



Toolmarks Examination Test No. 11-528 Summary Report

This test was sent to 238 participants. Each sample set contained two lockback knives (Items 1 and 2) and two sections of hose containing questioned toolmarks (Items 3 and 4). Participants were requested to examine these items and report their findings. Data were returned from 199 participants (84% response rate) and are compiled into the following tables:

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

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

Manufacturer's Information

Each sample set contained two lockback knives (Items 1 and 2), two sections of hose containing questioned toolmarks (Items 3 and 4) and excess hose substrate. Participants were requested to determine if any of the questioned toolmarks were made by the submitted tools. The Item 4 hose was punctured by the Item 1 lockback knife. The Item 3 hose was punctured by the Item 2 lockback knife.

SAMPLE PREPARATION -

The folding knives were Master Cutlery, Item # YD-5010A. The yellow hose was "Choose-A-Color" PVC Tubing, Yellow, 3/4" ID, 1" OD, 1/8" Wall Thickness, Item # 9446K931. The orange hose was "Masterleer Color PVC Tubing, Orange, 1/2" ID, 3/4" OD, 1/8" Wall Thickness, Item # 9117T411. Both types of hose were purchased from McMaster-Carr®. Two 4" pieces of both hose substrates were cut with a hose cutter to provide material for testing.

For all the punctures made in this test, a jig was used to support the tubing so it would not collapse during production.

ITEMS 1 AND 4 (PREPARATION and IDENTIFICATION MARKS): Each knife was opened and inspected for defects. The knives were then stabbed into scrap tubing and then sliced in a downward motion to remove manufacturing residue. Each handle was marked with green paint and allowed to dry. The above process was repeated until all Item 1 knives had been prepared. The Item 4 yellow hose was inserted into the jig and the knife was inserted into the center of the hose straight downward and then the knife was pulled back out straight. The piece of hose was packaged into a pre-labeled Item 4 envelope. The knives were packaged into a pre-labeled Item 1 envelope. The matching Item 1 knife and Item 4 piece of hose were immediately assembled in the sample set as described below. The above process was repeated until all identification toolmarks had been prepared.

ITEMS 2 AND 3 (PREPARATION and IDENTIFICATION MARKS): Each knife was opened and inspected for defects. The knives were then stabbed into scrap tubing and then sliced in a downward motion to remove manufacturing residue. Each handle was marked with white paint and allowed to dry. The above process was repeated until all Item 2 knives had been prepared. The Item 3 orange hose was inserted into the jig and the knife was inserted into the center of the hose straight downward and then the knife was pulled back out straight. The piece of hose was packaged into a pre-labeled Item 3 envelope. The knives were packaged into a pre-labeled Item 2 envelope. The matching Item 2 knife and Item 3 piece of hose were immediately assembled in the sample set as described below. The above process was repeated until all identification toolmarks had been prepared.

SAMPLE PACK ASSEMBLY: The corresponding Item 1 knife and the Item 4 hose were packaged into a pre-labeled sample pack box along with the corresponding Item 2 knife and the Item 3 hose. An additional two 4" sections of both hose substrates were included for testing purposes. This process was repeated until the required number of sample packs were produced.

VERIFICATION -

In addition to the sets examined by predistribution laboratories and an AFTE representative,¹⁰ of the completed sample sets were examined by a qualified tool mark examiner. The expected identifications and eliminations were confirmed by all but one predistribution laboratory. This predistribution laboratory reported inconclusive for both questioned Items 3 and 4 and was unable to identify or eliminate due to an absence of sufficient matching microscopic characteristics for identification purposes. This sample set was reviewed by an independent reviewer who determined that there were sufficient microscopic marks for identification purposes.

Summary Comments

This test was designed to allow participants to assess their proficiency at a toolmark examination involving striated type toolmarks. Each sample set consisted of two lockback knives (Items 1 and 2) and two sections of hose containing questioned toolmarks (Items 3 and 4). Participants were requested to determine which, if any, of the questioned sections of hose could have been punctured by the recovered knives. The Item 4 hose was punctured by the Item 1 lockback knife. The Item 3 hose was punctured by the Item 2 lockback knife. [Refer to Manufacturer's Information for preparation details.]

Of the 199 responding participants, 176 (88%) identified the Item 1 knife as having punctured the Item 4 hose and identified the Item 2 knife as having punctured the Item 3 hose. Of these participants, 162 eliminated the Item 1 knife as having punctured the Item 3 hose and the Item 2 knife as having punctured the Item 4 hose. The remaining 14 did not write a response for the comparison of the Item 1 knife to the Item 3 hose nor for the comparison of the Item 2 knife to the Item 4 hose.

Eleven participants had varied inconclusive responses. Six of these identified the Item 2 knife as having punctured the Item 3 hose; however, were inconclusive as to the Item 1 knife being the source of the puncture on the Item 4 hose and eliminated (1) or were inconclusive (5) as to the Item 2 knife being the source of the puncture on the Item 4 hose. Three participants identified the Item 1 knife as having punctured the Item 4 hose, eliminated (2) or were inconclusive (1) as to the Item 1 knife being the source of the puncture on the Item 3 hose and were inconclusive as to the Item 2 knife being the source of the puncture on the Item 3 hose. Two participants reported inconclusive for all Items. One of these reported in their Additional Comments that there were not enough individualizing characteristics to make a further determination.

Of the remaining 12 participants, four participants identified the Item 2 knife as having punctured both Items 3 and 4 hose and eliminated the Item 1 knife. Two participants identified the Item 1 knife as having punctured both Items 3 and 4 and eliminated the Item 2 knife. Two participants identified the Item 1 knife as having punctured the Item 4 hose and eliminated the Items 1 and 2 knives as having punctured the Item 3 hose. Two participants reported that the Item 1 knife punctured the Item 3 hose and the Item 2 knife punctured the Item 4 hose. One participant identified the Item 2 knife as having punctured the Item 3 hose and eliminated the Item 1 knife as having punctured Items 3 and 4. The remaining participant eliminated both knives as having punctured either of the two hoses.

Examination Results

Did either of the questioned knives from the two suspects (Items 1 and 2) cause the damage to either of the questioned punctured hoses (Items 3 and 4)?

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
2DQX7W		Yes	Yes	
2MFMTY	No	Yes	Yes	No
33JJKW	No	Yes	Yes	No
3B2UC4	No	Yes	Yes	No
3K3GN9	No	Yes	Yes	No
3NJWZL	No	Yes	Yes	No
3R86QB	No	Yes	Yes	No
3T3PHF	No	Yes	Yes	No
4KJ4N3	No	Yes	Yes	No
66M72X	No	Yes	Yes	No
69HX8A	No	Yes	Yes	No
6DB4LC	No	Yes	Yes	No
6DXB7B	No	Yes	Yes	No
6E7RZZ	No	Yes	Yes	No
6JLXYV		Yes	Yes	
6Q2YX6	No	No	No	No
73X9B7	No	Yes	Yes	No
74P34G	No	Yes	Yes	No
79DZC4	No	Yes	Inc	No
79FHNG	No	Yes	Yes	No
7CYNPP	No	Yes	Yes	No
7FYZLP	No	Yes	Yes	No
86FLK9	No	No	Yes	Yes
8AAKUX	No	Yes	Yes	No
8CDB2C	No	Yes	Yes	No
8EDQ49	No	Yes	Yes	No
8R6DHG	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
8WZJYL	No	Yes	Yes	No
9CR4D7	No	Yes	Yes	No
9DMPZ7		Yes	Yes	
9EGN3B	No	Yes	Yes	No
9UEHV6	Yes	No	No	Yes
9W2Z63	No	Yes	Yes	No
9WC74Y	No	Yes	Yes	No
9Y2CNW	No	Yes	Yes	No
9Z2C23	No	Yes	Yes	No
AAXVKG	No	Yes	Yes	No
AHTQN7	No	Yes	Yes	No
APT92X	No	Yes	Yes	No
B7D9L2		Yes	Yes	
BCKYN8	No	Yes	Yes	No
C7VUE4	No	Yes	Yes	No
C8LVH7	No	Yes	Yes	No
CABYDY	No	Yes	Yes	No
CB7K3J		Yes	Yes	
CE7Z72	No	Yes	Yes	No
CJG7QD	No	Yes	Yes	No
CUXZVE	No	Yes	Yes	No
CYC9Q7	No	Yes	Yes	No
D2Y8GA	No	Yes	Yes	No
D4XMPW	No	Yes	Yes	No
DAPPX4	No	Yes	Yes	No
DEXD9J	No	Yes	Yes	No
DR8VZM	No	Inc	Yes	Inc
EAMJRT	No	Yes	Yes	No
EPEDMR	No	Yes	Yes	No
EPY3WZ	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
ETCZVM	Inc	Inc	Inc	Inc
EV28FJ	No	Yes	Yes	No
EYZMLL	No	Yes	Yes	No
F324K2	No	Yes	Yes	No
FKZ26H	No	Yes	Yes	No
FQRBBA	No	Yes	Yes	No
FWCGZ4	No	Yes	Yes	No
FXPY6U	No	Yes	Yes	No
FZZPNW	No	Yes	Yes	No
G63AZ8	No	Yes	Yes	No
G92RPL	No	Yes	Yes	No
GGWR7Z	No	Yes	Yes	No
GYFEZN	No	Yes	Yes	No
H7UPK3	No	Yes	Yes	No
HBMWY6	Yes			Yes
HE8NB8	No	Yes	Yes	No
HN99BE	No	No	Yes	Yes
J36XQC	No	Yes	Yes	No
J38E3N	No	Yes	Yes	No
J6U6DU	No	Yes	Yes	No
JG6PQV		Yes	Yes	
JKVRUN		Yes	Yes	
JMT87R	No	Yes	Yes	No
JQXUM3	No	Yes	No	No
JZHB8W	No	Yes	Yes	No
K7FH4B	Yes	Yes	No	No
KAA6ZD	No	Yes	Yes	No
KGJDKU	Inc	Yes	Inc	No
L3YC6F	No	Yes	Yes	No
LD2KXY	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
M2YRVL	No	Yes	Yes	No
M4PTYN	No	Yes	Yes	No
M7FWUG	No	Yes	Yes	No
MECTQJ	No	Yes	Yes	No
MJGRN3	No	Yes	Yes	No
MNDEGQ	No	Yes	Yes	No
MPBHE8	No	Inc	Yes	Inc
MR2LAZ	No	Yes	Yes	No
MVUQWC	No	No	Yes	No
N3FX3N	No	Yes	Yes	No
NB8J3V	No	Yes	Yes	No
NEK3N4	No	Yes	Yes	No
NPR87R	No	Yes	Yes	No
NXX7LU	No	Yes	No	No
PA8333	No	Yes	Yes	No
PBHXRf	No	Yes	Yes	No
PCTQGN	No	Yes	Yes	No
PGTQ4Z	No	Yes	Inc	Inc
PQAKA2	No	No	Yes	Yes
PW3MFM		Yes	Yes	
PWH7YJ	No	Yes	Yes	No
PY8AUC	No	Yes	Yes	No
Q7JVBT	No	Yes	Yes	No
Q7XW43	No	Yes	Yes	No
Q992WB	No	Yes	Yes	No
Q9TTWN	No	Yes	Yes	No
QBU2RL		Inc	Yes	Inc
QBXJ2H	No	Yes	Yes	No
QCT6P3	No	Yes	Yes	No
QDJ8CH	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
QEHBAY		Yes	Yes	
QKHYEK	No	Yes	Yes	No
QLDHKR	No	Yes	Yes	No
QLV9RQ	No	Yes	Yes	No
QUR6VG		Yes	Yes	
R2PBRV	No	Yes	Yes	No
R4U2WP	No	Yes	Yes	No
RGX84H	No	Inc	Yes	Inc
RHJK8M	No	Yes	Yes	No
RJ3XAW	No	Yes	Yes	No
RU2QHN	Yes	Yes	No	No
RYY8X3	No	Yes	Yes	No
TDXDPD	No	Inc	Yes	No
TLN46D		Yes	Yes	
TTNEKJ	No	Yes	Yes	No
TVCWEP	No	Yes	Yes	No
TVEFNL	No	Yes	Yes	No
TXGP9N	No	Yes	Yes	No
TYDWZF		Yes	Yes	
TYET3Y		Yes	Yes	
U2CQU3	No	Yes	Yes	No
U79DRW	No	Yes	Yes	No
UE2JNJ	No	Yes	Yes	No
UFHMFV	No	Yes	Yes	No
UKZL67	No	Yes	Yes	No
UMZWVK	No	Yes	Yes	No
UT6WW4	No	No	Yes	Yes
UTZGKN	No	Yes	Yes	No
UUEUDR	No	Yes	Yes	No
UVU4HL	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
UWPN87	No	Yes	Yes	No
V4MN9K	No	Yes	Yes	No
VDP99R	No	Yes	Yes	No
VJTBB7	No	Yes	Yes	No
VJVRKX	No	Yes	Yes	No
VQCF6R	No	Yes	Yes	No
VXUXD9	No	Yes	Yes	No
W3JQ42	No	Yes	Yes	No
W3M9BD	No	Inc	Yes	Inc
W4GWT9	No	Yes	Yes	No
W69WNY	No	Yes	Yes	No
WCB489	No	Yes	Yes	No
WCKR8T	No	Yes	Yes	No
WFAHTC	No	Yes	Yes	No
WME3BF	No	Yes	Yes	No
WMRNUP	No	Yes	Yes	No
WMTMNX	No	Yes	Yes	No
WPEC8B	No	Yes	Yes	No
WXRGZV	No	Yes	Yes	No
WZHH4X	No	Yes	Yes	No
X9U3V2	No	Yes	Yes	No
XDKB7U	No	Yes	Yes	No
XDY2V6	No	Yes	Yes	No
XF8YKF	No	Yes	Yes	No
XGHU78	No	Yes	Yes	No
XL99Q9	No	Yes	Yes	No
XML389	No	Yes	Yes	No
XP8RQL	No	Yes	Yes	No
XPCJRW	No	Yes	Yes	No
XRGKWL	No	Yes	Yes	No

