit 2 was made by Exhibit 1 based on sufficient agreement of individual characteristics. 4. Microscopic comparison revealed the toolmark on Exhibit 3 was not made by Exhibit 1 based on sufficient disagreement of individual characteristics. All measurements are approximate.
H963JP	The recovered toolmark in Item 2 was made by the chisel in Item 1. The recovered toolmark in Item 3 was not made by the chisel in Item 1.
HBCHTG	Items – Description/Visual Examination. Item 1: One (1) Irwin brand ½" (12mm) cold chisel. Items 2 & 3: Two (2) pieces of cut metal with impression/striated toolmarks. Examination Results: Test toolmarks were created on cut metal with Item 1 for microscopic comparison purposes. Microscopic Comparison Conclusions: Identification: Based upon the reproducibility of class characteristics and microscopic individual characteristics, the following identifications were made: Item 2: One (1) impression/striated toolmark was made by Item 1 (Irwin chisel). Elimination: Based upon the difference in class characteristics, the following eliminations were made: Item 3: One (1) impression/striated toolmark not made by Item 1 (Irwin chisel).
HJLM78	The specimen marked #2 was compared microscopically against test toolmarks and identified as having been made by the submitted chisel (#1). The specimen marked #3 was compared microscopically against test toolmarks and eliminated as having been made by the submitted chisel (#1).
HKLPVC	The Item 2 and 3 (Toolmarks) were visually and microscopically examined and compared to each other, and to test toolmarks created from Item 1. Item 2 metal fragment, presented an agreement of discernable class characteristics and sufficient agreement of individual characteristics when compared to tests created from Item 1. Therefore; Item 2 (metal fragment) was identified as having been damaged by the Item 1 Irwin ½" cold chisel. Item 3 metal fragment, presented a disagreement of discernable class characteristics (different blade width) and sufficient disagreement of individual characteristics when compared to tests created from Item 1. Therefore; Item 3 (metal fragment) was eliminated as having been damaged by the Item 1 Irwin ½" cold chisel.
HWUP6A	Item 1 is one (1) cold chisel, IRWIN® brand. Item 2 is one (1) metal plate with a blue paint mark that exhibits a striated and impressed toolmark. Item 3 is one (1) metal plate with a red paint mark that exhibits a striated and impressed toolmark. The Items 2 and 3 toolmarks were microscopically compared to each other and to test toolmarks from the Item 1 tool. The Item 2 toolmark was identified as having been made by the Item 1 tool, and the Item 3 toolmark was eliminated as having been made by the Item 1 tool due to a significant disagreement of individual characteristics.
J482W2	The chisel, Item 1, was used to create the questioned toolmark on the surface of the cut piece of metal, Item 2. The chisel, Item 1, was not used to create the questioned toolmark on the surface of the cut piece of metal, Item 3.
J4N2VW	Item 2 was found to be consistent in class characteristics in terms of its general shape and general dimension to that of Item 1. Item 2 was also found to be consistent in individual characteristics in terms of its striation pattern to the test cut impression made from Item 1. Item 3 was found to be consistent in class characteristics in terms of its general shape, but not in general dimension to that of Item 1. Item 3 was also found to be inconsistent in individual characteristics in terms of its striation pattern to the test cut impression made from Item 1. Therefore in my professional opinion, (i) the suspect's cold chisel (Item 1) produced the questioned toolmarks on the cut piece of metal Item 2. (ii) the suspect's cold chisel (Item 1) did not produced the questioned toolmarks on the cut piece of metal Item 3.

