



## **Toolmarks Examination Test No. 16-528 Summary Report**

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This test was sent to 225 participants. Each sample set contained a folding pocket knife (Item 1) and two pieces of hose containing questioned toolmarks (Items 2 and 3). Participants were requested to examine these items and report their findings. Data were returned from 193 participants (86% 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**

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Each sample set contained one folding pocket knife (Item 1) and two sections of hose 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 and Item 3 hose pieces were both cut by the Item 1 pocket knife.

### **SAMPLE PREPARATION -**

Item 1 was a Camo Spring Assisted Folding Knife, Item # TF-464. Item 2 was "Choose-A-Color" PVC Tubing, Blue, 3/4" ID, 1" OD, 1/8" Wall Thickness. Item 3 was "Choose-A-Color" PVC Tubing, Black, 3/4" ID, 1" OD, 1/8" Wall Thickness.

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, 2 and 3 (IDENTIFICATION MARKS): Each knife was opened and inspected for defects. The knives were then stabbed into scrap tubing in a downward motion to remove manufacturing residue. The Item 2 blue hose was inserted into the jig and the Item 1 knife was inserted into the center of the hose straight downward and then the knife was pulled back out straight upward. The piece of blue hose was packaged into a pre-labeled Item 2 envelope. The Item 3 black hose was inserted into the jig and the Item 1 knife was inserted into the center of the hose straight downward and then the knife was pulled back out straight upward. The piece of black hose was packaged into a pre-labeled Item 3 envelope. The knife was packaged into a pre-labeled Item 1 envelope. Items 1, 2 and 3 were then immediately assembled into the sample pack box as described below. The above process was repeated until all identification toolmarks had been prepared.

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

VERIFICATION: Two of the three predistribution laboratories confirmed the expected identification between Items 1, 2 and 3. The remaining predistribution laboratory Identified Item 2, but was inconclusive for Item 3 as being produced by the Item 1 pocket knife and further stated that the inconclusive determination was based on laboratory policy.

In addition to the predistribution laboratories, 10 randomly selected sample sets were examined by a qualified toolmark examiner who also confirmed the expected identification between Items 1, 2 and 3.

## **Summary Comments**

This test was designed to allow participants to assess their proficiency at a toolmark examination involving striated type toolmarks. Each sample set consisted of one folding pocket knife (Item 1) and two pieces of hose (Items 2 and 3) containing the questioned toolmarks. Participants were requested to determine if the recovered pocket knife had cut either of the questioned pieces of hose. Both of the Item 2 and Item 3 hoses were cut by the Item 1 folding pocket knife. [Refer to Manufacturer's Information for preparation details.]

Of the 193 responding participants, 178 (92%) identified the Item 1 folding pocket knife as having punctured both of the Item 2 and Item 3 hoses. Seven participants either eliminated or were inconclusive as to either of the Item 2 and Item 3 hoses having been punctured by the Item 1 folding pocket knife. Six participants identified Item 2 and either eliminated or were inconclusive as to the Item 3 having been cut by the Item 1 pocket knife. The remaining two participants either eliminated or were inconclusive for Item 2 and identified Item 3 as having been cut by the Item 1 folding pocket knife.

## Examination Results

*Did the suspect's lockback pocket knife (Item 1) produce the questioned puncture toolmarks on either of the submitted pieces of hose (Items 2 or 3)?*

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
26NX94	Yes	Yes	6FWNFW	Yes	Yes
2HERHC	Yes	Yes	6TP4N7	Yes	Yes
2MU3VF	Yes	Yes	6TZEVA	Yes	Yes
2N2H68	Yes	Yes	6VCRZ7	Yes	Yes
2Q6DNB	Yes	Yes	728AP2	Yes	Yes
2QAXCD	Yes	Yes	74FL84	Yes	Yes
2ZEKQ6	Yes	Yes	7LFCN8	Yes	Yes
2ZJ3N4	Yes	Yes	7MWLMY	Yes	Yes
33HZBG	Yes	Yes	7PFMJ8	Inc	Yes
3BT76Y	Yes	Yes	7UP4TV	Yes	Yes
3EPVL7	Yes	Yes	834ZH3	Inc	Inc
3NT6RV	Yes	Yes	8CNF2W	Yes	Yes
3WDWM4	Yes	Yes	8RFD4R	Yes	Yes
3XGZRB	Yes	Yes	8WY27C	Yes	Yes
46WYYV	Yes	Yes	93KFAA	Yes	Yes
47CCPD	No	No	94RZPW	Yes	Yes
4NFQ78	Yes	Yes	94VHW9	Yes	Yes
4PM7DD	Yes	Yes	96MLJN	Yes	Yes
4QE9ZT	Yes	Yes	98UTR9	Yes	Yes
63UB47	Yes	Yes	99LWEN	Yes	Yes
6BLUHE	Yes	Yes	9BM3UU	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
9TAE9	Yes	Yes	DXR3C3	Yes	Yes
9TUU6C	Yes	Yes	DYNKE4	Yes	Yes
9XNP4X	Yes	Yes	E8A2M4	Yes	Yes
A6GJE2	Yes	Yes	E9LMAK	Yes	Yes
ADBN93	Yes	Yes	EAFQMR	Yes	Yes
AMYR8P	Yes	Yes	EAGJKZ	Yes	Yes
AUE9ZY	Yes	Yes	ECMVEU	Yes	Yes
AVAQ2Z	Yes	Yes	EHQUPK	Yes	Inc
AYF8J6	Yes	Yes	EJLDRL	Yes	Yes
AYPLHX	Yes	Yes	ENDKCF	Yes	Yes
B2WZN4	Yes	Yes	ENFETZ	Yes	Yes
BL47EY	Yes	Yes	EU4XBH	Yes	Yes
BLJRNZ	Yes	Yes	EZD7KY	Yes	Yes
BWHDY7	Yes	Yes	FABPEY	Yes	Yes
CC9Q3Y	Yes	Yes	FPM88Y	Yes	Yes
CCUE92	No	No	FQHNJW	Yes	Yes
CE3BVQ	Yes	Inc	FR9YAP	Yes	Yes
CHEJVV	Yes	Yes	FZQ8XL	Yes	Yes
CQT67Y	Yes	Yes	G2K492	Yes	Yes
CZF4W6	Yes	Yes	G4JJF4	Yes	Yes
D9BEU7	Yes	Yes	GG8LXV	Yes	Yes
DG27RY	Yes	Yes	GGC6LY	Yes	Yes
DX7GXQ	Yes	Yes	GGQEQT	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
GT23MW	Yes	Yes	L862FB	Yes	Yes
GXU9WR	Yes	Yes	LADAPV	Yes	Yes
H34N7G	Yes	Yes	LEQWFT	Yes	Yes
H9AFGY	Yes	Yes	LF2RAX	Yes	Yes
HBZJ4E	Yes	Yes	LKUUAR	Yes	Yes
HK6LBX	Yes	Yes	LM39FX	Yes	Yes
HLWPXD	Yes	Yes	M2HQNR	Yes	Yes
HPGABU	Yes	Yes	M7TLA	Yes	Yes
JF7MFY	Yes	Yes	MDUUAP	Yes	Yes
JGLUYV	Yes	Yes	MFW27M	Yes	Yes
JNHVTU	Yes	Yes	MP77HD	Yes	Yes
JPE3KL	Yes	Yes	MQGYLR	Yes	Yes
JPYRLT	Yes	Yes	NHLJAT	Yes	Yes
JV4N8E	Yes	Yes	NT384R	Yes	Yes
JVMKKZ	Yes	Yes	NVPVFR	Yes	Yes
JYYFDQ	Yes	Inc	P7JQTD	Yes	Yes
K6LPZT	Yes	Yes	P7ZKUN	Yes	Inc
K7FBTK	Yes	Yes	PLWZUG	Yes	Yes
KAFLPK	Yes	Yes	PQQRAQ	Yes	Yes
KDZEZM	Yes	Yes	PRZWNF	Yes	Yes
KGXX3L	Yes	Yes	PWT7MF	Yes	Yes
KKDM2N	Yes	Yes	Q3EH29	Yes	Yes
KVHNPU	Yes	Inc	QBT6BC	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
QDV6BA	Yes	Yes	UMQE8A	Yes	Yes
QKF32H	No	Yes	URM4NG	Yes	Yes
QQ4QWM	No	No	UT2J7N	Yes	Yes
QRWPYT	Yes	Yes	UYQZHE	Yes	Yes
QVXMLE	Yes	Yes	V3LWX8	Yes	Yes
QW9P8D	Yes	Yes	V3MT83	Yes	Yes
QZD6PG	Yes	Yes	VA3M6K	Yes	Yes
RBP4NG	Yes	Yes	VCPBGK	Yes	Yes
RGBUAC	Inc	Inc	VDLH8C	Yes	Yes
RGUUFM	Yes	Yes	VFPMCK	Yes	Yes
RH8AKN	Yes	Yes	VMN39J	Yes	Yes
RNC9VE	Yes	Yes	W3GY23	Yes	Yes
RRD6PE	Yes	Yes	W6LH9B	Yes	Yes
RREXMM	Yes	Yes	W9LT4B	Yes	No
RWMBGE	Yes	Yes	W9ML3H	Yes	Yes
T2TNCH	No	No	WCPNMD	Yes	Yes
T9FEXD	Yes	Yes	WGEBA7	Yes	Yes
TK799L	Yes	Yes	WHU837	Yes	Yes
TRNGWH	Yes	Yes	WLBP4M	Yes	Yes
TTH3PA	Yes	Yes	WT7WF2	Yes	Yes
TYTBYQ	Yes	Yes	X9YRQ7	Yes	Yes
UCU9EB	Yes	Yes	XB9RVD	Yes	Yes
UHY4GJ	Yes	Yes	XCJUGC	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
XE7HTC	Yes	Yes			
XJYG89	Yes	Yes			
XJZEH4	Yes	Yes			
XTKHP3	Yes	Yes			
XUG2R6	Yes	Yes			
Y8MCW7	Yes	Yes			
YKAG43	Yes	Yes			
YXZD7Z	Yes	Yes			
Z6DL82	Yes	Yes			
ZJT2VJ	Yes	Yes			
ZQDX9	Yes	Yes			
ZTJHQE	Yes	Yes			
ZXQVK8	No	No			