TABLE 1

WebCode	Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
	Item 3	Item 4	Item 3	Item 4
XX3K78	No	Yes	Yes	No
Y3ZGCD	No	Yes	Yes	No
Y8N9CT	No	Yes	Yes	No
Y9JTZD	No	Yes	Yes	No
Y9MCAB	No	Yes	Yes	No
YABU4G	Inc	Inc	Inc	Inc
YHNYW2	No	Yes	Yes	No
YKD3RT	No	Yes	Yes	No
YNDEPE	No	Yes	Yes	No
YRFAF9	No	Yes	Yes	No
Z2XB9N	No	Yes	Yes	No
ZDD6JG	No	Yes	Yes	No
ZFYUX3	No	Yes	Yes	No
ZH4K6H		Yes	Yes	
ZJY6T3	No	Yes	Yes	No
ZKP7W6	No	Yes	Yes	No
ZMEBRX	No	Yes	Yes	No
ZP6RNQ	No	Yes	Yes	No
ZRN7GL	No	Yes	Yes	No
ZTPJYT	No	Yes	Yes	No
ZXFXLF	No	Yes	Yes	No
ZXJBDH	No	Yes	Yes	No

Response Summary			Total Participants: 199		
<i>Did either of the questioned knives from the two suspects (Items 1 and 2) cause the damage to either of the questioned punctured hoses (Items 3 and 4)?</i>					
		Item 1 Lockback knife from first suspect		Item 2 Lockback knife from second suspect	
		ITEM 3	ITEM 4	ITEM 3	ITEM 4
Responses	Yes	4 (2%)	183 (92%)	187 (94%)	6 (3%)
	No	177 (89%)	7 (4%)	6 (3%)	171 (86%)
	Inc	3 (2%)	8 (4%)	5 (3%)	8 (4%)

Conclusions

TABLE 2

WebCode	Conclusions
2DQX7W	Tool marks observed in the puncture of the orange hose (Item 3) were microscopically compared to test tool marks made using the knives (Items 1 and 2). The tool marks in the puncture of the orange hose were identified as having been made by the Item 2 knife due to the sufficient agreement of individual characteristics observed between the evidence and test tool marks. Tool marks observed in the puncture of the yellow hose (Item 4) were microscopically compared to test tool marks made using the knives (Items 1 and 2). The tool marks in the puncture of the orange[sic] hose were identified as having been made by the Item 1 knife due to the sufficient agreement of individual characteristics observed between the evidence and test tool marks.
2MFMTY	Item 3 hose (orange) was punctured by the Item 2 lockback knife (white paint). Item 4 hose (yellow) was punctured by the Item 1 lockback knife (green paint).
33JJKW	In my opinion: 1) I am satisfied that the puncture mark in item 3 has been marked by item 2. 2) I am satisfied that the puncture mark in item 4 has been made by item 1.
3B2UC4	I made an examination of the two pieces of punctured hose, Item 3 being a piece of orange hose and Item 4 being a piece of yellow hose. I saw that each of [sic] pieces of hose had been punctured in the middle by a knife or similar object. I made test stabs/cuts into the supplied test material using the exhibit lockback knives Item 1 (green paint) and Item 2 (white paint). I made a comparison between the test cuts and the damaged pieces of hose Items 3 & 4 using a comparison microscope. This allows two objects to be viewed simultaneously so that microscopic marks caused by the application of a tool can be compared and assessed. As a result of this application I formed the opinion that the piece of orange hose Item 3 had been stabbed by lockback knife with white paint on it Item 2. I also formed the opinion that the piece of yellow hose Item 4 had been stabbed by the lockback knife with green paint on it, Item 1.
3K3GN9	The toolmarks on the item 3 hose was caused by the item 2 knife. The toolmarks on the item 4 hose was caused by the item 1 knife.
3NJWZL	Upon microscopic examination, tool marks observed on the yellow tube (Item 4) are identified as having been produced using the Item 1 knife. Upon microscopic examination, tool marks observed on the orange tube (Item 3) are identified as having been produced using the Item 2 knife.
3R86QB	The Item 1 and Item 2 lockback knives were examined and found to operate correctly. Neither knives possessed trace evidence. Test marks were made in the orange and yellow test hose material using both of the knives. The Item 3 and Item 4 hoses possess puncture marks which were microscopically compared to each other and to test marks made by the Item 1 and Item 2 knives. The Item 1 knife was identified as having punctured the Item 4 hose based on sufficient agreement of individual characteristics. The Item 2 knife was identified as having punctured the Item 3 hose based on sufficient agreement of individual characteristics.
3T3PHF	Item 1 was identified as having produced the puncture toolmark on Item 4. Item 2 was identified as having produced the puncture toolmark on Item 3.
4KJ4N3	Comparative examinations of the toolmarks on Item 3 (orange tubing) against test toolmarks produced with Item 2 (knife) showed the presence of matching features. This means that Item 2 was used to make the cut on Item 3. Comparative examinations of the toolmarks on Item 4 (yellow tubing) against test toolmarks produced with Item 1 (knife) showed the presence of