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TABLE 2

WebCode	Conclusions
JFXU6N	Tool marks observed on the section of sheet metal (Item 0001-AB, labeled Item 2) were microscopically compared to test tool marks made using the Irwin brand chisel (Item 0001-AA, labeled Item 1) with POSITIVE RESULTS. The tool marks observed on the sheet metal were identified as having been made by the Irwin chisel due to the sufficient agreement of individual characteristics. Tool marks observed on the section of sheet metal (Item 0001-AC, labeled Item 3) were microscopically compared to test tool marks made using the Irwin brand chisel (Item 0001-AA, labeled Item 1) with NEGATIVE RESULTS. The tool marks observed on the sheet metal were eliminated as having been made by the Irwin chisel. Small areas of the section of sheet metal (Item 0001-AD) were used to make test tool marks with the Irwin chisel (Item 0001-AA) for use in microscopic comparison examinations. The small sections containing the test tool marks were retained at the [State] Crime Laboratory.
JQFF9X	The blue colored Irwin cold chisel, Item #1, was used to create reference tool marks with material from the laboratory collection. Reference tool marks created on test material were microscopically compared to the metal plates containing tool marks, Items #2 (blue) and #3 (red), which revealed the following results: Item #2 possessed the same class characteristics, as well as sufficient agreement of individual markings to the reference material to determine that the tool marks present on Item #2 (blue) were made by the submitted blue colored Irwin cold chisel, Item #1. Item #3 possessed similar class characteristics, but significantly differing individual markings than the reference material to determine that the tool marks present on Item #3 were not made by the blue colored Irwin cold chisel, Item #1. All evidence will be returned to the Firearms Unit Vault upon completion of analysis.
JQH24D	By means of microscopic comparison, a toolmark on the piece of metal (item 2) was identified as having been produced by the Irwin ½" chisel (item 1). This qualitative identification is based on the agreement of all discernible class and sufficient agreement of individual characteristics. Using comparison microscopy, a difference in class and individual characteristics were observed. Therefore, the toolmark on the piece of metal (item 3) could not have been produced by the Irwin 1/2" chisel (item 1). Test toolmarks (item 1.1) are being returned with the evidence.
JX2837	[No Conclusions Reported.]
KBKCN8	Test impressions made from the submitted tool (Item 1) were microscopically compared to Items 2 & 3. Test impressions from Item 1 and Item 2 are an Identification. Test impressions from Item 1 and Item 3 are an Elimination.
KP4442	[No Conclusions Reported.]
KXYWK9	The toolmark in Item 2 was examined and found upon microscopic comparison to have been caused by the chisel in Item 1. This identification was based on an agreement of both class and individual characteristics. The toolmark in Item 3 was examined and found not to be caused by the chisel in Item 1. This exclusion was based on differences in class characteristics.
KYQT93	Sufficient agreements of class and individual characteristics confirmed the toolmark on item 2 was made by the item 1 cold chisel. Disagreements of class characteristics confirmed the toolmark on item 3 was not made by the item 1 cold chisel.
L37MME	Toolmarks present on Item 2 were microscopically examined, compared and identified as having been produced by the Item 1 cold chisel based on corresponding class and individual characteristics. Toolmarks present on Item 3 were microscopically examined, compared and eliminated as having been produced by the Item 1 cold chisel due to differences in individual characteristics.
LJD497	The piece of cut metal marked #2 with a toolmark (marked with blue paint) was microscopically compared to the test marks from the submitted chisel, marked #1, with positive results (Identification). The submitted chisel, marked #1, created the toolmark of the cut metal marked #2 (marked with blue paint). The piece of cut metal marked #3 with a toolmark (marked with red paint) was microscopically compared to the test marks from the submitted chisel. The chisel marked #1 was eliminated as having made the toolmarks on the cut metal marked #3 (marked with red paint).
LK6ZXZ	The toolmarks observed in the cut piece of metal (ITEM 2) have been produced by the cold chisel (ITEM 1). The toolmarks observed in the cut piece of metal (ITEM 3) have not been produced by the cold chisel (ITEM 1).
LUVK2D	Toolmarks present on Item 2 were microscopically examined and identified as having been produced