Response Summary		Total Participants: 193	
<i>Did the suspect's lockback pocket knife (Item 1) produce the questioned puncture toolmarks on either of the submitted pieces of hose (Items 2 or 3)?</i>			
<b>Responses</b>		<u>ITEM 2</u>	<u>ITEM 3</u>
	Yes	<b>184</b> (95.3%)	<b>180</b> (93.3%)
	No	<b>6</b> (3.1%)	<b>6</b> (3.1%)
	Inc	<b>3</b> (1.6%)	<b>7</b> (3.6%)



# Conclusions

TABLE 2

WebCode	Conclusions
26NX94	Toolmarks present on Items 2 and 3 were microscopically examined and identified as having been produced by Item 1. Two (2) tests produced using Item 1 are being returned as item 1T in sample pack T1 and should be maintained for possible future examinations.
2HERHC	One TAC-FORCE brand "SPEEDSTER MODEL" liner lock style knife, listed as "...recovered from the suspect." Please note that Item 1 was incorrectly listed as a "Lockback..." on the evidence submission forms. RESULTS: Item 1 was physically examined. The knife was used to make test toolmarks for microscopic comparison purposes. Item: 1.1 Test toolmarks made by the Item 1 knife using Laboratory supplied rubber tubing. RESULTS: The Item 1.1 test specimens will be retained by our Department for a period of time and will then be returned to your Agency for long term storage as evidence. Item: 2 One piece of blue rubber tubing, listed as "First punctured hose recovered... (blue)." Item: 3 One piece of black rubber tubing, listed as "Second punctured hose recovered... (black)." RESULTS: Items 2 and 3 were physically examined and microscopically compared with each other and test toolmarks made by the Item 1 knife. Matching individual identifying characteristics were found, and it was concluded that the toolmarks on Items 2 and 3 were made by the Item 1 knife.
2MU3VF	Item 1 (a lockback knife) was used to cut Items 2 and 3 (two pieces of hose).
2N2H68	Marks present on the item 2 & 3 pieces of hose were microscopically examined and identified as having been produced by the item 1 knife. Five (5) tests from laboratory stock materials produced using item 1 are being returned as item 1 T in the submitted container and should be maintained for possible future examinations.
2Q6DNB	Both punctures in the submitted black and blue tubing Agency Exhibits 3 and 2 were made by the submitted folding knife Agency Exhibit 1.
2QAXCD	The toolmarks in both punctured hoses (Items 2 and 3) were microscopically compared to exemplar punctures made by the Tac-Force model TF-464 folding pocket knife (Item1). The toolmarks in both punctured hoses (items 2 and 3) were identified as having been made by the Tac-Force knife (Item 1) by sufficient corresponding individual markings.
2ZEKQ6	The knife Exhibit 1 was used to make a puncture test in suitable (submit) material. The punctured areas on Exhibits 2 and 3 were compared microscopically with each other and with the test from Exhibit 1. Exhibits 2 and 3 were punctured by the knife Exhibit 1.
2ZJ3N4	Items 2 and 3 were microscopically examined and each contain one (1) cut. The cuts on Items 2 and 3 were identified as having been produced by the Item 1 knife.
33HZBG	Comparison microscope examinations were conducted on tests made using exhibit 1 with the tool marks seen in exhibits 2 & 3. The findings of this examiner are the following: 1. Tool marks observed in exhibits 2 & 3 were made by the submitted pocket knife, exhibit 1.
3BT76Y	3. On 2016-04-22 during the performance of my official duties I received a sealed evidence bag with number PA4001426056 from Case Administration of the Ballistics Section containing the following: 3.1 One (1) Lockback pocket knife marked "Item 1". 3.2 One (1) piece of blue hose marked "Item 2". 3.3 One (1) piece of black hose marked "Item 3". 4. The intention and scope of this forensic examination comprise of the following: 4.1 The examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the Lockback pocket knife mentioned in paragraph 3.1 and made replications for test purposes. 6. I compared the individual and class characteristic markings on the two (2) pieces of hose mentioned in paragraphs 3.2 and 3.3 and that of the replications mentioned in paragraph 5 using a comparison microscope and found: 6.1 The marks on the two (2) pieces of hose mentioned in paragraphs 3.2 and 3.3 were produced by the Lockback pocket knife mentioned in paragraph 3.1.
3EPVL7	Striation marks on first and second punctured hoses (Item 2 and Item 3) are coincident with striation marks on punctured hose generated by the knife (Item 1).