TABLE 2

WebCode	Conclusions
	matching features. This means that Item 1 was used to make the cut on Item 4.
66M72X	Test toolmarks from Item #1 were compared microscopically to toolmarks on Item #4 and the striations on these items match each other, therefore, the toolmark on Item #4 was made by the tool listed as Item #1. Test toolmarks from Item #2 were compared microscopically to toolmarks on Item #3 and the striations on these items match each other, therefore, the toolmark on Item #3 was made by the tool listed as Item #2.
69HX8A	Analysis revealed toolmarks suitable for comparison on the cut surfaces of both Items 3 and 4. Test marks made using Items 1 and 2 were compared to the questioned toolmarks observed on Items 3 and 4 resulting in the following conclusions: The questioned toolmarks on Item 3 were identified as being made by Item 2, and were therefore eliminated as having been made by Item 1. The questioned toolmarks on Item 4 were identified as being made by Item 1, and were therefore eliminated as having been made by Item 2.
6DB4LC	The Item 1 knife is identified as having cut the Item 4 hose. The Item 2 knife is identified as having cut the Item 3 hose.
6DXB7B	Comparative examinations of the toolmark on Item 3 (punctured orange hose) against test marks made with Item 2 (lockback knife with white paint) showed the presence of matching features. This means that Item 2 was used to puncture Item 3. Comparative examinations of the toolmark on Item 4 (punctured yellow hose) against test marks with Item 1 (lockback knife with green paint) showed the presence of matching features. This means that Item 1 was used to puncture Item 4.
6E7RZZ	Examinations showed the tool mark within Item 3 was created by Item 2. Examinations showed the tool mark within Item 4 was created by Item 1.
6JLXYV	The puncture mark present in Item #3 was made by Item #2, the knife with the white paint. The puncture mark present in item #4 was made by Item #1, the knife with the green paint.
6Q2YX6	The punctures on item 3 (orange) and item 4 (yellow) aren't perfectly straight lines, as if the used "blade" was rather buckled on one's cutting edge. On the thickest side of the blade (back of the blade), the "V" which has appeared on the hoses Item 3 and 4 is the same shape and same "overstriking" (width) and is distinctly wider than those caused by the blades item 1 and It 2. These two punctures (item 3 and 4) might have been made by the same "tools", perhaps a knife, which nevertheless is different, both from the pocket-knife of item 1 (green paint) and from the one of item 2 (white paint).
73X9B7	The tool mark on Item 3, the orange hose, was made with Item 2, the Master folding knife (white dot). The tool mark on Item 4, the yellow hose, was made with Item 1, the Master folding knife (green dot).
74P34G	Toolmarks present on Exhibit #3 were made by the knife submitted as Exhibit #2. Toolmarks present on Exhibit #4 were made by the knife submitted as Exhibit #1. Exhibit #1 was examined and tested. Exhibit #2 was examined and tested.
79DZC4	The hose pieces submitted Items 3 and 4 were examined and found to exhibit puncture-type toolmarks. The toolmarks were microscopically compared to test marks produced with the two knives submitted Items 1 and 2. The hose submitted Item 4 was punctured by the knife submitted Item 1. The hose submitted Item 3 was not punctured by the knife submitted Item 1. The hose submitted Item 3 was found to exhibit similar class characteristics as test marks produced with the knife submitted Item 2, however there was no significant agreement of

TABLE 2

WebCode	Conclusions
	individual characteristics found. The knife Item 2 can not be eliminated has[sic] having punctured the hose submitted Item 3.
79FHNG	Item 3 was punctured by the Item 2 knife. Item 4 was punctured by the Item 1 knife.
7CYNPP	The toolmarks in the puncture of the Item 3 piece of orange plastic tubing were examined, compared microscopically, and identified as having been produced with the Item 2 knife. The toolmarks in the puncture of the Item 4 piece of yellow plastic tubing were examined, compared microscopically, and identified as having been produced with the Item 1 knife.
7FYZLP	Toolmarks present on the Item 3 hose were examined, compared microscopically, and identified as having been produced by the Item 2 lockback knife. Toolmarks present on the Item 4 hose were examined, compared microscopically, and identified as having been produced by the Item 1 lockback knife.
86FLK9	i) Upon comparison, I found that the characteristic fine marks on Item 3 to match with those on the test cut marks made by the lockback knife (Item 2). i) Upon comparison, I found that the characteristic fine marks on Item 4 to match with those on the test cut marks made by the lockback knife (Item 2).
8AAKUX	Examinations showed the puncture mark in Item 3 was made by Item 2. Examinations showed the puncture mark in Item 4 was made by Item 1.
8CDB2C	The knives Items 1 and 2 were used to make tests in submitted materials. The damage (puncture) mark in the orange hose Item 3 was compared microscopically with tests. It was made by the knife Item 2. The damage (puncture) mark in the yellow hose Item 4 was compared microscopically with tests. It was made by the knife Item 1.
8EDQ49	Toolmarks present on Item #3 were made by Item #2. Toolmarks present on Item #4 were made by Item #1.
8R6DHG	Toolmarks observed on the portion of 3/4 inch orange hose (Item 3) were identified to test marks produced by the blade of the lockback knife with white paint (Item 2). Toolmarks observed on the portion of 1 inch yellow hose (Item 4) were identified to test marks produced by the blade of the lockback knife with green paint (Item 1).
8WZJYL	[No Conclusions Reported.]
9CR4D7	1. The knife, Exhibit 2, produced the toolmarks present in the piece of hose, Exhibit 3. 2. The knife, Exhibit 1, produced the toolmarks present in the piece of hose, Exhibit 4.
9DMPZ7	Toolmarks present on the Item 4 tubing was[sic] identified as having been cut by the Item 1 knife. Toolmarks present on the Item 3 tubing was[sic] identified as having been cut by the Item 2 knife.
9EGN3B	The tool marks in the puncture on the orange tubing in item 3 were microscopically compared to and identified as having been made by the Master brand lock back knife in item 2. The tool marks in the puncture on the yellow tubing in item 4 were microscopically compared to and identified as having been made by the Master brand lock back knife in item 1.
9UEHV6	Based on the reproduction of corresponding patterns of individual microscopic characteristics, the defect in the submitted piece of hose (Item 3) is identified as having been produced by the submitted knife (Item 1). Based on the reproduction of corresponding patterns of individual microscopic characteristics, the defect in the submitted piece of hose (Item 4) is identified as

TABLE 2

WebCode	Conclusions
	having been produced by the submitted knife (Item 2).
9W2Z63	The tool mark on Item 3, the orange plastic tube, was made with Item 2, the Master Knives lock-blade knife. The tool mark on Item 4, the yellow plastic tube, was made with Item 1, the Master Knives lock-blade knife. The test cuts using Items 1 and 2, the Master Knives lock-blade knives, were each sealed in an individual manila envelope and will be retained in the laboratory for possible future analysis.
9WC74Y	Test toolmarks were created using the Master Knives folding knives, Items 1 and 2, and microscopically compared to the toolmarks exhibited on the portions of hose, Items 3 and 4. The toolmark exhibited on the portion of yellow hose, Item 4, was identified as having been created by the knife, Item 1. The toolmark exhibited on the portion of orange hose, Item 3, was identified as having been created by the knife, Item 2.
9Y2CNW	With the questioned knives (item 1 and item 2) test marks were made in the sections of the hoses that were added for test marks. Casts of the mentioned test marks were made and compared with casts of the questioned marks on item 3 and item 4 to investigate similarities and dissimilarities of the toolmarks. The microscopical investigation revealed that the surface structures of the test marks caused by item 1 correspond with the surface structures of the toolmarks on item 4 and the test marks caused by item 2 correspond with the surface structures of the toolmarks on item 3. On the active surface of both knives are grooves from various shape cutting manufacturing processes. The alignment and combination of the different manufacturing marks are unique in their shape, position and size. Therefore the knife labeled as item 1 is identified as the tool that caused the toolmarks on item 4 and the knife labeled as item 2 is identified as the tool that caused the toolmarks on item 3.
9Z2C23	The tool mark on Item 3, the orange rubber tubing, was made with Item 2, the Master Knives knife with a white mark. The tool mark on Item 4, the yellow rubber tubing, was made with Item 1, the Master Knives knife with a green mark.
AAXVKG	Item #1 - The knife is a "Master Knives" brand lockback style folding knife. Using a stabbing motion into submitted and laboratory supplied hose, test were generated for comparison purposes. Item #2 - The knife is a "Master Knives" brand lockback style folding knife. Using a stabbing motion into submitted and laboratory supplied hose, test were generated for comparison purposes. Items #3 & #4 - Examination of the orange and yellow sections of hose revealed that each had a single puncture consistent with the use of a single-edged knife blade(s). Microscopic Examination and comparison of the questioned toolmarks present within these punctures and the known toolmarks generated using the two (2) submitted pocket knives revealed the following: The orange hose, Item #3 had been punctured using Item #2 (the knife marked with white paint). The yellow hose, Item #4 had been punctured using Item #1 (the knife marked with green paint).
AHTQN7	The Item 3 cut was made by the Item 2 knife blade. The Item 4 cut was made by the Item 1 knife blade.
APT92X	The damage to the punctured hose marked item 3 was made by the knife with white paint marked as item 2. The damage to the punctured hose marked item 4 was made by the knife with green paint marked as item 1. These identifications are established by a finding of sufficient agreement of unique surface contours between the evidence damage areas and test cuts using the suspected tool.
B7D9L2	Test cuts made using the Item 1 and Item 2 knives were compared to the cuts in Item 3 and Item 4. The cut in Item 3 was made using the Item 2 knife. The cut on Item 4 was made using

TABLE 2

WebCode	Conclusions
	the Item 1 knife.
BCKYN8	1. There are toolmarks on the piece of hose, Item 3, that were produced using the knife, Item 2. 2. There are toolmarks on the piece of hose, Item 4, that were produced using the knife, Item 1.
C7VUE4	Items 1 and 2 were examined and tests made using the submitted exemplar tubing. The tests are being returned with their respective Items. Item 3 was microscopically compared with tests made using the Item 2 knife. It was punctured by the Item 2 knife. Item 4 was microscopically[sic] compared with tests made using the Item 1 knife. It was punctured by the Item 1 knife.
C8LVH7	The puncture in Item 3 was identified as having been produced using Item 2. The puncture in Item 4 was identified as having been produced using Item 1.
CABYDY	Part 1: Standards were made using the "Master" folding knife marked #1 (Green Paint) and compared to the striations appearing upon the yellow hose marked #4 with positive results. The striation appearing upon the yellow hose marked #4 were made by the blade of the "Master" folding knife marked #1 (Green Paint). Part 2: Standards were made using the "Master" folding knife marked #2 (White Paint) and compared to the striations appearing upon the orange hose marked #3 with positive results. The striations appearing upon the orange hose marked #3 were made by the blade of the "Master" folding knife marked #2 (White Paint).
CB7K3J	Silicone casts were made of the toolmarks in the punctures in the hoses for examination and comparison. The examination of the casts showed indications that both punctures were made by the point of single edged knife blades. The casts from the two punctures were compared to each other, and from the observed lack of correspondence it was concluded that the punctures were made by two knives. Test toolmarks were made with the two submitted knives, and silicone casts were made of the toolmarks for examination. Comparison of consecutively made toolmarks by each knife showed that each knife had good reproducibility in their toolmarks sufficient for an identification. Comparison of the silicone casts of the puncture marks in the hoses to the silicone casts of the test toolmarks made by the knives showed a correspondence of microscopic characteristics in the casts between the yellow plastic hose (Item 4) and the first submitted knife (Item 1) from which it was concluded that the submitted knife (item 1) was used to puncture the yellow plastic hose (Item 4). The examination further showed a correspondence of microscopic characteristics in the casts between the orange plastic hose (Item 3) and the second submitted knife (Item 2) from which it was concluded that the submitted knife (item 2) was used to puncture the orange plastic hose (Item 3).
CE7Z72	The Item 3 tubing was punctured by the Item 2 knife. The Item 4 tubing was punctured by the Item 1 knife.
CJG7QD	The defect on Item 3 was identified as having been produced by Item 2. The defect on Item 4 was identified as having been produced by Item 1. Lab generated evidence (orange and yellow tubing cut to produce tests) was retained with Item 001 for storage purposes.
CUXZVE	Conclusive support for the proposition that item 4 was cut by item 1. Conclusive support for the proposition that item 3 was cut by item 2.
CYC9Q7	The puncture in hose #3 showed characteristics consistent with the blade of lockback knife #2 whereas the characteristics of the puncture in hose #4 are consistent with the blade of lockback knife #1.