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TABLE 2

WebCode	Conclusions
	by Item 1 based on corresponding class and individual characteristics. Toolmarks present on Item 3 were microscopically examined and eliminated as having been produced by Item 1 due to differences in individual characteristics. Four (4) tests produced using Item 1 are being returned as Item 1T and should be maintained for possible future examinations.
MXAH9Z	After comparing the Class Characteristics of item 1, item 2, item 3. It was found that the item 3 has longer marks than the tool (item 1) itself. It was then excluded for further comparison. As for item 1 and item 2 they were almost the same size. After further comparison under microscope between item 1 and item 2 it was found that the individual characteristics matches. Which gives us a positive result. Therefore it was concluded that item 1 was used on the item 2 and wasn't used on item 3.
N27LDR	The toolmark present on submitted metal sheet, Item #2 was compared microscopically with tests made using the submitted cold chisel, Item #1. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, the toolmark on Item #2 is identified as having been made by the submitted cold chisel, Item #1. The toolmark present on submitted metal sheet, Item #3 was compared microscopically with tests made using the submitted cold chisel, Item #1. There is agreement of class characteristics, however due to sufficient disagreement of corresponding individual characteristics, the toolmark on Item #3 is eliminated as having been made by the submitted cold chisel, Item #1.
N2Q3TU	A comparison of the tool marks on the two cut pieces of metal in items 2 and 3 with test marks made using the suspected chisel, item 1 was undertaken. A high degree of correspondence was noted between the marks on item 2 and the test marks made using the chisel, item 1. However there was no correspondence with the tool marks on item 3 and the test marks. I have considered the proposition that the tool mark on cut piece of metal in item 2 was made using the suspected chisel, item 1; the results of this examination provide conclusive support for this proposition. The tool mark on the cut piece of metal in item 3 has not been made by the submitted tool, item 1.
N93GBQ	Tool marks observed on Item 1B (metal with blue mark) are identified as having been produced by Item 1A (chisel). Tool marks observed on Item 1C (metal with red mark) are eliminated as having been produced by Item 1A (chisel). There are differences in class characteristics (tool width). Test tool marks produced using Item 1A (chisel) will be returned to the submitting agency.
NCHXKU	1. The item 2 and item 3 toolmarks in the pieces of cut metal were eliminated as having been produced by the same tool. 2. The item 2 toolmark was identified as having been produced by the item 1 chisel. 3. The item 3 toolmark was eliminated as having been produced by the item 1 chisel.
NE9YNX	The toolmarks in Item 2 were made by the chisel in Item 1 based on an agreement of class and individual characteristics. The toolmarks in Item 3 were not made by the chisel in Item 1 based on a disagreement of class characteristics.
NRXU94	The toolmark on exhibit 2 was identified as having been made by exhibit 1, the submitted Irwin chisel. The toolmark on exhibit 3 was not made by exhibit 1, the submitted Irwin chisel, based on differences in class characteristics.
NVW764	I microscopically compared Item 2 to the test cuts from Item 1 and found sufficient corresponding individual marks to conclude that the toolmark on Item 2 was made by the Item 1 tool. I microscopically compared Item 3 to the test cuts from Item 1 and found differences in class and individual marks to conclude that the toolmark on Item 3 was not made by the Item 1 tool. The toolmarks on Items 2 and 3 were also microscopically compared. Differences in class and individual marks were found to conclude that they were not made by the same tool.
PKRMXT	[No Conclusions Reported.]
PKU8U9	Item 2 was identified as having been marked by Item 1 based on the agreement of class characteristics, and individual characteristics observed within the marked surfaces (toolmarks). Item 3 was eliminated as having been marked by Item 1. This eliminated is based on differences in class characteristics. The difference being the width of the toolmarking surface (blade).
PYFK7J	Tool Mark Analysis: Methodology: Physical (Visual Examination), Microscopy (Comparison Microscope), Digital Micrometer. Test marks were made with Item 1, the cold chisel, using submitted testing media. Item 1A, the test marks, was sealed in a manila envelope and will be returned with the

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TABLE 2

WebCode	Conclusions
	evidence to the submitting agency. The tool mark on Item 2, the piece of metal, was made with Item 1, the cold chisel, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 3, the piece of metal, was not made with Item 1, the cold chisel, based upon different individual microscopic characteristics.
QARALZ	The toolmark on exhibit 2 was identified as having been made by exhibit 1, the submitted Irwin chisel. The toolmark on exhibit 3 was not made by exhibit 1, the submitted Irwin chisel, based on differences in class characteristics.
QUEXU7	1. Examinations showed the tool mark on Item 2 was produced by Item 1. 2. Examinations showed the tool mark on Item 3 was not produced by Item 1.
QUYJHQ	The cold chisel item 1 made the toolmark item 2. The cold chisel item 1 did not make the toolmark item 3.
QXW6AT	Item 1 was identified as having been used to produce the toolmarks on Item 2. Item 1 was eliminated as having been used to produce the toolmarks on Item 3
RBHRZ7	On the item 2 there is an impression/striation mark which correspond in width and several individual characteristics with the test marks made with chisel of item 1. On the item 3 there is an impression/striation mark which doesn't correspond in width with the chisel of item 1. The impression/striation mark of the item 2 is left by the chisel of the item 1. The impression/striation mark of the item 3 is not left by the chisel of the item 1.
RCRWEU	Through macroscopic/microscopic examination and based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks of interest exhibited on the metallic square, Laboratory Item 2, were identified as having been created by the use of the chisel, Laboratory Item 1. Through macroscopic/microscopic examination and based on significant disagreement of class characteristics, the toolmarks of interest exhibited on the metallic square, Laboratory Item 3, could not have been created by the use of the chisel, Laboratory Item 1.
RNAGXQ	Observed toolmarks on Item2 have been produced by Item1. Observed toolmarks on Item3 have not been produced by Item1.
RUX227	Item 2 questioned tool marks on cut piece of metal (marked with blue paint) were produced with Item 1 questioned cold chisel recovered from apprehended suspect. Item 3 questioned tool marks on cut piece of metal (marked with red paint) were not produced with Item 1 questioned cold chisel recovered from apprehended suspect.
RW2YCY	The toolmark on item 2 was identified as having been produced by item 1 based on the significant agreement of class and individual characteristics. The toolmark on item 3 was eliminated as having been produced by item 1 based on the significant disagreement of class characteristics.
T9NLVZ	The piece of cut metal marked #2 with a toolmark (marked with blue paint) was microscopically compared to test marks from the submitted cold chisel, marked #1 with positive results (Identification). The submitted cold chisel, marked #1, created the toolmark on the cut metal marked #2 (marked with blue paint). The piece of cut metal marked #3 with a toolmark (marked with red paint) was microscopically compared to the test marks from the submitted cold chisel. The cold chisel marked #1 was eliminated as having made the toolmarks on the cut metal marked #3 (marked with red paint).
TBGGKT	Through macroscopic/microscopic examination and based on agreement of discernible class characteristics and sufficient corresponding individual detail, the toolmarks of interest exhibited on the piece of metal, Laboratory Item 2, were identified as having been created by the use of the chisel, Laboratory Item 1. Through macroscopic/microscopic examination and based on significant disagreement of discernible class characteristics, the toolmarks of interest exhibited on the piece of metal, Laboratory Item 3, could not have been created by the use of the chisel, Laboratory Item 1.
TRWVRQ	Results of Examinations: Item 1 is an Irwin cold chisel. Toolmarks present on the Item 2 plate were identified as having been produced by the Item 1 chisel. Toolmarks present on the Item 3 metal plate were excluded as having been marked by the Item 1 chisel.
TXU8XN	Toolmarks observed on item #2 are identified as having been produced by item #1. Toolmarks observed on item #3 are eliminated as having been produced by item #1. There are differences in