TABLE 2

WebCode	Conclusions
3NT6RV	Test cuts made with the lockback pocket knife, marked as Item #1, were microscopically compared with the cut marks found on both pieces of tubing, marked as Items #2 & #3. Based on similarities in both class and individual characteristics in this comparison, it is the opinion of this examiner that the lockback pocket knife, Item #1, was used to cut both pieces of tubing, Items #2 & #3.
3WDWM4	The Item 1 knife was examined and two (2) test marks produced using Item 1 were designated Item 1T. The tests produced using Item 1 are being maintained for possible future examinations. Toolmarks present on Item 2 and Item 3 were microscopically examined and identified as having been produced by Item 1. Supporting examination documentation is maintained in the case file.
3XGZRB	As a result of the macroscopic and microscopic comparison it is certain that the questioned toolmarks present on both submitted sections of punctured hose (marked as "Item 2" and "Item 3") have been produced by the suspect's lockback pocket knife (marked as "Item 1").
46WYYY	1. On 24 May 2016 during the performance of my official duties I received a sealed evidence bag with number PA4001991941 from Case Administration of Ballistics Section, containing the following exhibits: 1.1 One (1) Lockback pocket knife and marked IT 181192/16 Item 1. 1.2 One (1) Blue punctured fuel hose and marked it 181192/16 Item 2. 1.3 One (1) black punctured fuel hose and marked it 181192/16 item 3. 2. The intention and scope of this forensic examination comprise of the following: 2.1 Examination of tools and tool mark related materials. 2.2 Microscopic individualization of tool marks. 3. I examined the fuel hoses mentioned in 1.2 and 1.3 using a comparison microscope and found microscopic comparable marks which can possibly be utilized for individualization. 4. I examined the lockback pocket knife mentioned in 1.1 and made replications for test purposes and marked the tests 1921T1 to 1921T4. 5. I compared the individual and class characteristic markings on the exhibits and tests mentioned in 1.2, 1.3 and 4 using a comparison microscope and found: 5.1 The puncture marks on the fuel hoses mentioned in 1.2 and 1.3 were produced by the lockback pocket knife mentioned in 1.1.
47CCPD	Comparison between Items 2 & 3 with test cuts made using the exhibit lock back knife (Item 1) showed that Item 1 was not used to cut the lengths of hose (Items 2 & 3). However Items 2 & 3 were cut by the same knife.
4NFQ78	Test toolmarks produced by Item 1 were microscopically examined in conjunction with toolmarks present on Item 2 and Item 3. Based on these comparative examinations, it was determined that the toolmarks present on items 2 and 3 had been produced by item 1.
4PM7DD	Item 1 is a Tac-Force brand knife. A test mark was made in a section of blue hose. Item 2 is a section of blue hose with an area of damage. The area of damage was microscopically compared to the test from Item 1. Item 1 was identified as having caused the damage to Item 2. Item 3 is a section of black hose with an area of damage. The area of damage was microscopically compared to the test from Item 1. Item 1 was identified as having caused the damage to Item 3.
4QE9ZT	At the first stage the punctured toolmarks on the presented hose sections and the blade of lockback pocket knife have been examined visually and with microscope (National, Motic). In order to determine, whether toolmarks on Item 2 and Item 3 hose sections have been cut by pocket knife, recovered from the suspect, we made experimental cuts with the pocket knife on the undamaged presented hoses, using different strength and directions. The toolmarks on the Item 2 and Item 3 and on the experimental hoses have been compared with microscope (National, Motic). The following examination stated that the general signs of the presented hoses, in details: forms, traces and micro-relief, coincide with the Item 2 and Item 3. This gives us explanation that the toolmarks on the examination Item 2 and Item 3 have been produced by presented pocket knife recovered from the suspect.
63UB47	Test tool marks produced by the knife in Item 1 were microscopically examined in conjunction with the tool marks found on Items 2 and 3. Based on these comparative examinations, it was determined that the tool marks present on Items 2 and 3 had been produced by the blade of Item 1.
6BLUHE	Item 2: One (1) of the tool marks on the hose was compared to the test exemplars obtained with the knife, Item 1. Sufficient corresponding individual tool mark signatures were observed to conclude that

TABLE 2

WebCode	Conclusions
	the tool mark was made with the knife. Item 3: One (1) of the tool marks on the hose was compared to the test exemplars obtained with the knife, Item 1. Sufficient corresponding individual tool mark signatures were observed to conclude that the tool mark was made with the knife.
6FWNFW	The marks on the punctured hoses mentioned in Item 2 and Item 3 were produced by the lockback Pocket Knife mentioned in Item 1
6TP4N7	Item #1 (Tac Force model TF-464 knife), Item #2 (first punctured hose – blue) and Item #3 (second punctured hose – black) were examined on 5/11/2016 and microscopically compared on 5/12/2016. The questioned cuts in Items #2 and #3 (blue and black hoses) were positively identified as having been produced by Item #1 (TF-464 knife).
6TZEVA	Items 2 and 3 were compared microscopically with tests from Item 1. There is agreement of all discernable class characteristics and sufficient agreement of individual characteristics for identification. They were cut by this knife
6VCRZ7	The Exhibit 1 knife was identified as having punctured the Exhibits 2 and 3 sections of hose.
728AP2	The evidence in items 1, 2, and 3 was analyzed by physical and microscopic examination. The toolmarks present on the first and second punctured hoses in items 2 and 3 were determined to have been made by the lockback knife in item 1.
74FL84	Item 2 The toolmark on the Item 2 hose was made by the Item 1 pocket knife. Item 3 The toolmark on the Item 3 hose was made by the Item 1 pocket knife.
7LFCN8	Toolmarks present on Item 2 and Item 3 were made by Item 1
7MWLMY	Toolmarks present on Items 2 and 3 were examined microscopically and identified as having been produced by Item 1.
7PFMJ8	Test toolmarks produced by the item 1-1-1 knife were microscopically compared to the toolmarks observed on the item 1-2-1 blue tubing and on the item 1-3-1 black tubing. Sufficient agreement of microscopic toolmarks, or individual characteristics, was observed between the toolmarks on item 1-3-1 and the test toolmarks for a conclusion of identification. This means that the item 1-1-1 knife was identified as having produced the toolmarks on the item 1-3-1 black tubing. Insufficient agreement or disagreement of microscopic toolmarks, or individual characteristics, was observed between the toolmarks on item 1-2-1 and the test toolmarks and the toolmarks on item 1-3-1 for a conclusion of identification or elimination. This means that the item 1-1-1 knife could not be identified or eliminated as having produced the toolmarks on the item 1-2-1 blue tubing.
7UP4TV	3. On 2016-04-25 during the performance of my official duties I received a sealed evidence bag with number PA4001426054 from Case Administration of the Ballistics Section, containing the following exhibits: 3.1 One (1) lockback pocket knife marked by me "128640/16 1". 3.2 One (1) piece of blue hose marked by me "128640/16 2". 3.3 One (1) piece of black hose marked by me "128640/16 3". 4. The intention and scope of this forensic examination comprise of the following: 4.1 Microscopic individualization of tool marks. 4.2 Examination of tools and tool mark related materials. 5. I compared the individual and class characteristic markings on the hose pieces mentioned in paragraphs 3.2 and 3.3 using the comparison microscope and found: 5.1 The marks on the hose pieces mentioned in paragraphs 3.2 and 3.3 were produced by the pocket knife mentioned in paragraph 3.1.
834ZH3	The puncture in the blue colored hose (2) and the puncture in the black colored hose (3) were produced by the same cutting device. The puncture in the blue colored hose (2) and the puncture in the black colored hose (3) were neither identified nor eliminated as having been produced by the lockback folder knife (1). There is agreement in the class characteristics; however, there is insufficient agreement in the individual characteristics to establish an identification.
8CNF2W	The questioned toolmarks (item 2 and 3) are produced by the suspect's pocket knife (item 1)