TABLE 2

WebCode	Conclusions
D2Y8GA	Item #1 was examined and tested. Item #2 was examined and tested. Toolmarks present on Item #3 were made by Item #2. Toolmarks present on Item #4 were made by Item #1.
D4XMPW	The puncture in the orange hose (item 3) was caused by the knife labeled as item 2. The puncture in the yellow hose (item 4) was caused by the knife labeled as item 1.
DAPPX4	Toolmarks present on Item 4 were produced by the Item 1. Toolmarks present on Item 3 were not produced by the Item 1. Toolmarks present on Item 3 were produced by the Item 2. Toolmarks present on Item 4 were not produced by the Item 2.
DEXD9J	The Item 3 toolmark was examined, compared microscopically, and identified as having been produced by the Item 2 knife. The Item 4 toolmark was examined, compared microscopically, and identified as having been produced by the Item 1 knife.
DR8VZM	Examination of the two (2) pieces of tubing, submitted as items #3, and #4, revealed the presence of a puncture type cut in the middle of each piece that is consistent with having been made by a knife. Microscopic comparisons of the evidence cut in item #3 with the test cuts made by the submitted pocket knives, item #1 and #2, revealed matching individual striated characteristics. This finding confirms that the evidence cut was made by the knife submitted as item #2. No conclusive determination could be made as to whether the tool marks registered on the piece of tubing, submitted as item #4, were made by the submitted knives. The toolmark exemplars generated using the submitted knives from Items #1 and #2 will be returned with the evidence.
EAMJRT	Examinations showed the tool marks on Item 3 were made by Item 2. Examinations showed the tool marks on Item 4 were made by Item 1.
EPEDMR	Test tool marks were made using Item 1 & Item 2. Test tool marks 1A (right side of blade) were compared microscopically to Item 3A & 4A (right sides of Item 3 & 4 hoses). The results of these examinations between test toolmark 1A & Item 4A are positive which means that there is sufficient agreement of individual striations found between test toolmark 1A and Item 4A. Therefore Item 4 was punctured by Item 1. The results of these examinations between test toolmark 1A and Item 3A are negative due to a lack of sufficient agreement of individual striations. Therefore Item 3 was not punctured by Item 1. Test tool marks 2A (right side of blade) were compared microscopically to Item 3A. The result of this examination is positive, which means that there is sufficient agreement of individual striations found between Item 2A & Item 3A. Therefore Item 2 was used to puncture Item 3.
EPY3WZ	The Item 1 knife cut the Item 4 hose. The Item 1 knife did not cut the Item 3 hose. The Item 2 knife cut the Item 3 hose. The Item 2 knife did not cut the Item 4 hose.
ETCZVM	The toolmarks observed on the punctured hoses in Items 3 and 4 bear class characteristics consistent with those produced by the knives in Items 1 and 2. However, the hoses in Items 3 and 4 could not be positively included or excluded as having been punctured by the knives in Items 1 or 2 to the exclusion of all other knives bearing the same class characteristics.
EV28FJ	Items 1, 2, 3 and 4 were examined and analyzed using microscopy. The toolmarks exhibited on the item 3 and item 4 punctured hoses were made by a cutting type tool using a slicing action. The toolmarks noted on the item 3 punctured hose were identified as having been produced by the item 2 knife. The toolmarks noted on the item 4 punctured hose were identified as having been produced by the item 1 knife.
EYZMLL	Test toolmarks were created using the folding knives, Items 1-2, and microscopically

TABLE 2

WebCode	Conclusions
	compared with the toolmarks exhibited on the sections of tubing, Items 3 and 4. The folding knife, Item 1, was identified as having been used to create the puncture-type toolmark exhibited on Item 4. The folding knife, Item 2, was identified as having been used to create the puncture-type toolmark exhibited on Item 3.
F324K2	1. Microscopic comparison disclosed that Exhibit 1 (Knife) made the questioned toolmarks on Exhibit 4 (Yellow hose). 2. Microscopic comparison disclosed that Exhibit 2 (Knife) made the questioned toolmarks on Exhibit 3 (Orange hose).
FKZ26H	The knife recovered from the first suspect (Item 001-01) produced the puncture in the yellow hose (Item 001-04). The knife recovered from the second suspect (Item 001-02) produced the puncture in the orange hose (Item 001-03).
FQRBBA	Upon microscopic examination, the toolmark impressions present on Item 4 are positively identified to test impression T-1 has[sic] having been made by Item 1. Upon microscopic examination, the toolmark impressions present on Item 3 are positively identified to test impression T-2 has[sic] having been made by Item 2.
FWCGZ4	Item 1 was identified as having made the tool marks on Item 4. Item 2 was identified as having made the tool marks on Item 3. Tests generated during examination are being returned in the same container as Items 1 & 2.
FXPY6U	Toolmarks observed in the puncture in the orange hose (Item 3) were determined to have been made by the lockblade knife (Item 2). Toolmarks observed in the puncture in the yellow hose (Item 4) were determined to have been made by the lockblade knife (Item 1).
FZZPNW	Item #3 was punctured by Item #2. Item #4 was punctured by Item #1.
G63AZ8	1) It is the opinion of this examiner that the cut/puncture mark in the tubing submitted as item #4 was caused by the knife submitted as item #1. 2) It is the opinion of this examiner that the cut/puncture mark in the tubing submitted as item #3 was caused by the knife submitted as item #2.
G92RPL	Microscopic comparisons of the knife puncture in Item #4 with exemplars generated using Item #1 revealed matching striated toolmarks. This finding confirms that the puncture in Item #4 was produced by the knife in Item #1. Microscopic comparisons of the knife puncture in Item #3 with exemplars generated using Item #2 revealed matching striated toolmarks. This finding confirms that the puncture in Item #3 was produced by the knife in Item #2.
GGWR7Z	1) There are toolmarks on the portion of orange tubing, Item 3, that had been produced with the knife, Item 2. 2) There are toolmarks on the portion of yellow tubing, Item 4, that had been produced with the knife, Item 1.
GYFEZN	The Q-1 tool mark (Item 3) was produced by the K-2 tool (Item 2). The Q-2 tool mark (Item 4) was produced by the K-1 tool (Item 1).
H7UPK3	Item 1 - This knife was used to make test cuts in the submitted tubing. Item 2 - This knife was used to make test cuts in the submitted tubing. Item 3 - The cut area of this section of tubing was compared microscopically with tests. It was punctured by the knife Item 2. Item 4 - The cut area of this section of tubing was compared microscopically with tests. It was punctured by the knife Item 1.
HBMWY6	Item 3 was punctured and cut by using Item 1. Item 4 was punctured and cut by using Item 2.

TABLE 2

WebCode	Conclusions
HE8NB8	Toolmarks present on the Item #3 (amber tubing) were identified as having been produced using the Item #2 knife (white dot). Toolmarks present on the Item #4 (yellow tubing) were identified as having been produced using the Item #1 knife (green dot).
HN99BE	After examining item 1 and item 2 (lockback knives) with microscopes, they were found to have a difference in the blade shape. Items 3 and 4 (hoses) were cut in order to examine the tool marks on the sliced surfaces. The two types of oil hoses were pierced with item 1 and item 2 repeatedly. As a result, it was concluded that both item 3 and item 4 were pierced with item 2. The tool marks left on item 3 and item 4 were different from those left by item 1, whereas they were identical with the[sic] those left by item 2.
J36XQC	The hose Item 3 was cut by the knife Item 2. The hose Item 4 was cut by the knife Item 1.
J38E3N	Test toolmarks were created using the Master Knives brand folding lockback knives, Items 1 and 2, and microscopically compared to the toolmarks exhibited on the sections of tubing, Items 3 and 4. The Master Knives brand knife, Item 1, was identified as having created the perforating defect exhibited on the section of yellow tubing, Item 4. The Master Knives brand knife, Item 2, was identified as having created the perforating defect exhibited on the section of orange tubing, Item 3.
J6U6DU	Evidence items 1-3 and 1-4 were microscopically compared to test punctures made with evidence items 1-1 and 1-2 with the following results. The puncture in item 1-3 was positively made with the submitted silver Master brand folding knife found in evidence item 1-2. The puncture in item 1-4 was positively made with the submitted silver Master brand folding knife found in evidence item 1-1.
JG6PQV	The Item 3 and Item 4 questioned punctures were compared to test punctures produced using both the Item 1 knife and Item 2 knife. The Item 3 questioned puncture was made using the Item 2 knife. The Item 4 questioned puncture was made using the Item 1 knife.
JKVRUN	Examination showed that the knife (Item 1) was used to cause the damage to the hose (Item 4). Examination showed that the knife (Item 2) was used to cause the damage to the hose (Item 3).
JMT87R	1. The orange tubing (item 3) was cut by the lockback knife (item 2). 2. The yellow tubing (item 4) was cut by the lockback knife (item 1).
JQXUM3	The toolmarks on Item 4 were identified as having been produced by the Item 1 knife. Because of differences in individual characteristics the toolmarks on Item 3 were eliminated as having been produced by either the Item 1 or Item 2 knife.
JZHB8W	Standards were made using the knife recovered from the first suspect (item #1) and compared against the toolmarks in the punctured yellow hose recovered from the business (item #4). The examination showed that the marks present in the yellow hose (item #4) were made by the knife recovered from the first suspect (item #1). Standards were made using the knife recovered from the second suspect (item #2) and compared against the toolmarks in the punctured orange hose recovered from the business (item #3). The examination showed that the marks present on the orange hose (item #3) were made by the knife recovered from the second suspect (item #2).
K7FH4B	The microscopic striation of item 1 (lockback knife with green paint) match with the microscopic striation punctured hose item 3. The microscopic striation of item 1 (lockback knife with green paint) match with the microscopic striation punctured hose item 4. There is no