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TABLE 2

WebCode	Conclusions
	class characteristics (cutting edge width).
U49D8Z	Exhibit 1 consists of one (1) cold chisel. Test toolmarks were produced using the Exhibit 1 chisel and were designated as Exhibit 1.1. Exhibits 2 and 3 each consist of a piece of cut metal with a striated and impressed toolmark. The Exhibit 2 and 3 toolmarks were compared to the test toolmarks from Exhibit 1 with the following results: The Exhibit 2 toolmark was identified as having been made by the Exhibit 1 tool. [Source identification] The Exhibit 3 toolmark was excluded as having been made by the Exhibit 1 tool. [Source exclusion] The toolmarks present on Exhibit 3 bear class characteristics produced by a tool with a bladed tool having a width of approximately 17/32 of an inch.
UGXA9X	The Item 2 questioned toolmark was microscopically compared with test specimens produced by the Item 1 tool, revealing correspondence of class characteristics and individual distinguishing characteristics. It was concluded that the Item 2 questioned toolmark was made by the Item 1 tool. The Item 3 questioned toolmark was microscopically compared with test specimens produced by the Item 1 tool, revealing class characteristic (tool working surface width) and significant individual distinguishing characteristic differences. It was concluded that the Item 3 questioned toolmark was not made by the Item 1 tool.
ULQLZN	The Item 1 test toolmark was microscopically compared to the Item 2 toolmark and determined to have consistent class characteristics and sufficient agreement of individual characteristics for an identification. Therefore, in the opinion of the examiner, the Item 2 toolmark was produced by the Item 1 tool. The Item 1 test toolmark was microscopically compared to the Item 3 toolmark and determined to have sufficient disagreement of class and individual characteristics for an elimination. Therefore, in the opinion of the examiner, the Item 3 toolmark was not produced by the Item 1 tool.
UQ7UNM	Tool marks on items 001-02 and 001-03 were microscopically compared with each other and with test tool marks created using 001-01 chisel on 001-04 reference metal with the following results: 001-02 tool marks were identified as having been made by the 001-01 chisel. 001-03 tool marks were eliminated as having been made by the 001-01 chisel.
V7BVH2	Examinations found the toolmark on Item 2 was created by the Item 1 cold chisel. Examinations found the toolmark on Item 3 was not created by the Item 1 cold chisel.
VCJ42Q	The tool mark exhibited on Item 2, the metal plate with a blue paint mark, was identified as having been made with the Item 1, chisel. The tool mark exhibited on Item 3, the metal plate with a red paint mark, was not made with Item 1, chisel.
WEJPDT	1. Examination of Exhibit 1 disclosed it to be consistent with being an Irwin brand Cold Chisel, utilized for cutting metal. For the purpose of microscopic comparison, test standards (Exhibit 1.1) were created with Exhibit 1. 2. Examination of Exhibits 2 and 3 disclosed them to be two (2) pieces of non-ferromagnetic metal, each displaying an area of damage. a. Exhibit 2 displays an area of damage of approximately 12.94mm in length with an impressed marking. b. Exhibit 3 displays an area of damage of approximately 13.38mm in length with striations and an impressed marking. 3. The damage displayed on Exhibits 2 and 3 were microscopically compared to Exhibit 1.1. As a result, it was concluded that due to a sufficient agreement of class and individual characteristics, the damage on Exhibit 2 had been made by Exhibit 1. b. Due to differences of class and individual characteristics, it was concluded that the damage of Exhibit 3 had not been created by Exhibit 1.
WGBL2M	The tool mark on item 1-2 was microscopically compared to test marks from item 1-1 and found to have areas of corresponding individual characteristics. The tool mark on item 1-2 was identified as having been made by item 1-1. The tool mark on item 1-3 was physically compared with item 1-1 and found to have different class characteristics. The tool mark on item 1-3 was eliminated as having been made by item 1-1.
WKBU7X	Item 2, impression, was made by item 1, chisel. There were sufficient surface contours and microscopic marks in agreement with the tool impressions for identification. Item 3, impression, was not made by item 1, chisel. There were sufficient differences in the length of the tool impressions for elimination.
WN8MVL	As a result of the examination and the comparison of the traces with the suspect tool, it can be determined that item 2 was caused with the chisel item 1. The toolmark at item 3 was not caused with