TABLE 2

WebCode	Conclusions
8RFD4R	I compared the individual and class characteristic markings on the tests as well as the stab marks found in the pipes (items 2 & 3) using a comparison microscope and found: The stab marks in the pipes (items 2 & 3) were produced by the knife (item 1).
8WY27C	The puncture marks noted in the two pieces of plastic tubing (Items 2 and 3) were identified as having been made by the pocket knife (Item 1).
93KFAA	The knife (Item 001-01) produced the puncture marks on the submitted tubing (Items 001-02 and 001-03).
94RZPW	With the questioned knife (item 1) 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 2 and item 3 to investigate similarities and dissimilarities of the toolmarks. The microscopical examination revealed that the surface structures of the test marks caused by item 1 correspond with the surface structures of the toolmarks on item 2 and item 3. On the active surface of the knife 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 2 and item 3.
94VHW9	Comparison of a test puncture (in rubber hose made using Item 1 pocket knife) with Item 2 rubber hose puncture and Item 3 rubber hose puncture revealed the presence of matching features. This indicates that Items 2 and 3 are consistent with having been punctured with the blade of Item 1 (pocket knife).
96MLJN	Examinations showed Item 2 and Item 3 were punctured with Item 1.
98UTR9	Item 1 (a knife) produced the toolmarks on Items 2 and 3 (two pieces of punctured hose).
99LWEN	Comparative examinations of test toolmarks made with Item 1 (a Tac-Force brand knife) against toolmarks on Item 2 (a section of blue hose) and Item 3 (a section of black hose) showed the presence of matching features. This means Item 1 produced the toolmarks on Item 2 and Item 3.
9BM3UU	Punctures in items 2 & 3 were punctured by Item 1.
9TAEP9	Tests were made in the Exhibit #4 blue rubber hose using the Exhibit #1 knife. The Exhibit #1 knife made the cuts in the Exhibit #2 and #3 rubber hoses. The Exhibit #4 black rubber hose was not used or examined.
9TUU6C	THE PUNCTURE MARK IN ITEM 2 AND THE PUNCTURE MARK IN ITEM 3 WERE MADE BY THE SUBMITTED KNIFE, ITEM 1.
9XNP4X	Item 1 is a Tac-Force brand single edge lockback style knife with an approximately 3 inch blade and a digital camouflage handle. Item 2 is an approximately 3 1/8 inch long, 1 inch nominal diameter section of blue plastic tubing bearing a slit-shaped puncture mark. Item 3 is an approximately 3 1/8 inch long, 1 inch nominal diameter section of black plastic tubing bearing a slit-shaped puncture mark. Based on sufficient correspondence of class and individual details, the slit-shaped puncture marks in Items 2 and 3 were identified as having been made by the Item 1 knife. Items 1, 2, and 3 were analyzed using stereomicroscopy, comparison microscopy, and a Mikrosil™ casting technique as appropriate.
A6GJE2	The submitted Tac-Force knife was functional. The submitted punctured blue hose was identified as having been punctured by the submitted Tac-Force knife due to consistent and reproducible marks. The submitted punctured black hose was identified as having been punctured by the submitted Tac-Force knife due to consistent and reproducible marks. The blue hose was submitted for testing purposes only. The black hose was submitted for testing purposes only.
ADBN93	Examinations showed the tool marks present on Item 2 were made by Item 1. Examinations showed the tool marks present on Item 3 were made by Item 1.

TABLE 2

WebCode	Conclusions
AMYR8P	1. Examination of Exhibit 1 disclosed a Tac-Force brand folding knife. Exhibit 1 was used to create Exhibit 1.1, test standards, which will be retained in the laboratory. 2. Examination of Exhibits 2 and 3 disclosed damage to each piece of tubing which is consistent with a puncture. A. Exhibits 2 and 3 were microscopically compared to test standards from Exhibit 1. B. The damage present on Exhibits 2 and 3 was caused by Exhibit 1.
AUE9ZY	MICROSCOPIC COMPARISONS OF EVIDENCE TOOLMARKS ITEMS 2 AND 3 (SECTIONS OF PUNCTURED HOSE) WITH TEST TOOLMARKS CREATED WITH ITEM 1 SUSPECT KNIFE REVEAL THAT THE TOOLMARKS ON ITEMS 2 AND 3 WERE CREATED WITH ITEM 1 SUSPECT KNIFE.
AVAQ2Z	The Item 1 pocket knife was identified as having made the toolmarks on Item 2 and Item 3.
AYF8J6	Item: 1 One TAC-FORCE Speedster Model TF-464 liner lock folding pocket knife described as "recovered from the suspect". Please note that Item 1 was incorrectly listed as a "lockback" pocket knife. RESULTS: Item 1 was physically and microscopically examined and found to be in working order. Item: 1.1 Test specimens made using the Item 1 knife on supplied hose. RESULTS: Test specimens will be retained by this department for a period of time and will then be returned to your Agency for long term storage as evidence. Item: 2 One piece of hose described as "First punctured hose recovered from the fuel distribution center (blue)". RESULTS: Item 2 was physically and microscopically examined. The cut in the Item 2 hose was microscopically compared to test specimens/cuts made by the Item 1 knife. Matching individual identifying characteristics were found, and it was concluded that Item 2 was cut by the Item 1 knife. Item: 3 One piece of hose described as "Second punctured hose recovered from the fuel distribution center (black)". RESULTS: Item 3 was physically and microscopically examined. The cut in the Item 3 hose was microscopically compared to test specimens/cuts made by the Item 1 knife. Matching individual identifying characteristics were found, and it was concluded that Item 3 was cut by the Item 1 knife.
AYPLHX	I got test toolmarks used Item 1 and sample hoses. The toolmarks of Item 2 and Item 3 are the same with test toolmarks. The shape and striation marks in the section of test toolmarks the same as Item 2 and Item 3. So, Item 2 and Item 3 were punctured by Item 1.
B2WZN4	(1) This knife was used to make test marks. (2 and 3) The puncture mark in Items 2 and 3 have been examined and compared microscopically with each other and tests made using the submitted knife, Item 1. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, the puncture mark in Items 2 and 3 are identified as having been made by Item 1.
BL47EY	MICROSCOPIC COMPARISON OF EVIDENCE ITEM 2 (BLUE HOSE) AND EVIDENCE ITEM 3 (BLACK HOSE), WITH EVIDENCE ITEM 1 (LOCK BACK POCKET KNIFE) REVEALS THE FOLLOWING: THE PUNCTURE DAMAGE ON EVIDENCE ITEM 2 (BLUE HOSE) AND EVIDENCE ITEM 3 (BLACK HOSE) WERE BOTH MADE WITH EVIDENCE ITEM 1 (LOCK BACK POCKET KNIFE).
BLJRNZ	The items 2 and 3 sections of hose are identified with practical certainty as having been punctured with the item 1 knife.
BWHDY7	The puncture marks on both the Item 2 and Item 3 pieces of hose were identified as being made by the Item 1 knife.
CC9Q3Y	Comparative examinations of toolmarks on Item 2 (a punctured blue hose said to have been recovered from the fuel distribution center) and Item 3 (a punctured black hose said to have been recovered from the fuel distribution center) against test marks created using Item 1 (a lockback pocket knife) showed the presence of matching features. This means that Item 1 was used to puncture Items 2 and 3.
CCUE92	Examinations showed that Item 2 (blue tubing) and Item 3 (black tubing) were not cut by Item 1 (knife). Examinations showed that Item 2 (blue tubing) and Item 3 (black tubing) were both cut by the same unknown tool.
CE3BVQ	The hose section marked as item 2 was punctured by the Lockback pocket knife marked as item 1. It