TABLE 2

WebCode	Conclusions
	match of item 2 (lockback knife with white paint) with punctured hose item 3 and item 4. From the exam item 1 was use to make puncture in item 3 and 4.[sic]
KAA6ZD	The puncture mark on Item 3 was made with Item 2. The puncture mark on Item 4 was made with Item 1.
KGJDKU	The Item 4 tubing was identified as having been cut by the Item 1 Master knives, serrated lock back knife. No conclusion could be reached as to whether the toolmarks present on the Item 3 tubing were produced by the Item 1 or Item 2 Master knives, serrated lock back knives.
L3YC6F	Microscopic examinations of item #3, the orange piece of hose, revealed a cut/puncture mark that matched individual characteristics to test cuts made by item #2. This finding confirms that the cut made in item #3 was made by the knife, item #2. Microscopic examinations of item #4, the yellow piece of hose, revealed a cut/puncture mark that matched individual characteristics to the test cut made by item #1. This finding confirms that the cut in item #4 was made by the knife, item #1.
LD2KXY	The punctured orange tubing, item 3, and the punctured yellow tubing, item 4 were examined microscopically and microscopic markings present on the two (2) pieces of tubing were compared with toolmarks produced by the two (2) knives[sic] in items 1 and 2. The punctured hose, item 3, was identified microscopically as having been made by the knife, item 2. The punctured hose, item 4, was identified microscopically as having been made by the knife, item 1.
M2YRVL	1. Examinations showed that the tool marks present in the puncture found in the orange hose (Item 3) were made by the Item 2 knife. 2. Examinations showed that the tool marks present in the puncture found in the yellow hose (Item 4) were made by the Item 1 knife.
M4PTYN	The segment of yellow hose (4) was cut by one of the two lockback knives (1). The segment of orange hose (3) was cut by one of the two lockback knives (2).
M7FWUG	Initial examination of Item 3 and Item 4 (tubing) both disclosed a single cut type of puncture located in the side of the tubing. Microscopic examination disclosed that the puncture cut damage to Item 3 (tubing) was caused by Item 2 (knife). The puncture cut damage to Item 4 (tubing) was caused by Item 1 (knife).
MECTQJ	1. The knife labelled as item 1 was identified as having caused the puncture to the questioned hose labelled as item 4. 2. The knife labelled as item 2 was identified as having caused the puncture to the questioned hose labelled as item 3.
MJGRN3	Test cuts were made by the submitted tools, Items 1 and 2, into similar hoses submitted for test purposes. Items 3 and 4 were microscopically examined and compared to test cuts made by Items 1 and 2. The tool marks on Item 3 were consistent with a slicing tool and were identified as being made by Item 2, the lockback knife recovered from first suspect. The tool marks on Item 4 were also consistent with a slicing tool and were identified as being made by Item 1, the lockback knife recovered from the second suspect.
MNDEGQ	Opinion 1: The puncture toolmark present on the body of the submitted yellow tubing, Item 4, was produced by the submitted knife, Item 1. Opinion 2: The puncture toolmark present on the body of the submitted red[sic] tubing, Item 3, was produced by the submitted knife, Item 2.
MPBHE8	Based on matching class characteristics and individualizing detail, it was determined that the puncture mark in the hose (Item 3) from the scene was made by the Lockback knife (Item 2) from the second suspect and, consequently, not by the Lockback knife (Item 1) from the first

TABLE 2

WebCode	Conclusions
	<p>suspect. Examination of the puncture mark found in the hose (Item 4) was inconclusive as to having been made by either the Lockback knife (Item 1) recovered from the first suspect or the Lockback knife (Item 2) recovered from the second suspect.</p>
MR2LAZ	<p>The puncture in Item 3 was identified as having been made using Item 2. The puncture in Item 4 was identified as having been made using Item 1.</p>
MVUQWC	<p>I have found a match between the toolmarks found on the punctured hose, Item 3, and the marks produced by the suspect's Lockback knife, Item 2. This knife was used to cut the punctured hose, Item 3. No match was found between the toolmarks found on the punctured hose, Item 4, and the marks produced by the suspect's Lockback knife, Item 2. This knife was not used to cut the punctured hose Item 4. No match was found between the toolmarks found on both punctured hoses, Items 3 and 4, and the marks produced by the suspect's 2nd Lockback knife, Item 1. This knife was not used to cut the punctured hoses, Items 3 and 4.</p>
N3FX3N	<p>Test cuts made with the submitted knives (Items 1 & 2) were compared to the cuts in the two pieces of evidence tubing (Items 3 & 4) with the following results: The orange tubing (Item 3) was identified as having been cut (punctured) by the knife; Item 2. The yellow tubing (Item 4) was identified as having been cut (punctured) by the knife; Item 1. Note: To facilitate the comparison process, each piece of tubing was cut in half longitudinally.</p>
NB8J3V	<p>Tests were conducted with suitable material (submitted) (hoses) using the knives Exhibits 1 and 2. The toolmarks (puncture) on Exhibit 3 was produced by the knife Exhibit 2. The toolmark (puncture) on Exhibit 4 was produced by the knife Exhibit 1.</p>
NEK3N4	<p>Item 1: The knife (item 1) was used to puncture the yellow hose (item 4). The knife (item 2) can be excluded. Item 2: This knife (item 2) was used to puncture the orange hose (item 3). The knife (item 1) can be excluded.</p>
NPR87R	<p>The results of the examination extremely strongly support that the knife Item 1 caused the damage to the punctured hose Item 4 (Level +4). The results of the examination extremely strongly support that the knife Item 2 caused the damage to the punctured hose Item 3 (Level +4).</p>
NXX7LU	<p>The overall mark in Item 4 (yellow hose) has class and individualizing characteristics that compared with test marks made with Item 1 (Lockback knife recovered from first suspect). Sufficient matching striae were found between Item 4 and several test punctures that were made with Item 1 in the additional supplied material of Item 4 to reach the conclusion that Item 4 was punctured with Item 1. Features of the overall puncture of Item 4 (yellow hose) as well as test marks made with Item 2 (Lockback knife recovered from second suspect), showed both class characteristics and individualizing characteristics in appearance on the outer surface of the hose and in the general striae pattern on the right and left sides of the mark. However, the striae seen in Item 4 did not compare with striae produced with test punctures made in the additional supplied material with Item 2. Features of the overall puncture of Item 3 (orange hose) as well as test marks made with Item 1 (Lockback knife recovered from first suspect) and Item 2 (Lockback knife recovered from second suspect), showed both class characteristics and individualizing characteristics in appearance on the outer surface of the hose and in the general striae pattern on the right and left sides of the mark. However, the striae did not compare with test punctures made in the additional supplied material with either Item 1 or Item 2. Conclusion: Item 1 (lockback knife recovered from the first suspect) was used to puncture Item 4 (yellow hose). Item 1 (lockback knife recovered from the first suspect) and Item 2 (lockback knife recovered from second suspect) was[sic] not used to puncture Item 3 (orange hose).</p>

TABLE 2

WebCode	Conclusions
PA8333	Upon microscopic examination, the toolmark observed in item #3 and test impressions from item #2 are identified as having been produced by the same tool. Upon microscopic examination, the toolmark observed in item #4 and test impression from item #1 are identified as having been produced by the same tool.
PBHXRF	The submitted specimens marked Item 1 and Item 2 were examined and identified as two (2) lockback knives. The submitted specimen marked Item 3 was examined and identified as an orange-colored hose exhibiting a puncture toolmark. The submitted specimen marked Item 4 was examined and identified as a yellow-colored hose exhibiting a puncture toolmark. Test toolmarks created using Item 1 and Item 2 were microscopically compared to the puncture toolmarks exhibited on Item 3 and Item 4. As a result of microscopic examination, Item 1 was identified as having punctured Item 4, and Item 2 was identified as having punctured Item 3.
PCTQGN	Items 1 and 2 are folding knives bearing the trade name "Master Knives." The Item 2 knife was identified as having produced the toolmark present on the Item 3 rubber tube. The Item 1 knife was identified as having produced the toolmark present on the Item 4 rubber tube.
PGTQ4Z	Item 1 was identified as having made the puncture in Item 4. Items 1 and 2 could neither be identified nor eliminated as having made the puncture in Item 3.
PQAKA2	The knife Item 2 was used to puncture the two hoses Item 3 and 4.
PW3MFM	The orange tubing in item 3 was punctured by the submitted knife in item 2. The yellow tubing in item 4 was punctured by the submitted knife in item 1.
PWH7YJ	1. It is our opinion that the Item 1 knife was used to cut the Item 4 hose. It is our opinion that the Item 2 knife was used to cut the Item 3 hose.
PY8AUC	Item #1A (#1) was used to puncture item #1D (yellow colored tubing) (#4). Item #1B (#2) was used to puncture item #1C (orange colored tubing) (#3).
Q7JVBT	Item 1, Item 4 - The tool marks on the Item 4 hose were made by the Item 1 lockback knife. Item 2, Item 3 - The tool marks on the Item 3 hose were made by the Item 2 lockback knife.
Q7XW43	This examiner used two (2) pieces of similar tubing to items 3 & 4 for test purposes and made test puncture marks in each sample with items 1 & 2. These test samples were then microscopically compared to items 3 & 4, with the following results; The puncture mark on item #3 was created by item #2. (Knife with white dot). The puncture mark on item #4 was created by item #1. (Knife with green dot).
Q992WB	[No Conclusions Reported.]
Q9TTWN	1. Examination of Exhibit 3 (Orange hose section) disclosed toolmark damage consistent with being made by a single bladed slicing tool. Microscopic comparison disclosed that Exhibit 2 (Knife) made the cut in Exhibit 3. 2. Examination of Exhibit 4 (Yellow hose section) disclosed toolmark damage consistent with being made by a single bladed slicing tool. Microscopic comparison disclosed that Exhibit 1 (Knife) made the cut in Exhibit 4.
QBU2RL	Test cuts were made using the Item 1 and 2 knives for comparison to the Item 3 and Item 4 toolmarks. The Item 2 knife made the toolmark on Item 3. The Item 4 toolmark could neither be identified nor eliminated as having been cut using either the Item 1 or Item 2 knives, but bore the same class characteristics and could have been cut using them for that reason.