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TABLE 2

WebCode	Conclusions
	the chisel item 1.
WW4FCT	1. Exhibit 1 is an Irwin brand chisel which can be used as a striking or scraping tool and was used to create the Exhibit 1.1 test standards. 2. Exhibits 2 and 3 each contain a piece of metal with damage near the middle. 3. Microscopic comparison revealed the following: a. The damage to Exhibit 2 was caused by Exhibit 1 based on sufficient agreement of class and individual characteristics. b. The damage to Exhibit 3 was not caused by Exhibit 1 based on disagreement of class characteristics.
WYVC2M	The questioned toolmark observed on item 2 have been made by the chisel, item 1. The questioned toolmark observed on item 3 have not been made by the chisel, item 1.
X2B7EY	Item 2 was made by Item 1. Item 3 was not made by Item 1.
XJRE8M	K1 - 1/2" cold chisel was examined and found suitable for comparison. Q1 - Cut metal marked with blue paint compared against Test Mark I (TMI) found to contain sufficient microscopic marks to determine that it was produced by K1 (cold chisel). (Positive Identification). Q2 - Cut metal marked with red paint compared against Q1 found to contain sufficient microscopic marks to determine that it was NOT produced by K1 (cold chisel). (Elimination)
YHGM2Q	Exhibit 1.1 was found to be an Irwin brand chisel. Test marks (Exhibit 1.1.1) were created using Exhibit 1.1 and the provided test material. The test marks will be packaged with Exhibit 1.1. The toolmark on Exhibit 1.2 was compared to test marks (Exhibit 1.1.1) made with Exhibit 1.1 chisel. Microscopic comparison revealed the damage on Exhibit 1.2 was caused by Exhibit 1.1 due to sufficient agreement of individual characteristics. The toolmarks on Exhibits 1.2 and 1.3 were compared to each other. Microscopic comparison revealed the damage on Exhibits 1.2 and 1.3 was not caused by the same tool due to disagreement of class characteristics (Length of toolmark). The length of the toolmark on Exhibit 1.2 is ~12mm. The toolmark on Exhibit 3 is ~13mm.
YLUMXH	The toolmark found on "Item 2" was made by the cold chisel marked "Item 1" The toolmark found on "Item 3" was not made by the cold chisel marked "Item 1"
YNLN2L	[No Conclusions Reported.]
YTWLMM	1) A feature point of the same shape was observed at the same position as the feature point of the blade part of cold chisel (Item 1) impressed mark on the item 2 metal plate. 2) A feature point of the same shape was not observed at the same position as the feature point of the blade part of cold chisel (Item 1) impressed mark on the item 3 metal plate. 3) The comparison between the stripe marks of the impressed mark on the item 2 and the stripe marks of impressed mark by cold chisel (Item 1) shows that they match each other. 4) The comparison between the stripe marks of the impressed mark on the item 3 and the stripe marks of impressed mark by cold chisel (Item 1) shows that they no match each other. Conclusion: The impressed marks on the metal plate(Item 2) plate were imprinted using cold chisel (Item 1)
YV6PJJ	The examination of the set comparison marks of the suspect's cold chisel revealed similarities in the shape and size of set comparison traces on lead and wax plates with item 2. There couldn't be found any similarities with item 3 striations. The microscopic comparison examination revealed significant similarities in between item 1 and item 2 traces. Therefore, it is very likely that the trace item 2 on the metal plate was caused by the suspect's cold chisel. The trace item 3 was not caused by the cold chisel item 1.
Z8U9BU	This report refers to exhibits by Lab Number. The following results only apply to the items tested. The Exhibit 1 chisel was used to make test toolmarks. The test toolmarks were designated as Exhibit 1.1. The Exhibits 2 and 3 toolmarks were excluded as having been made by the same tool. The Exhibit 2 toolmark was identified as having been made by the Exhibit 1 tool. The Exhibit 3 toolmark was excluded as having been made by the Exhibit 1 tool. See the Appendix of this report for further context regarding the conclusions listed above.