TABLE 2

WebCode	Conclusions
	cannot be determined if the hose section marked as item 3 was or was not punctured by the Lockback pocket knife marked as item 1.
CHEJWV	We observed an excellent correspondence of the puncture toolmarks between the cut surfaces of the submitted two pieces of hose (Item2, Item3) and the cut surfaces of a piece of hose cut by LockBack pocket knife (Item1). In our opinion, this correspondence means that the puncture toolmarks of Item2 and Item3 are produced by Item1.
CQT67Y	The Item 1 pocket knife was identified as having punctured the Item 2 and Item 3 hoses.
CZF4W6	A microscopic comparison was conducted with the following results: The puncture marks exhibited on Item #2 (blue hose) and Item #3 (black hose) were made by the knife submitted as Item #1 (K-1).
D9BEU7	I compared the marks present on the cut surfaces of the two pieces of fuel supply hose (items 2 and 3) to test cuts made using the lockback pocket knife (item 1). There was an excellent correspondence of microscopic features seen between the toolmarks present in the two punctured fuel supply hoses and test marks made with the knife. In my opinion, this correspondence means that this knife cut the two fuel supply hoses.
DG27RY	Microscopic examination and comparison reveal that the item 2 (blue hose) and the item 3 (black hose) were punctured by the pocket knife item 1
DX7GXQ	I examined the lockback pocket knife and made replications for test purposes. The tests were marked: TA1, TA2 and TB1, TB2. I compared the individual & class characteristics markings on the punctured hoses using a comparison microscope & found: The marks on the punctured hoses mentioned in 3.1 & 3.2 were produced by the lockback pocket knife mentioned in 3.1 of my statement
DXR3C3	Item 1 was identified as having produced the puncture toolmarks on Items 2 and 3.
DYNKE4	Test standards were made using the " TAC-FORCE " brand folding knife marked #1 and compared to striations appearing in the punctures of the two fuel hoses marked #2 and #3 with positive results (Identification). The punctures in the two fuel hoses marked #2 and #3 were made by the blade of the folding knife marked #1.
E8A2M4	Toolmark Analysis: Methodology - Comparison Microscopy. Test marks were made with Item 1, the Tac-Force knife, using submitted testing media. The tool mark on Items 2 and 3, the PVC tubes, was made with Item 1, the Tac-Force knife, based upon corresponding class and individual microscopic characteristics.
E9LMAK	2.1 The marks on the hoses item (Item 2 and Item 3) were produced by the one and the same tool. 2.2 The marks on the hoses (Items 2 & 3) were produced by the lockback pocket knife (Item-1).
EAFQMR	The toolmarks observed on Items 2 & 3 were produced by the knife in Item 1.
EAGJKZ	The puncture marks on laboratory Item (001.B) (item 2) blue color hose recovered from the fuel distribution center and the puncture marks on item (001.C) (item 3) black color hose recovered from the fuel distribution center are identified as being made by Laboratory Item (001.A) (item 1) Tac-Force model speedster pocket knife. The items are identified as to sharing a common source because there is agreement of all discernible class characteristics and sufficient agreement of a combination of individual characteristics where the extent of agreement exceeds that which can occur in the comparison of toolmarks made by different tools and is consistent with the agreement demonstrated by toolmarks known to have been produced by the same tool.
ECMVEU	Results of Examinations: Item 1 is a China-made folding knife marketed under the name Tac-Force that uses a slicing-type of action. The Item 1 knife was identified as having made the perforating damage on the Item 2 and Item 3 hose sections. Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Laboratory's Firearms/Toolmarks Unit reference library may be used to make determinations. When a microscopic

TABLE 2

WebCode	Conclusions
	<p>comparison is necessary using a questioned tool, test samples are created using a test material that is softer or similar in quality to the item being compared. Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Tool: The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Unit. Toolmark Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.</p>
EHQUPK	The marks on the blue plastic hose were produced by the pocket knife. It cannot be determined if the marks on the black hose were produced by the pocket knife mentioned
EJLDRL	Item 3 (black hose)and Item 2 (blue hose) were punstured by Item 1(knife)
ENDKCF	The punctures in the hoses, Items 2 and 3, were produced by the knife, Item 1.
ENFETZ	The sections of tubing Exhibits 2 and 3 were identified as having been cut by the knife Exhibit 1. The knife Exhibit 1 was used to make tests in suitable materials
EU4XBH	1. Microscopic examination of Exhibit 2 (punctured hose) revealed it was cut with Exhibit 1 (pocket knife). 2. Microscopic examination of Exhibit 3 (punctured hose) revealed it was cut with Exhibit 1 (pocket knife).
EZD7KY	Examination of the hose sections in Items 2 and 3 revealed the presence of a puncture type toolmark consistent with having been produced by a single bladed cutting tool, like the pocket knife in Item 1. Test toolmarks produced using the knife in Item 1 were microscopically examined in conjunction with the toolmarks present in the hose sections in Items 2 and 3. Based on these comparative examinations it was determined that the toolmarks present in Items 2 and 3 had been produced by the knife in Item 1.
FABPEY	The submitted sections of hose, items 2 and 3, were identified as having been punctured by the submitted pocket knife, item 1.
FPM88Y	Items 2 and 3 were identified as having been cut by Item 1.
FQHNJW	The submitted two hoses, Items 2 and 3, were punctured by the submitted knife, Item 1.
FR9YAP	In my opinion, the findings conclusively show that each of the submitted hoses have been damaged by

TABLE 2

WebCode	Conclusions
	the submitted lock knife.
FZQ8XL	The marks on the punctured hoses mentioned in Item 2 and Item 3 were produced by the Lockback pocket knife mentioned in Item 1.
G2K492	I conducted a microscopic examination of casts produced from the cut surfaces of Items 2 and 3 as well as test cuts made into exemplar material from Item 1 (lockback pocket knife). I made an identification for both items 2 & 3. There was agreement of both individual and all discernible class characteristics where the extent of the agreement exceeds that which can occur in the comparison of toolmarks made by different tools and is consistent with the agreement demonstrated by toolmarks known to have been produced by the same tool. In my opinion Item 1 (lockback pocket knife) produced the toolmarks produced in Items 2 & 3.
G4JJF4	The punctures on the submitted hoses (Item 2 and Item 3) were made by the submitted knife (Item 1).
GG8LXV	Both pieces of submitted hose, Items 01-02(2) and 01-03(3) were punctured by the submitted knife, Item 01-01(1).
GGC6LY	Items 2 and 3 were identified as having been punctured by Item 1.
GGQEQT	The Investigation was carried out by using a comparison light microscope. The toolmarks on the submitted black hose ITEM 2 and the submitted blue hose ITEM 3 were caused by the pocket knife ITEM 1 recovered from suspect.
GT23MW	Examinations showed Items 2 and 3 were punctured by Item 1.
GXU9WR	Result of Examinations: Toolmarks present on the Item 2 and Item 3 pieces of hose were identified as having been produced by the Item 1 knife. Methods: Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Toolmark Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.
H34N7G	Due to corresponding characteristics found on the punctured surfaces of the item 2 and characteristics on punctured surface of the questioned knife (item 1) the first punctured hose (item 2) was produced by questioned knife. Due to corresponding characteristics found on the punctured surfaces of the item 3 and characteristics on punctured surface of the questioned knife (item 1) the second punctured hose



TABLE 2

WebCode	Conclusions
	(item 3) was produced by questioned knife.
H9AFGY	Items 2 and 3 were examined. Both were found to have punctures, which exhibited toolmarks. Tests made with the knife submitted as Item 1 were microscopically compared to the toolmarks exhibited on Items 2 and 3. The punctures in Items 2 and 3 were made by the knife submitted as Item 1.
HBZJ4E	In my opinion: The Lockback knife, item 1, was conclusively used to puncture the blue hose, item 2. The Lockback knife, item 1, was also conclusively used to puncture the black hose, item 3.
HK6LBX	Items 2 and 3 were identified as having been cut/punctured by Item 1.
HLWPXD	Item 1 is a folding knife bearing the trade names of "TAC-FORCE" and "Speedster." Item 2 and Item 3 are pieces of rubber tubing that each bear toolmarks consistent with having been produced by a single bladed tool such as a knife. The toolmarks present on the Item 2 and Item 3 pieces of rubber tubing were identified as having been produced by the Item 1 knife.
HPGABU	The questioned toolmarks on the submitted hoses (Items 2 and 3) were identified as having been stabbed by the submitted Tac-Force pocket knife (Item 1).
JF7MFY	Tool Mark Analysis: Methodology - Comparison Microscopy. Test marks were made with Item 1, the knife, using submitted testing media. 1A, test marks, were sealed in a manila envelope and retained in laboratory for possible future analysis. The tool mark on Items 2 and 3, the PVC hose, were made with Item 1, the knife, based upon corresponding class and individual microscopic characteristics.
JGLUYV	Item: 1 One liner lock pocket knife, described as "...recovered from the suspect". Note: The Item 1 pocket knife was incorrectly described as "Lockback" on the evidence submission documents. Item: 1.1 Test specimens made by Item 1 using Laboratory supplies. RESULTS: Item 1 was physically and microscopically examined and found to be in working order. Test specimens were made using appropriate Laboratory supplies. The Item 1.1 test specimens will remain with the other Items in this case for long term storage as evidence. Item: 2 One section of punctured hose, described as "...recovered from the fuel distribution center (blue)". Item: 3 One section of punctured hose, described as "...recovered from the fuel distribution center (black)". RESULTS: The Item 2 and 3 puncture marks were physically examined and microscopically compared with the test specimens made by the Item 1 knife. Matching individual identifying characteristics were found, and it was concluded that the Item 2 and 3 puncture marks were made by the Item 1 knife.
JNHVTU	Based on the agreement of class characteristics of the cuts and sufficient agreement of individual characteristics of the striation marks on the cut surfaces, the cuts on the hoses marked "Item 2" and "Item 3" were made by the knife marked "Item 1".
JPE3KL	Examination of Item #1 revealed one (1) Tac-Force brand folding knife, Speedster model. Examination of Item #2 revealed one (1) portion of hose, blue in color, with puncture type toolmark observed in side. Examination of Item #3 revealed one (1) portion of hose, black in color, with puncture type toolmark observed in side. Tests were obtained by using Item #1 and compared with Items #2 & #3 with the following results: Item #1 was used to cause the toolmarks observed on Items #2 & #3.
JPYRLT	The laboratory examinations of the one knife (item 1) and two punctured hoses (item 2 and item 3) were analysed by application of the comparison microscope Leica FSC. The enclosed evidence materials (item 1) as well as the comparative material obtained with the punctured hoses (item 2 and 3) were examined in order to find individual characteristics present on their surfaces. Similar individual characteristics were found both in the evidence knife and on the blue and black punctured hoses marked item 2 and 3.
JV4N8E	Test cuts were made in the test material using the item 1 (knife). The test cuts from the item 1 (knife) were microscopically compared to the cut in the item 2 (blue tubing) and it was determined that the item 2 (blue tubing) was cut using the item 1 knife. The test cuts from the item 1 (knife) were microscopically compared to the cut in the item 3 (black tubing) and it was determined that the item 3 (black tubing) was cut using the item 1 knife.