TABLE 2

WebCode	Conclusions
QBXJ2H	I examined the two knives and made test marks using the provided tubing. I microscopically compared the test marks to the tubing with apparent cut/stab marks submitted as Item 3 and Item 4. I observed sufficient matching stria in comparisons of Item 3 to test marks made with the knife submitted as Item 2. The knife, Item 2, made the cut/stab mark in the tubing submitted as Item 3. I observed sufficient matching stria in comparisons of Item 4 to test marks made with the knife submitted as Item 1. The knife, Item 1, made the cut/stab mark in the tubing submitted as Item 4.
QCT6P3	The orange hose recovered from the business (Item 3) was punctured with the knife recovered from the second suspect (Item 2). The yellow hose recovered from the business (Item 4) was punctured with the knife recovered from the first suspect (Item 1).
QDJ8CH	Examinations showed the tool marks on Item 3 were made by Item 2. Examinations showed the tool marks on Item 4 were made by Item 1.
QEHBAY	1) After performing microscopic examination, it is the opinion of this examiner that evidence Item 1 knife was used to puncture Item 4 hose. 2) After performing microscopic examination, it is the opinion of this examiner that evidence Item 2 knife was used to puncture Item 3 hose.
QKHYEK	By using a comparison light microscope the comparison of the tool marks of the pressurized heating oil supply hose (Item 3; Item 4) and the test marks, caused by the suspect lockback knives[sic] (Item 2; Item 1), show numerous well matching features of general and individual characteristics. Such matching features only exist if the tool marks from crime scene and the test marks were caused by the same tool. The wording of the conclusions in our report would be: The tool mark (Item 3) was caused by the edge of the lockback knife (white paint, Item 2). The tool mark (Item 4) was caused by the edge of the lockback knife (green paint, Item 1).
QLDHKR	Toolmarks on the piece of hose, item 3, were produced with the knife item 2. Toolmarks on the piece of hose, item 4, were produced with the knife, item 1.
QLV9RQ	The Item 1 (lockback knife) caused the damages on Item 4 (punctured hose). The Item 2 (lockback knife) caused the damages on Item 3 (punctured hose).
QUR6VG	The puncture mark in the orange supply hose (Item 3) was identified as having been made by the Item #2 lockback knife (white paint). The puncture mark in the yellow supply hose (Item 4) was identified as having been made by the Item #1 lockback knife (green paint).
R2PBRV	The knives Exhibits 1 and 2 were used to make tests in suitable materials. The sections of tubing Exhibits 3 and 4 were compared microscopically with tests made using the knives Exhibits 1 and 2. The section of tubing Exhibit 3 was identified as having been cut by the knife Exhibit 2. The section of tubing Exhibit 4 was identified as having been cut by the knife Exhibit 1.
R4U2WP	Item 3 was punctured by Item 2. Item 4 was punctured by Item 1.
RGX84H	The item 3 puncture mark was made by the item 2 knife. The item 4 puncture mark bears similar in nature marks to the items 1 and 2 knives but insufficient microscopic marks to permit an identification.
RHJK8M	Item 4 was punctured by item 1. Item 3 was punctured by item 2.
RJ3XAW	Item 1 was used to puncture Item 4. Item 2 was used to puncture Item 3.
RU2QHN	After examining the marks on the two items (Item 3 and Item 4) and comparing them with the

TABLE 2

WebCode	Conclusions
	test marks left on the hose substrates by lockback knives (Item 1 and Item 2) by using comparison microscope, it was found that marks left by Item 1 has[sic] the same cross lines as the marks on Item 3 and Item 4. Therefore it is concluded that Item 1 (lockback knife with green paint) was used to puncture both supply hoses (Item 3 and Item 4).
RYY8X3	Tests were obtained by using Items #1 & #2 and were compared to the toolmarks on Items #3 and #4 with the following results: Item #1 was used to cause the toolmarks on Item #4. Item #2 was used to cause the toolmarks on Item #3.
TDXDPD	Items 3 and 4 were microscopically compared with tests made by the Item 1 and Item 2 knives[sic] with the following conclusions: The Item 3 tool mark was made by the Item 2 knife. The Item 4 tool mark was inconclusive with the Item 1 tests. The Item 4 tool mark could have been made by Item 1 or by another similar tool. The Item 4 tool mark was not made by the Item 2 knife.
TLN46D	The tool marks found in the punctures present on Items 3 and 4 were microscopically compared with test marks made with the Item 1 and Item 2 knives. Matching individual identifying characteristics were found. It was concluded that the puncture in the Item 3 tubing had been created with the Item 2 knife, and the puncture in the Item 4 tubing was created with the Item 1 knife.
TTNEKJ	As a result of the macroscopic comparison it is certain that the toolmarks present on the questioned punctured hose Item 3 have been produced with the knife Item 2. It is certain that the toolmarks present on the questioned punctured hose Item 4 have been produced with the knife Item 1.
TVCWEP	The cut in the center of the Item 3 hose was made by the Item 2 knife. The cut in the center of the Item 4 hose was made by the Item 1 knife.
TVEFNL	Identified item 1-1 (Lockback knife with green paint) as having been used to puncture item 1-4 (Yellow tubing). Identified item 1-2 (Lockback knife with white paint) as having been used to puncture item 1-3 (Orange tubing).
TXGP9N	Identification: Based on the macroscopic and microscopic comparison of test cuts made by Item #1 (White[sic] dot) with cut found in Item #4, the cut in Item #4 was identified as having been made by item #1. Identification: Based on the macroscopic and microscopic comparison of test cuts made by Item #2 (White dot) with cut found in Item #3, the cut in Item #3 was identified as having been made by item #2.
TYDWZF	[No Conclusions Reported.]
TYET3Y	1. There is conclusive scientific support for the proposition that the submitted Lockback knife, Item 1 had been used to puncture the submitted hose, Item 4. 2. There is conclusive scientific support for the proposition that the submitted Lockback knife, Item Item[sic] 2 had been used to puncture the submitted hose, Item 3.
U2CQU3	The Item 1 and 2 knives were examined and test marks were produced with both tools. The toolmarks present on the Item 3 hose were examined microscopically and identified as having been produced by the Item 2 knife. The toolmarks present on the Item 4 hose were examined microscopically and identified as having been produced by the Item 1 knife. The tests produced with the Item 1 and 2 knives are being returned with the evidence and should be maintained.
U79DRW	Test cuts were made in the provided tubing substrates using both knives (Item 1 and Item 2).

TABLE 2

WebCode	Conclusions
	The toolmarks in these test cuts were then microscopically compared to the toolmarks in the cuts on the tubing from Item 3 and Item 4. Sufficient agreement in class and individual characteristics was observed between the toolmarks in a test cut from Item 2 on the substrate tubing and the toolmarks in the cut on Item 3 to conclude that the knife (Item 2) produced the cut in the amber tubing (Item 3). Sufficient agreement in class and individual characteristics was observed between the toolmarks in a test cut from Item 1 on the substrate tubing and the toolmarks in the cut on Item 4 to conclude that the knife (Item 1) produced the cut in the yellow tubing (Item 4).
UE2JNJ	The lockback knife (Item 1) was identified as having been used to puncture the yellow hose (Item 4). The lockback knife (Item 2) was identified as having been used to puncture the orange hose (Item 3).
UFHMFP	The knives Items 1 and 2 were used to make tests with the supplied hose in Item 5[sic]. The puncture in the hose Item 3 was compared microscopically with tests. It was cut with the knife Item 2. The puncture in the hose Item 4 was compared microscopically with tests. It was cut with the knife Item 1.
UKZL67	Item 1 was identified as having punctured/cut item 4. Item 2 was identified as having punctured/cut item 3. Four test cuts using items 1 and 2, puncturing the orange test hose, and four test cuts using items 1 and 2, puncturing the yellow test hose were packaged in a laboratory container, designated item "1-2 tests", and returned with the evidence.
UMZWXX	Class characteristics are the same for all the samples (Item 3-4 and samples produced using Item 1-2). Comparison between Item 4 and samples produced using Item 1 shows sufficient agreement to support a conclusion of a common source. The same kind of similarities[sic] have been observed between Item 3 and samples produced using Item 2. Item 3 has thus been produced by Item 2.
UT6WW4	The Lockback knife identified with the Item #2 was the tool used for hitting the Item #3 and #4 (oil line).
UTZGKN	The puncture mark on the section of vinyl hose (item 3) was identified as having been made by the knife (item 2). Agreement of the characteristics is sufficient to determine that the knife is the source of the puncture mark. The puncture mark on the section of vinyl hose (item 4) was identified as having been made by the knife (item 1). Agreement of the characteristics is sufficient to determine that the knife is the source of the puncture mark.
UUEUDR	The cut/puncture in Item #3 (hose) was made by Item #2 (folding knife). The cut/puncture in Item #4 (hose) was made by Item #1 (folding knife).
UVU4HL	Toolmark damage in the perforation in the orange piece of tube, Exhibit 3, was identified as having been produced by the knife, Exhibit 2. Toolmark damage in the perforation in the yellow piece of tube, Exhibit 4, was identified as having been produced by the knife, Exhibit 1.
UWPN87	Examination of the piece of orange hose, submitted as item #3, revealed the presence of a single puncture type cut. Microscopic comparisons of this cut with test cuts made by the lock blade knives, submitted as items #1 and #2, revealed matching individual striated characteristics with the lock blade knife, item #2. This finding confirms that this piece of hose had been cut by this particular lock blade knife. Examination of the piece of yellow hose, submitted as item #4, revealed the presence of a single puncture type cut. Microscopic comparisons of this cut with test cuts made by the lock blade knives, submitted as items #1 and #2, revealed matching individual striated characteristics with the lock blade knife, item