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Additional Comments

TABLE 3

WebCode	Additional Comments
22X4UV	Examinations showed that the toolmark contained on Item 3 (M-2) was not produced by Item 1 (MAP-1).
2CJ84F	Conclusion Scale for Microscopic Comparisons: The following descriptions are meant to provide context to the levels of opinions reached in this report. Identification: This is the strongest statement of association that can be expressed. An identification is made to a degree of practical certainty when there is agreement of all discernible class characteristics and sufficient agreement of the individual characteristics of toolmarks. When sufficient agreement exists, in part, this means the likelihood of another tool producing the same marks is so remote it is considered a practical impossibility. Elimination: This is the strongest statement of non-association that can be expressed. An elimination is made when it is physically impossible (i.e., there is a clear, demonstrable incompatibility in class characteristics) for the items to have been marked by the same tool/fired in the same firearm. Inconclusive: An inconclusive is made when one of the following situations is true. Agreement of all discernible class characteristics and some agreement of individual characteristics, but insufficient for identification. Agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility. Agreement of all discernible class characteristics and disagreement of individual characteristics. Agreement of all discernible class and subclass characteristics. The individuality of the characteristics is not discernible; therefore, the items may have been fired from the same firearm or from another firearm that was machined with the same tool in the approximate same state of wear. Unsuitable: An item is considered unsuitable for comparison. The interpretation of the data and authorization of the results was performed by the undersigned forensic analyst. Other staff members may have performed laboratory activities concerning evidence associated with this report. For a complete listing of all staff members who performed laboratory activities in this case, please contact the laboratory via the telephone number above. [Number not provided]
3JVHUL	[Initials] November/13/2023
6U8RBB	The comparsion has been performed with a comparsion microscope.
7GG6VG	Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Discipline 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. Pattern Examination Toolmarks, whether they are present on evidence items or secondary evidence created in the Laboratory, undergo two stages of comparison. First, the class characteristics are examined and compared. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. Comparative examinations of the impressed and striated toolmarks, in at least two items, are conducted to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Source Exclusion Source exclusion is an Examiner's conclusion that two toolmarks did not originate from the same source. This conclusion is an Examiner's opinion that the observed difference(s) in class characteristics provides extremely strong support for the proposition that the two toolmarks came from different sources and extremely weak or no support for the proposition that the two toolmarks came from the same source. A source exclusion based on a minor difference in measured class characteristics requires a verification. 2) Source Identification Source identification is an Examiner's conclusion that two toolmarks originated from the same source. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another source. The basis for a source identification conclusion is an Examiner's opinion that the observed class characteristics and corresponding individual characteristics provide extremely strong support for the proposition that the two toolmarks originated from the same source and extremely weak support for the proposition that the two toolmarks originated from different

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TABLE 3

WebCode	Additional Comments
	sources. A source identification requires a verification and is the Examiner's opinion that the probability that the two toolmarks were made by different sources is so small that it is negligible. 3) Inconclusive Inconclusive is an Examiner's conclusion that all observed class characteristics are in agreement but there is insufficient quality and/or quantity of corresponding individual characteristics such that the Examiner is unable to identify or exclude the two toolmarks as having originated from the same source. This conclusion is an Examiner's opinion that there is an insufficient quality and/or quantity of individual characteristics to identify or exclude. Reasons for an inconclusive conclusion include the presence of microscopic similarity that is insufficient to form the conclusion of source identification, or a lack of any observed microscopic similarity. Limitations: Tool The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Discipline. Pattern Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to variations in substrate, changes in tool working surfaces from wear, corrosion, subclass, damage, or the employment of unusual tool/work piece orientations, toolmark reproduction may be incomplete or insufficient, as a result it may not be possible for an examiner to reach a source conclusion. Additionally, some tool manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value. Damaged, corroded, or fragmented items may be of little or no value for comparison purposes.
7YWDVH	Item 3 "Second piece of cut metal with questioned" toolmark (marked with red paint) scratch by another tool.
9RU2WQ	The toolmark/impression on the Item 01-02 piece of metal was microscopically compared to tests from the Item 01-01 chisel and was identified as having been made by that chisel based on sufficient agreement of individual characteristics; orientation brown and black. The toolmark/impression on the Item 01-03 piece of metal was microscopically compared to the toolmark/impression on the Item 01-02 piece of metal (previously ID as having been struck by Item 01-01 chisel), Item 01-01 chisel, and tests from the Item 01-01 chisel. Differences in the overall length of the impressions were observed. Differences in individual characteristics were also observed. Due to sufficient differences, the toolmark/impression on the Item 01-03 piece of metal was eliminated as having been made by the Item 01-01 chisel.
AZZ84D	Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Discipline 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. Pattern Examination Toolmarks, whether they are present on evidence items or secondary evidence created in the Laboratory, undergo two stages of comparison. First, the class characteristics are examined and compared. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. Comparative examinations of the impressed and striated toolmarks, in at least two items, are conducted to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Source Exclusion: Source exclusion is an Examiner's conclusion that two toolmarks did not originate from the same source. This conclusion is an Examiner's opinion that the observed difference(s) in class characteristics provides extremely strong support for the proposition that the two toolmarks came from different sources and extremely weak or no support for the proposition that the two toolmarks came from the same source. A source exclusion based on a minor difference in measured class characteristics requires a verification. 2) Source Identification: Source identification is an Examiner's conclusion that two toolmarks originated from the same source. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another source. The basis for a source identification conclusion is an Examiner's opinion that the observed class characteristics and corresponding individual characteristics provide extremely strong support for the proposition that the two toolmarks originated from the same source and extremely weak support for the proposition that the two toolmarks originated from different sources. A source identification requires a verification and is the Examiner's opinion that the probability that the two toolmarks were made by different sources is so small that it is negligible. 3) Inconclusive: Inconclusive is an Examiner's conclusion that all observed class characteristics are in agreement but