TABLE 2

WebCode	Conclusions
JVMKKZ	Both of the cut marks found on the pieces of hoses (items 2 and 3) were made by the knife (item 1).
JYYFDQ	The pocket knife in Item #1 was identified as having made the puncture mark in the hose in Item #2. The pocket knife in Item #1 could not be identified as or excluded from having made the puncture mark in the hose in Item #3 based on class characteristic similarities (type of cut and striations).
K6LPZT	Item #01.01- The tool is a folding knife of a spring assisted opening design (manufactured in China), TAC-FORCE Speedster model. Using both submitted and laboratory supplied hose the submitted knife was utilized in a stabbing manner to generate known toolmarks for comparison purposes. Items #01.02 & #01.03- Examination of both the blue and black piece of submitted hose revealed the presence of a questioned puncture in each. Microscopic examination and comparison of the questioned toolmarks revealed the following: The questioned toolmarks found within the punctures revealed sufficient agreement of individual characteristics to conclude that they are the result of the submitted knife, Item #01.01 being used in a stabbing manner to puncture the hoses, Items #01.02 & #01.03.
K7FBTK	The tool mark present in the hose described in items 2 and 3, were produced by the lockback pocket knife described in item 1.
KAFLPK	The toolmarks present in the hoses described in Items 2 (hose blue) and 3 (hose black), were produced by the lockback pocket knife described in Item 1.
KDZEZM	Identification: Based on the agreement of discernible class characteristics and sufficient matching individual detail, the tool marks exhibited on the pieces of hose, TE-1 (Item 2) and TE-2 (Item 3), were identified as having been created by the use of the knife, T-1 (Item 1).
KGXX3L	The questioned punctures on the hoses Item 2 and 3 were made by the lockback pocket knife Item 1.
KKDM2N	Results of Examinations: Toolmarks present on the Item 2 and Item 3 pieces of hoses were identified as having been produced by the Item 1 knife. Methods: Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an Exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Toolmark Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.
KVHNPU	The toolmarks on the 0001-AB (Item 2) section of blue tubing were microscopically compared to test cuts made with the 0001-AA (Item 1) Tac-Force knife with POSITIVE RESULTS. The toolmarks on the

TABLE 2

WebCode	Conclusions
	0001-AB (Item 2) tubing were made by the 0001-AA (Item 1) knife. The toolmarks on the 0001-AC (Item 3) section of black tubing were microscopically compared to test cuts made with the 0001-AA Tac-Force (Item 1) knife with INCONCLUSIVE RESULTS. Due to insufficient agreement or disagreement of individual characteristics, the toolmarks on the 0001-AC (Item 3) tubing could neither be identified nor eliminated as having been made by the 0001-AA (Item 1) knife.
L862FB	Microscopic examination and comparison identified item #1 as having made the punctures in items #2 and #3.
LADAPV	The toolmarks present within the punctured area of the evidence hoses were microscopically examined in conjunction with test toolmarks made using the submitted knife. Based on these comparative examinations, the following was determined: The toolmarks on both hoses (Items 2 & 3) had been made using the knife (Item 1).
LEQWFT	The knife Exhibit 1 was used to make test cuts in submitted materials. The tubing sections Exhibits 2 and 3 were cut by the knife Exhibit 1.
LF2RAX	The toolmark on Item T1B, the plastic tube, was made with Item T1A, the knife, based upon corresponding class and Individual Microscopic characteristics. The toolmark on Item T1C, the plastic tube, was made with Item T1A, the knife, based upon corresponding class and Individual microscopic characteristics.
LKUUAR	Examinations showed the tool marks on Item 2 were made by Item 1. Examinations showed the tool marks on Item 3 were made by Item 1.
LM39FX	Item #2: A puncture-type tool mark was compared to the test mark exemplars obtained from the Tac-Force brand, pocket knife, Item #1. Sufficient corresponding individual tool mark signatures were observed to conclude that the puncture-type tool mark was made by the knife. Item #3: A puncture-type tool mark was compared to the test mark exemplars obtained from the Tac-Force brand, pocket knife, Item #1. Sufficient corresponding individual tool mark signatures were observed to conclude that the puncture-type tool mark was made by the knife.
M2HQNR	Examinations showed the tool marks within Items 2 and 3 were created by Item 1.
M7TLA	Test puncture marks were made to the blue and black reference material using the Tac-Force, Speedster Model, lock back pocket knife, Item 1. The reference puncture marks were microscopically compared to the punctured pieces of blue and black hose, Items 2 and 3. It was determined that the Tac-Force lock back pocket Knife, Item 1, punctured Items 2 and 3.
MDUUAP	The submitted pocket knife, Item 1, produced the stabbing toolmarks present on each of the submitted rubber tubes, Items 2 and 3.
MFW27M	The Item 2 and Item 3 hoses were both punctured by the Item 1 knife.
MP77HD	1. Exhibit 1 (tool) is a Tac-force brand, model speedster TF-464 folding knife. Exhibit 1.1 (test standards) was created for comparison purposes and is being retained at the laboratory. 2. Exhibits 2 and 3 (two cut fuel hoses) were visually examined and microscopically compared to test standards from Exhibit 1. a. Microscopic comparison disclosed that Exhibits 2 and 3 were both cut by Exhibit 1 (knife). b. Exhibits 2 and 3 were altered during laboratory examination to facilitate microscopic comparison.
MQGYLR	The toolmarks on the Items 2 and 3 hoses were identified as having being made by the Item 1 knife.
NHLJAT	The knife item 1 was responsible for the cut/puncture mark to the plastic hose - Item 2. The knife item 1 was responsible for the cut/puncture mark to the plastic hose - Item 3.
NT384R	Punctures were made in test media (supplied tubing), utilizing Item 1, for comparison to punctures found in Items 2 and 3. The punctures in Items 2 and 3 were identified as having been made by the blade of Item 1.