TABLE 2

WebCode	Conclusions
	#1. This finding confirms that this piece of hose had been cut by this particular lock blade knife. Test cuts made by the submitted knives are being returned with the other items of evidence.
V4MN9K	The toolmarks present on Item 3 were identified as having been made by the knife, Item 2. The toolmarks present on Item 4 were identified as having been made by the knife, Item 1.
VDP99R	Identification - Knife item 1 was used to puncture the yellow colored hose item 4. Identification - Knife item 2 was used to puncture the orange colored hose item 3.
VJTBB7	Items 1 and 2 are two Master Knives brand folding blade knives. Item 3 is a piece of orange colored tubing. Item 4 is a piece of yellow colored tubing. Using Items 1 and 2, test marks were made in the sections of tubing provided and microscopically compared to the questioned areas of Items 3 and 4. Item 1 was identified as having caused the damage to Item 4. Item 2 was identified as having caused the damage to Item 3.
VJVRKX	The Q-1 tool mark (Item 3) was produced by the K-2 tool (Item 2). The Q-2 tool mark (Item 4) was produced by the K-1 tool (Item 1).
VQCF6R	The two pieces of plastic tubing/hose, sub-items 1C and 1D, were examined and each was found to exhibit a single stab mark. Test marks were created in the submitted reference materials (the orange and yellow tubing) using the knives, sub-items 1A and 1B. These test marks were then microscopically compared to the stab marks observed on the evidence tubing, sub-items 1C and 1D. By means of comparison microscopy, the orange evidence tubing, sub-item 1C ("Item 3"), was determined to have been stabbed by the knife, sub-item 1B ("Item 2"). By means of comparison microscopy, the yellow evidence tubing, sub-item 1D ("Item 4"), was determined to have been stabbed by the knife, sub-item 1A ("Item 1").
VXUXD9	Microscopic comparisons of the puncture mark on Item #3 with test marks made in similar hose using Item #2 revealed matching striated marks. This finding confirms that the puncture mark on Item #3 was made by using the knife from Item #2. Microscopic comparisons of the puncture mark on Item #4 with test marks made in similar hose using Item #1 revealed matching striated marks. This finding confirms that the puncture mark on Item #4 was made using the knife from Item #1.
W3JQ42	The puncture toolmarks on the orange hose (Item 3) are caused by the lockback knife (Item 2). The puncture toolmarks on the yellow hose (Item 4) are caused by the lockback knife (Item 1).
W3M9BD	Microscopic comparison of the test marks made with the knife in item #2 to the tool marks in the puncture mark of item #3 revealed a match. Microscopic comparison of test marks made with submissions #1 & #2 to the tool marks on submission #4 revealed similar class characteristics but failed to reveal a match. Therefore submissions #1 & #2 could not be identified or excluded from making the marks on submission #4.
W4GWT9	Items 3 and 4 were microscopically compared to test marks made with Items 1 & 2. The toolmark on Item 3 was made by Item 2. The toolmark on Item 4 was made by Item 1.
W69WNY	The toolmark areas on the pieces of punctured hose, Item 3 and Item 4, were microscopically examined and compared with test toolmarks made with the Item 1 knife and Item 2 knife. Based on these comparisons, in my opinion, Item 1 knife can be identified as causing the toolmarks present on Item 4 hose and Item 2 knife can be identified as causing the toolmarks present on Item 3 hose.
WCB489	The linear defect present on item 3 was produced by item 2. The linear defect present on item

TABLE 2

WebCode	Conclusions
	4 was produced by item 1.
WCKR8T	The toolmarks present on Item #1.3.1 (CTS Item #3) were identified as having been made by Item #1.2.1 tool (CTS Item #2). The toolmarks present on Item #1.4.1 (CTS Item #4) were identified as having been made by Item #1.1.1 tool (CTS Item #1).
WFAHTC	The toolmarks present in the puncture of the orange tubing, designated as Item 3, were identified as having been made by the knife, designated as Item 2. The toolmarks present in the puncture of the yellow tubing, designated as Item 4, were identified as having been made by the knife, designated as Item 1.
WME3BF	The puncture mark on Item 3, the orange plastic tubing, was made with Item 2, the knife with a white dot. The puncture mark on Item 4, the yellow plastic tubing, was made with Item 1, the knife with a green dot.
WMRNUP	Toolmarks present on Exhibit #3 were made by Exhibit #2. Toolmarks present on Exhibit #4 were made by Exhibit #1.
WMTMNX	Items 3 and 4 were microscopically examined. The puncture in Item 3 was identified as having been produced by the Item 2 knife. The puncture in Item 4 was identified as having been produced by the Item 1 knife. Five (5) tests made in laboratory stock material using the Item 1 knife are being returned as Item 1A and should be maintained for possible future examinations. Six (6) tests made in laboratory stock material using the Item 2 knife are being returned as Item 2A and should be maintained for possible future examinations.
WPEC8B	1. Examinations showed the tool marks in the puncture in Item 3 were made by Item 2. 2. Examinations showed the tool marks in the puncture in Item 4 were made by Item 1.
WXRGZV	Examination of the hose segments, items 3 and 4, revealed a puncture near the center of each. The following was determined through microscopic comparison: The item 1 knife caused the puncture in the item 4 hose. The item 2 knife caused the puncture in the item 3 hose.
WZHH4X	Item 1 punctured Item 4. Microscopic comparison of Item 4 with a test cut from Item 1 revealed agreement of unique striations. Item 2 punctured Item 3. Microscopic comparison of Item 3 with a test cut from Item 2 revealed agreement of unique striations.
X9U3V2	The tool mark on Item 3, the orange hose, was made with Item 2, the Master Knives knife. The tool mark on Item 4, the yellow hose, was made with Item 1, the Master Knives knife.
XDKB7U	The submitted knives, Items 1 and 2, were used to make test marks. These tests were compared with the damaged areas of Items 3 and 4. The damaged area in Item 3 was made by Item 2. The damaged area in Item 4 was made by Item 1.
XDY2V6	Item 3 has a penetrating striated defect, a toolmark. Using a toolmark comparison microscope, I matched many of these striations to a test toolmark made with item 2. Item 2 made the toolmark in item 3. Item 4 has a penetrating striated defect, a toolmark. Using a toolmark comparison microscope, I matched many of these striations to a test toolmark made with item 1. Item 1 made the toolmark in item 4.
XF8YKF	The lockback knife in Item #1 was identified as having made the puncture in the hose in Item #4. The lockback knife in Item #2 was identified as having made the puncture in the hose in Item #3.

TABLE 2

WebCode	Conclusions
XGHU78	Microscopic examination and comparison of the questioned toolmark in the yellow hose section, Item 4, revealed that it was made by the Master brand lockback folder[sic] knife, Item 1. Microscopic examination and comparison of the questioned toolmark in the orange hose section, Item 3, revealed that it was made by the Master brand lockback folder[sic] knife, Item 2.
XL99Q9	Exemplar tool item 1 is excluded as a possible source of unknown impression item 3, based on class characteristics. Exemplar tool item 1 is the source of unknown impression item 4 based on class and individualizing characteristics. Exemplar tool item 2 is excluded as a possible source of unknown impression item 4 based on class characteristics. Exemplar tool item 2 is the source of unknown impression item 3 based on class and individualizing characteristics.
XML389	Item 1 was used to cause the puncture in the hose, item 4. Item 1 was not used to cause the puncture in the hose, item 3. Item 2 was used to cause the puncture in the hose, item 3. Item 2 was not used to cause the puncture in the hose, item 4.
XP8RQL	The cut in the Item 3 tubing section was made by the Item 2 knife. The cut in the Item 4 tubing section was made by the Item 1 knife.
XPCJRW	[No Conclusions Reported.]
XRGKWL	The toolmark found in Item 3 was identified as having been produced by the knife contained in Item 2. The toolmark found in Item 4 was identified as having been produced by the knife contained in Item 1.
XX3K78	Examinations showed the tool marks on Item #3 were made by Item #2. Examinations showed the tool marks on Item #4 were made by Item #1.
Y3ZGCD	Test toolmarks from the two knives (Item 1 & 2) were microscopically examined in conjunction with the toolmarks present on the evidence hoses. Based on these comparative examinations, the following was determined: The toolmark present on the orange hose in Item 3 had been made by the knife in Item 2. The toolmark present on the yellow hose Item 4 had been made by the knife in Item 1.
Y8N9CT	Microscopic comparison of the test toolmarks produced by Item 1 (Lockback knife) and Item 2 (Lockback knife) were consistent both in class and individual characteristics with the toolmarks on Item 3 and Item 4. The punctured[sic] on Item 3 (orange) have one slender end and one triangle end. And the toolmarks on Item 3 match with the test toolmarks produced by Item 2. Therefore, toolmarks on Item 3 were identified as having been produced by Item 2. The punctured[sic] on Item 4 (yellow) have one slender end and one triangle end. And the toolmarks on Item 4 match with the test toolmarks produced by Item 1. Therefore, toolmarks on Item 4 were identified as having been produced by Item 1.
Y9JTZD	The knife in Item #1 was identified as having punctured the hose in Item #4. The knife in Item #2 was identified as having punctured the hose in Item #3.
Y9MCAB	Item #1 (knife #1) was used to create the toolmarks in Item #4 (yellow hose). Item #2 (knife #2) was used to create the toolmarks in Item #3 (orange hose).
YABU4G	[No Conclusions Reported.]
YHNYW2	Item #1 was examined. Test marks were made using Item #1. Item #2 was examined. Test marks were made using Item #2. A toolmark present on Item #3 was made by Item #2. A toolmark present on Item #4 was made by Item #1.