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TABLE 3

WebCode	Additional Comments
	there is insufficient quality and/or quantity of corresponding individual characteristics such that the Examiner is unable to identify or exclude the two toolmarks as having originated from the same source. This conclusion is an Examiner's opinion that there is an insufficient quality and/or quantity of individual characteristics to identify or exclude. Reasons for an inconclusive conclusion include the presence of microscopic similarity that is insufficient to form the conclusion of source identification, or a lack of any observed microscopic similarity. Limitations: Tool: The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Discipline. Pattern Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to variations in substrate, changes in tool working surfaces from wear, corrosion, subclass, damage, or the employment of unusual tool/work piece orientations, toolmark reproduction may be incomplete or insufficient, as a result it may not be possible for an examiner to reach a source conclusion. Additionally, some tool manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value. Damaged, corroded, or fragmented items may be of little or no value for comparison purposes
BY2JZ9	Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Discipline 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. Pattern Examination: Toolmarks, whether they are present on evidence items or secondary evidence created in the Laboratory, undergo two stages of comparison. First, the class characteristics are examined and compared. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. Comparative examinations of the impressed and striated toolmarks, in at least two items, are conducted to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Source Exclusion: Source exclusion is an Examiner's conclusion that two toolmarks did not originate from the same source. This conclusion is an Examiner's opinion that the observed difference(s) in class characteristics provides extremely strong support for the proposition that the two toolmarks came from different sources and extremely weak or no support for the proposition that the two toolmarks came from the same source. A source exclusion based on a minor difference in measured class characteristics requires a verification. 2) Source Identification: Source identification is an Examiner's conclusion that two toolmarks originated from the same source. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another source. The basis for a source identification conclusion is an Examiner's opinion that the observed class characteristics and corresponding individual characteristics provide extremely strong support for the proposition that the two toolmarks originated from the same source and extremely weak support for the proposition that the two toolmarks originated from different sources. A source identification requires a verification and is the Examiner's opinion that the probability that the two toolmarks were made by different sources is so small that it is negligible. 3) Inconclusive: Inconclusive is an Examiner's conclusion that all observed class characteristics are in agreement but there is insufficient quality and/or quantity of corresponding individual characteristics such that the Examiner is unable to identify or exclude the two toolmarks as having originated from the same source. This conclusion is an Examiner's opinion that there is an insufficient quality and/or quantity of individual characteristics to identify or exclude. Reasons for an inconclusive conclusion include the presence of microscopic similarity that is insufficient to form the conclusion of source identification, or a lack of any observed microscopic similarity. Limitations: Tool: The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Discipline. Pattern Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to variations in substrate, changes in tool working surfaces from wear, corrosion, subclass, damage, or the employment of unusual tool/work piece orientations, toolmark reproduction may be incomplete or insufficient, as a result it may not be possible for an examiner to reach a source conclusion. Additionally, some tool manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value. Damaged, corroded, or fragmented items may be of little or no value for comparison purposes.