TABLE 2

WebCode	Conclusions
NVPVFR	Microscopic comparison was conducted with the following results: Item #1 (folding knife) was used to make the toolmarks on item #2 (blue hose) and item #3 (black hose).
P7JQTD	A microscopic examination and comparison of the questioned cuts on Item #2 and Item #3 was made with test cuts produced on the fuel supply hoses by Item #1 (lockback knife). Items #2 and #3 were identified as being cut by the submitted lockback knife, Item #1.
P7ZKUN	The knife in Item #1 was identified as having made the cut on the piece of hose in Item #2. The knife in Item #1 could not be identified as or excluded from having made the cut on the hose in Item #3 based on class characteristic similarities (type of cut).
PLWZUG	THE TOOL (ITEM 1) HAS PRODUCED THE SIGNS PRESENTS IN THE TUBES BLUE AND BLACK (ITEM 2 AND 3, RESPECTIVILITY).
PQQRAQ	The toolmarks present on Items 2 and 3 were microscopically identified as having been made by the knife, Item 1.
PRZWNF	Toolmarks present on the Items A1-2 and A1-3 pieces of synthetic hose were examined, compared microscopically, and identified as having been produced by the Item A1-1 Tac-Force lockback knife.
PWT7MF	Item 2 and Item 3 were punctured by Item 1, that is, one lockback pocket knife purported to be recovered from the suspect.
Q3EH29	The examined toolmarks (punctures on item 2 and 3) could be attributed to the recovered knife (item 1).
QBT6BC	I can conclude that both pieces of hose Blue and Black were cut by the knife received. Conclusions were reached after comparing the received punctured hose pieces with the test that I puncture by myself. Through microscopic comparison I could see that the marks on the pieces of hose were made by the knife.
QDV6BA	Item 1-1, the submitted pocket knife, was examined. The knife has a single drop-point blade that can be used to puncture, as well as slice, materials. No potential subclass characteristics were observed along the working surface (edge) of the blade. The knife was used to make test puncture marks in the plastic tubing provided for this purpose. Items 1-2 and 1-3, the questioned pieces of cut tubing, were examined. The puncture marks on both items had class characteristics similar to the test marks produced with Item 1-1. The test marks from Item 1-1 were microscopically compared to Items 1-2 and 1-3. Sufficient agreement was observed between the individual striae on the test marks from Item 1-1 and those on Items 1-2 and 1-3 to conclude that these items were punctured by Item 1-1.
QKF32H	[No Conclusions Reported].
QQ4QWM	The knife was opened and inspected as to any defects. Afterwards a similar hose was punctured with the pocket knife recovered from the suspect (Item 1). The test cuts made with the submitted knife were compared to Item 2 and Item 3 with the following result: Both hoses (Item 2 and Item 3) were punctured with a knife. But the suspect`s lockback pocket knife (Item 1) was not used to puncture the submitted hoses (Item 2 and Item 3) recovered from the distribution center.
QRWPYT	The puncture toolmark in the Item 2 (blue hose) was produced, within the limits of practical certainty*, by the Item 1 knife. The puncture toolmark in the Item 3 (black hose) was produced, within the limits of practical certainty*, by the Item 1 knife. * Practical Certainty: Since it is not possible to collect and examine samples of all tools, it is not possible to make an identification with absolute certainty. However all scientific research and testing to date and the continuous inability to disprove the principles of toolmark analysis have demonstrated that tools produce unique, identifiable characteristics which allow examiners to reliably make identifications. Firearms/Toolmark Identification is an empirical science that relies on objective observations and a subjective interpretation of microscopic marks of value.
QVXMLE	Striations of hose using item 1 are same as striations of item 2 and item 3

TABLE 2

WebCode	Conclusions
QW9P8D	The submitted lockback knife, that is, Item 1 was used to puncture the two hoses, that is, Item 2 and Item 3.
QZD6PG	The lockback pocket knife (Item 1) produced the puncture marks in the blue hose (Item 2) and the black hose (Item 3).
RBP4NG	<p>Results of Examination: Item 1 is a Tac-Force knife. Toolmarks present on Item 2 and Item 3 hoses were identified as having been produced by the Item 1 knife. Methods: Tool: The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Laboratory's Firearms/Toolmarks Unit reference library may be used to make determinations. When a microscopic comparison is necessary using a questioned tool, test samples are created using a test material that is softer or similar in quality to the item being compared. Toolmark Examination: Toolmarks, whether they are present on two evidence items or on one evidence item and one test-mark created in the laboratory, undergo two stages of comparison. First, the toolmarks are examined to determine and compare their class characteristics. The class characteristics of toolmarks include type of cutting action and the size and orientation of gripping or cutting surfaces. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy. A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued: 1) Exclusion (Elimination): If two toolmarks or a tool and toolmark have incompatible class characteristics, an exclusion opinion is rendered. 2) Identification: If the following conditions are met during the comparison of microscopic marks, an opinion of Identification is rendered: a) The degree of similarity is greater than the examiner has ever observed in previous evaluations of toolmarks known to have been created by different tools. b) The degree of similarity is equivalent to that normally observed in toolmarks known to have been created by the same tool. When these conditions are met the likelihood another tool could have produced the same mark is so remote as to be considered a practical impossibility. An Identification opinion cannot be reported unless a second qualified toolmarks Examiner has examined the items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, an opinion of Inconclusive is rendered. A failure to meet the conditions for an Exclusion or Identification could be the result of limited microscopic marks of value, a lack of any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for identification. Limitations: Tool: The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Unit. Toolmark/Examination: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to changes in tool working surfaces from wear, corrosion and abuse or the employment of unusual tool/work piece orientations, toolmarks created by the same tool are not always identifiable as such.</p>
RGBUAC	The damaged area on the blue hose (item #2) and the black hose (item #3) exhibit similar class characteristics as those produced by the knife (item #1). However, due to the lack of corresponding individual characteristics, it is not possible to identify that knife (item #1) as having made the damage. The damaged area on the blue hose (Item #2) and the black hose (Item #3) were identified as having been made by the same tool.
RGUUFM	Item 1 was identified as having produced the toolmarks present on items 2 and 3 based on the sufficient agreement of class and individual characteristics. Lab generated evidence (test toolmarks produced by item 1) were retained with item 001.
RH8AKN	The test punctures made with the knife (Item 1) and the punctures in the hoses (Items 2 & 3) were microscopically examined and compared. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, the punctures in the hoses (Items 2 & 3) are identified as having been produced by the knife (Item 1).
RNC9VE	Visual examination of the blue rubber hose, item #2, and the black rubber hose, item #3, revealed areas of toolmark damage consistent with a cut / perforation. The areas of toolmark damage present