TABLE 2

WebCode	Conclusions
YKD3RT	Upon microscopic examination, the following results were obtained: The submitted Master brand lock back knife (Item #1) is identified as having produced the toolmarks observed on the submitted portion of punctured yellow hose (Item #4). The submitted Master brand lock back knife (Item #2) is identified as having produced the toolmarks observed on the submitted portion of punctured orange hose (Item #3).
YNDEPE	Reference puncture marks were made with the submitted lockback knives[sic] (items 1 and 2) in the hose substrates. Next, castings were made of the reference marks as well as of the damaged sections of the submitted punctured hoses (items 3 and 4). These castings were consequently compared with a comparison microscope. No subclass agreement was found between the reference marks from the two knives[sic] (items 1 and 2). Compelling agreement was found between the reference mark from knife 1 and the mark in hose 4, from which we conclude that the questioned knife 1 caused the damaged[sic] to the punctured hose 4. Equivalently there is extremely good agreement between the reference mark from knife 2 and the mark in hose 3 from which we conclude that the questioned knife 2 caused the damage to the punctured hose 3.
YRFAF9	A. The item #3, orange hose, was punctured with the item #2, knife. B. The item #4, yellow hose, was punctured with the item #1, knife.
Z2XB9N	The lockback knife, Item 1, was determined to have punctured the yellow hose, Item 4. The lockback knife, Item 2, was determined to have punctured the orange hose, Item 3.
ZDD6JG	The toolmarks on the punctured hose, item #3, have been made by the lockback knife[sic], item #2. The toolmarks observed on the punctured hose, item #4, have been made by the lockback knife[sic], item #1.
ZFYUX3	The hose (Item 3) was cut with the Item 2 knife. The hose (Item 4) was cut with the Item 1 knife.
ZH4K6H	Lockback knife recovered from first suspect with green paint caused the damage to Item 4 (Second punctured hose recovered from the business). Lockback knife recovered from second suspect with white paint caused the damage to Item 3 (First punctured hose recovered from the business).
ZJY6T3	The toolmark on Item #3 was made by Item #2. The toolmark on Item #4 was made by Item #1.
ZKP7W6	The damaged area on the hose (item 3) was identified as having been made by the knife marked as item #2. The damaged area on the hose (item 4) was identified as having been made by the knife marked as item #1.
ZMEBRX	Items 3 & 4 each consist of a pipe that bears a puncture mark typical of having been produced by forceful contact with the tip of a blade of a knife with a single cutting edge. It was noted that each knife had a blade with a polished area at the tip showing that both had been used to force into an item. Both of the puncture marks in question have been compared with test marks produced using the submitted knives, items 1 & 2. The mark on pipe 3 was found to contain fine detail that corresponded precisely with fine detail present within test marks made using the knife, item 2. In addition, the mark on pipe 4 was found to contain fine detail that corresponded precisely with fine detail present within test marks made using the knife, item 1. In my opinion, in each case, the chance of this level of agreement having occurred by coincidence is so unlikely it can be discounted as a practical possibility. It follows that it is my opinion that the knife, item 2, made the puncture mark on pipe 3 and the knife,

TABLE 2

WebCode	Conclusions
	item 1, made the puncture mark on pipe 4.
ZP6RNQ	A microscopic examination was conducted comparing test marks made by the two submitted knives and the two submitted sections of damaged hose. The one submitted section of damaged orange hose Item #3 is identified as having been damaged by the one submitted lockback knife with white paint Item #2. The one submitted section of damaged yellow hose Item #4 is identified as having been damaged by the one submitted lockback knife with green paint Item #1.
ZRN7GL	The knife cuts in the two sections of tubing were microscopically examined and compared with test cuts made with the two submitted knives[sic]. The knife cut in the section of tubing item number 4 (yellow tubing) was identified as having been produced with the knife from item number 1 (green paint). The knife cut in the section of tubing item number 3 (orange tubing) was identified as having been produced with the knife from item number 2 (white paint).
ZTPJYT	The puncture defect in the hose segment in Item #3 was originally made with the knife in Item #2. The puncture defect in the hose segment in Item #4 was originally made with the knife in Item #1.
ZXFRLF	1. There are toolmarks on the orange tubing, Exhibit 3, that were produced with the knife, Exhibit 2. 2. There are toolmarks on the yellow tubing, Exhibit 4, that were produced with the knife, Exhibit 1.
ZXJBDH	1) The cut in Item 4 was made by the knife labeled as Item 1. 2) The cut in Item 3 was made by the knife labeled as Item 2.

Additional Comments

TABLE 3

WebCode	Additional Comments
79DZC4	The class characteristics for the hose submitted Item 3 and tests made with the Item 2 knife were similar, however there was no significant agreement of individual characteristics found. The tests made with the Item 2 knife matched very well. Therefore the result is inconclusive.
CABYDY	Yellow hose (#4) cut by green knife (#1). Orange hose (#3) cut by white knife (#2).
CE7Z72	Eliminations are not addressed in reporting when the evidence has been identified to another item.
CJG7QD	The defect on Item 3 was identified as having been made by Item 2 based on sufficient agreement of individual characteristics on striated toolmarks present on the cut surface of the orange tubing. Potential subclass on the milled blade edge is not a concern due to the ~90 degree angle (milled striations on blade in relation to direction of toolmark production). The defect on Item 4 was identified as having been made by Item 1 based on sufficient agreement of individual characteristics on striated toolmarks present on the cut surface of the yellow tubing. Potential subclass on the milled blade edge is not a concern due to the ~90 degree angle (milled striations on blade in relation to direction of toolmark production).
CYC9Q7	The sharpening of the point of both knife blades differed despite the obvious similarities in both lockback knives. So the characteristics of the puncture caused by each knife blade differed.
DR8VZM	Inconclusive findings on item #4 due to similar sized individual characteristics and the elasticity of the tubing.
ETCZVM	This comparison of the test marks from Items 1 & 2 to themselves was conducted first. Numerous parallel striations covering the thickness of the hose were observed. There was agreement in the parallel striations resulting from Items 1 & 2. These striations were also observed on the Items 3 & 4; however they lacked sufficient individualization for identification. Items 3 & 4 bear class characteristics consistent with the knives in both Items 1 & 2 therefore could not be included or excluded as having made the punctures.
EV28FJ	The resultant test marks produced by the item 1 and item 2 knives are being returned as item 1T and item 2T. The test marks should be maintained for possible future examinations.
G63AZ8	This was a fairly straightforward test.
JZHB8W	Test Methods: The following techniques were utilized in the examination of these items of evidence. Visual examination, Stereomicroscopy, Test impressions and Mikrosil castings, Toolmark comparison microscopy. Evidence Disposition: The test impressions and castings are being returned along with their respective source items.
KAA6ZD	The sections of hose submitted was used for testing purposes. (The two (2) sections of hose with no puncture marks). The test cuts were sealed in a manila envelope and will be retained in the laboratory for possible future analysis.
KGJDKU	The Standard Operating Procedures of the Laboratory will not allow an exclusion on microscopic marks only. There must be a difference in class characteristics in order to exclude.
MPBHE8	While the tool class characteristics were the same, there was disagreement of individualizing detail found between the puncture mark on the hose (Item 4) from the scene and test marks made using both the first suspect's knife (Item 1) and test marks made using the second suspect's knife (Item 2). This disagreement of individual characteristics was insufficient to allow elimination. Therefore, the results of this comparison are inconclusive.
NPR87R	We can send our scale of conclusions on request.

TABLE 3

WebCode	Additional Comments
PCTQGN	Please note that the two exclusions indicated in Question 1 are not the result of direct examinations but rather the application of the simple logic that if Item 1 produced the toolmark, then Item 2 did not.
QBU2RL	No conclusion could be reached as to whether the Item 4 toolmark was made using either of the knives.
TDXDPD	Item 4 tool mark was inconclusive with the Item 1 tests due to a lack of corresponding marks of value.
TTNEKJ	The toolmarks for comparison have been produced using the knives Item 1 and Item 2 and the test hose substrates provided. The toolmarks produced in our lab and the toolmarks from the scene have been moulded using a suitable moulding material. The mouldings have been examined[sic] using a comparative microscope.
TYET3Y	The hoses, Items 3 and 4 were cut to expose marks used for comparison purposes on both the slits of the questioned puncture marks.
ZJY6T3	The eliminations documented were based on the toolmarks being identified to the other tool, respectively.

Appendix: Data Sheet

Collaborative Testing Services - Forensic Testing Program

Test No. 11-528: Toolmarks Examination

DATA MUST BE RECEIVED BY September 06, 2011 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

Accreditation Release Statement

CTS submits external proficiency test data directly to ASCLD/LAB and FQS-International. 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 and/or FQS-International. (Accreditation Release section on the last page must be completed and submitted.)
- This participant's data is **NOT** intended for submission to ASCLD/LAB or FQS-International.

Scenario:

Police are investigating the vandalism of a business's heating oil line. Two of the pressurized heating oil supply hoses were punctured. While investigating the incident, police located two employees who were recently fired for drinking together on the job. Investigators have recovered knives from both employees, and are submitting them along with the sections of punctured hose for your examination.

Please note the following:

- The knives are sharp objects, and all precautions should be taken to handle them in a safe manner.
- For the sections of hose, the mark for examination is located in the center, the two ends were cut using a hose cutter and are not for comparison.
- Each Item is in a labeled envelope, it is suggested that when the Items are removed from their labeled envelopes, they be marked sufficiently using laboratory procedure. To assist in distinguishing the two submitted knives, each handle has been marked with paint as indicated next to their item description.
- Two 4" sections of both hose substrates are included for possible test mark purposes.

Items Submitted:

- Item 1: Lockback knife recovered from first suspect.(green paint)
Item 2: Lockback knife recovered from second suspect.(white paint)
Item 3: First punctured hose recovered from the business.(orange)
Item 4: Second punctured hose recovered from the business.(yellow)

1.) Did either of the questioned knives from the two suspects (Items 1 and 2) cause the damage to either of the questioned punctured hoses (Items 3 and 4)?

	<u>Item 1 (Lockback knife with green paint)</u>			<u>Item 2 (Lockback knife with white paint)</u>			
Item 3:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc* <input type="checkbox"/>	Item 3:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc* <input type="checkbox"/>
Item 4:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc* <input type="checkbox"/>	Item 4:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc* <input type="checkbox"/>

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

Please return all pages of this data sheet.

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RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **11-528: Toolmarks Examination**

This release page must be completed and received by **September 6, 2011** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

ASCLD/LAB RELEASE

If your lab has been accredited by ASCLD/LAB and you are submitting this data as part of their external proficiency test requirements, have the laboratory's designated individual complete the following.

The information below must be completed in its entirety for the results to be submitted to ASCLD/LAB.

ASCLD/LAB Legacy Certificate No. _____ ASCLD/LAB International Certificate No. _____

Signature _____ Date _____

Laboratory Name _____

Location (City/State) _____

FQS-INTERNATIONAL RELEASE

If your laboratory maintains its accreditation through FQS-International, please complete the following form in its entirety to have your results forwarded.

FQS-International Certificate No. _____

Signature and Title: _____ Date _____

Laboratory Name _____

Location (City/State) _____

Accreditation Release

Return Instructions

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

Questions? Contact us 8 am-4:30 pm EST

Telephone: +1-571-434-1925
email: forensics@cts-interlab.com

Please return all pages of this data sheet.

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