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TABLE 3

WebCode	Additional Comments
C7XURJ	Slight differences in size (.005") and differences in patterns of individual characteristics were noted between the toolmarks made by the submitted cold chisel and the toolmark present on Item 3; however, these differences were insufficient for elimination as the reproducibility of the marks on Item 01-03 could not be ascertained.
D9JVBC	TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
FCCND6	the tool marks on the blue metal piece (item2)were formed by the tool obtained from the suspect. The tool marks on the red metal piece (item3) were not formed by the tool obtained from the suspect.
GTWRGC	Technical Notes: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
HKLPVC	TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to the manufacture of the firearm/tool. Individual characteristics are defined as marks produced by random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
L37MME	Eight tests produced using Item 1 are being returned as Item 1T and should be maintained for possible future examinations.
QARALZ	a second sheet of metal substrate would have been helpful.
TRWVRQ	Methods: Pattern Examination: Toolmarks, whether they are present on evidence items or secondary evidence created in the Laboratory, undergo two stages of comparison. First, the class characteristics are examined and compared. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. Comparative examinations of the impressed and striated toolmarks, in at least two items, are conducted to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Source Exclusion Source exclusion is an Examiner's conclusion that two toolmarks did not originate from the same source. This conclusion is an Examiner's opinion that the observed difference(s) in class characteristics provides extremely strong support for the proposition that the two toolmarks came from different sources and extremely weak or no support for the proposition that the two toolmarks came from the same source. A source exclusion based on a minor difference in measured class characteristics requires a verification. 2) Source Identification Source identification is an Examiner's conclusion that two toolmarks originated from the same source. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another source. The basis for a source identification conclusion is an

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TABLE 3

WebCode	Additional Comments
	Examiner's opinion that the observed class characteristics and corresponding individual characteristics provide extremely strong support for the proposition that the two toolmarks originated from the same source and extremely weak support for the proposition that the two toolmarks originated from different sources. A source identification requires a verification and is the Examiner's opinion that the probability that the two toolmarks were made by different sources is so small that it is negligible. 3) Inconclusive Inconclusive is an Examiner's conclusion that all observed class characteristics are in agreement but there is insufficient quality and/or quantity of corresponding individual characteristics such that the Examiner is unable to identify or exclude the two toolmarks as having originated from the same source. This conclusion is an Examiner's opinion that there is an insufficient quality and/or quantity of individual characteristics to identify or exclude. Reasons for an inconclusive conclusion include the presence of microscopic similarity that is insufficient to form the conclusion of source identification, or a lack of any observed microscopic similarity. Tool The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Discipline 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. Limitations: Pattern Examination Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to variations in substrate, changes in tool working surfaces from wear, corrosion, subclass, damage, or the employment of unusual tool/work piece orientations, toolmark reproduction may be incomplete or insufficient, as a result it may not be possible for an examiner to reach a source conclusion. Additionally, some tool manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value. Damaged, corroded, or fragmented items may be of little or no value for comparison purposes. Tool The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Discipline.
WEJPDT	TECHNICAL NOTES: Class characteristics are defined as measureable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
WW4FCT	TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm or tool, which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm or tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm or tool surfaces. These random imperfections or irregularities can be either produced incidental to manufacture or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm or tool are not to the absolute exclusion of all other firearms or tools, because it is not feasible to examine all firearms or tools in the world. However, observing this amount of agreement between different sources is considered extremely remote.
YTWLMM	test is good

-End of Report-
(Appendix may follow)

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Collaborative Testing Services ~ Forensic Testing Program

Test No. 23-5282: Toolmarks Examination

DATA MUST BE SUBMITTED BY **Nov. 13, 2023, 11:59 p.m. EST** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A WebCode: JQ6C3M

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

Scenario:
Investigators have recovered two pieces of metal with a questioned toolmark from a crime scene. In addition, a cold chisel was recovered from the apprehended suspect. Investigators are requesting that you examine the toolmarks and determine if any were made using the suspect's cold chisel.

Please note the following:
- Each Item is in an envelope, it is suggested that when the items are removed from their labeled envelope, they be marked according to your laboratory procedure.
-Use caution when handling the samples, as there may be sharp areas on the questioned Items and exemplar piece of cut metal.

Items Submitted (Sample Pack T2):
Item 1: Cold chisel recovered from the apprehended suspect.
Item 2: First piece of cut metal with questioned toolmark (marked with blue paint).
Item 3: Second piece of cut metal with questioned toolmark (marked with red paint).

1.) Did the suspect's cold chisel (Item 1) produce the questioned toolmarks on either of the submitted cut pieces of metal (Items 2 or 3)?

	Yes	No	Inconclusive*
Item 2:	○	○	○
Item 3:	○	○	○

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

Please note: *Any additional formatting applied in the free form space below will not transfer to the Summary Report and may cause your information to be illegible. This includes additional spacing and returns that present your responses in lists and tabular formats.*

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

3.) Additional Comments

Participant Code: U1234A
WebCode: JQ6C3M

RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

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

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

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

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

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

A2LA Certificate No.

Step 2: Complete the Laboratory Identifying Information in its entirety

Authorized Contact Person and Title

Laboratory Name

Location (City/State)