TABLE 2

WebCode	Conclusions
	on the blue rubber hose, item #2, and the black rubber hose, item #3, were microscopically compared with test toolmarks made by the Tac Force brand Speedster model folding lockblade knife, item #1. These comparisons revealed matching class and individual characteristics, confirming that the areas of toolmark damage present on the blue rubber hose, item #2, and the black rubber hose, item #3, were made by the submitted knife, item #1. The supplied rubber hoses were used for test purposes and will be returned with the evidence.
RRD6PE	Item 2 and 3 are caused by item 1
RREXMM	Hose item 2 and item 3 were both cut by knife item 1.
RWMBGE	Visual examination of the two (2) hoses, items #2 and #3, revealed an apparent puncture / cut in the center of each of the hoses. The two (2) hoses, items #2 and #3, were microscopically compared with test toolmarks generated with the Tac-Force pocket knife, item #1. These comparisons revealed matching individual toolmark characteristics, confirming that the puncture / cut present on each hose was made by the Tac-Force pocket knife. The submitted hoses were used for test purposes and will be returned with the evidence.
T2TNCH	Upon comparison between the puncture toolmark on Item 2 and that on Item 3, there is sufficient agreement in the class characteristics and in the individual characteristics to conclude that these toolmarks were made by one same and only tool. The class characteristics show that the tool used is a pointy and sharp knife. For comparison purpose, several test puncture toolmarks were made with Item 1 on the two sections of hose that were submitted. Upon comparison between these marks and the marks on Item 2 and Item 3, it was found that there are significant discrepancies in both the class characteristics and in the individual characteristics. Therefore we can conclude that Item 1 did not produce the punctures on Item 2 and Item 3.
T9FEXD	The toolmarks observed on Items 2 and 3 were identified as having been produced by the Item 1 pocket knife.
TK799L	Microscopic comparison was conducted with the following results. Item #2 & #3 were punctured/cut by Item #1.
TRNGWH	The item 1 knife is identified, with practical certainty, as having been used to cut item 2 and item 3.
TTH3PA	The hose pieces marked I2 and I3 were punctured with the knife mailed I1.
TYTBYQ	It is the finding of this examiner that the tool marks found on the submitted first and second punctured hose, Items 2 and 3, were made by the submitted TAC-Force pocket knife, Item 1.
UCU9EB	The cutting surface of item 1 (knife) are honed and thus are unique. The marks on item 2 and item 3, which are on the plastic tubes, are toolmarks. With the knife (item 1) we produced comparison marks in comparable plastic. Those marks have been compared to the marks on item 2 and item 3, using Toolscan. Comparison between item 2 and item 3: During the comparison we were able to ascertain a big number of concordances. It is certain, that the toolmarks on item 2 and item 3 have been produced by the same knife. Comparison between item 2, item 3 and the comparison marks from item 1: During the comparison we were able to ascertain a big number of concordances. It is certain, that the toolmarks on item 2 and item 3 have been produced by the knife (item 1).
UHY4GJ	1. Examinations showed that the tool marks present within the Item 2, punctured hose, were made by the Item 1 knife. 2. Examinations showed that the tool marks present within the Item 3, punctured hose, were made the Item 1 knife.
UMQE8A	Test marks from Item 1 were compared to the marks on Items 2 and 3 using a comparison microscope. There is sufficient agreement of discernible class characteristics markings and individual characteristics markings to determine that Item 1 produced the marks on Items 2 and 3.
URM4NG	The punctures present in the two pieces of tubing (items 2 and 3) were identified as having been produced by the Tac-Force brand pocket knife (item 1).

TABLE 2

WebCode	Conclusions
UT2J7N	Tool Mark Analysis: Test marks were made with Item 1, the Tac-Force knife, using submitted testing media. Item 1A, the test marks, was sealed in a manila envelope and will be retained in the laboratory for possible future analysis. Methodology - Comparison Microscopy: The tool mark on Item 2, the blue rubber hose, and Item 3, the black rubber hose, was made with Item 1, the Tac-Force knife, based upon corresponding class and individual microscopic characteristics.
UYQZHE	The puncture in the blue hose, item T1-2, and the puncture in the black hose, item T1-3, were each identified as having been made by the USA Design brand lock back knife, item T1-1.
V3LWX8	a) The suspected marks on the exhibit marked Item 2 were caused by the suspect knife marked Item 1. b) The suspected marks on the exhibit marked Item 3 were caused by the suspect knife marked Item 1 i.e.: Exhibits marked Item 2 & 3 are positive to Item 1
V3MT83	Items 2 and 3 were identified as having been punctured/cut by the same source tool (item 1) based on a sufficient agreement of individual characteristics and an agreement of class characteristics.
VA3M6K	Items 2 and 3 were identified as having been cut using Item 1.
VCPBGK	Microscopic comparison conducted with the following results: puncture in item #2 was caused by K-1. Puncture in item #3 was caused by K-1. Type of test conducted: puncture. Medium used for test: Identical rubber tubing of the same size and color as the evidence submitted.
VDLH8C	The blue tubing (#2) was cut by the knife (#1). The black tubing (#3) was cut by the knife (#1).
VFPMCK	Submitted tubing, items #2 and #3 were both punctured by item #1, knife.
VMN39J	The puncture toolmarks found on items 2 and 3 were both made by the knife, item 1. These identifications are established by finding sufficient agreement of unique surface contours.
W3GY23	1. On 30 May 2016 during the performance of my official duties I received a sealed evidence bag with number PA40001991940 from Case Administration of the Ballistics Section, containing the following exhibits: 1.1 One (1) Lockback pocket knife (Tac-Force) model speedster tactical line TF-484) and marked it 168789/16 item 1. 1.2 One (1) blue punctured fuel hose and marked it 168789/16 item 2. 1.3 One (1) black punctured fuel hose and marked it 168789/16 item 3. 2. The intention and scope of this forensic examination comprise the following: 2.1 Examination of tools and tool mark related materials. 2.2 Microscopic individualization of tool marks. 3. I examined the fuel hoses mentioned in 1.2 and 1.3 using a comparison microscope and found microscopic comparable marks which can possibly be utilized for individualization. 4. I examined the lockback pocket knife mentioned in 1.1. and made replications for test purposes and marked the tests 789T1 to 789T4. 5. I compared the individual and class characteristics markings on the exhibits and tests mentioned in 1.2, 1.3 and 4 using a comparison microscope and found: 5.1 The puncture marks on the fuel hoses mentioned in 1.2 and 1.3 were produced by the lockback pocket knife mentioned in 1.1.
W6LH9B	Items 2 and 3 hoses were punctured with Item 1 lockback pocket knife.
W9LT4B	Item 1B (Item 2) was identified as having been cut by Item 1A (item 1) based on the agreement of class and individual characteristics. Item 1C (item 3) was eliminated as having been cut by Item 1A (item 1) based on the disagreement of individual characteristics.
W9ML3H	The puncture toolmarks on Item 2 and Item 3 were identified as having been made by the Item 1 pocket knife.
WCPNMD	Test toolmarks, produced using the knife in Item 1, were microscopically examined in conjunction with the toolmarks on the hose segments in Items 2 and 3. Based on these comparative examinations, it was determined that the toolmarks on both Items 2 and 3 were produced by Item 1.
WGEBA7	The pocket knife mentioned in 3.1 (Item 1) was used to produce toolmarks on hoses mentioned in 3.2 and 3.3 (items 2 & 3).
WHU837	On 2016-04-25 during the performance of my official duties I received a sealed evidence bag with

## TABLE 2

WebCode	Conclusions
	number PA4001426055 from Case Administration of the Ballistics Section, containing the following: 1.1 One (1) sealed cardboard box marked "Test No. 16-528: TOOLMARKS EXAMINATION", containing the following: 1.1.1 One (1) small brown envelope marked "Test No. 16-528 Item 1", containing the following exhibit: 1.1.1.1 One (1) Tac-Force Speedster model lockback pocket knife marked by me "128719/16 1" 1.1.2 One (1) small brown envelope marked "Test No. 16-528 Item 2", containing the following exhibit: 1.1.2.1 One (1) blue piece of punctured hose, marked by me "128719/16 2". 1.1.3 One (1) small brown envelope marked "Test No. 16-528 Item 3", containing the following exhibit: 1.1.3.1 One (1) black piece of punctured hose, marked by me "128719/16 3". 2. 2.1 Examination of tools and toolmark related materials. 2.2 Microscopic individualization of toolmarks. 3. I examined the lockback knife mentioned in paragraph 1.1.1.1 and made replications for test purposes, marked 719T1 and 719T2 respectively. 4. I compared the individual and class characteristic markings on the pieces of hose mentioned in paragraphs 1.1.2.1 and 1.1.3.1 and the tests mentioned in paragraph 3 using a comparison microscope and found: 4.1 The marks on the punctured hoses mentioned in paragraphs 1.1.2.1 and 1.1.3.1 were produced by the lockback knife mentioned in paragraph 1.1.1.1.
WLBP4M	Item 1 made the puncture in items 2 and 3.
WT7WF2	The marks on the punctured hoses mrk item 2 and 3 were produced by the lockback pocket knife.
X9YRQ7	The known pocket knife, item 1, is the source of the questioned toolmark impressions, items 2 and 3.
XB9RVD	The Item 01-01 knife was identified as having made the punctures in both the Item 01-02 blue tubing and the Item 01-03 black tubing.
XCJUGC	Test toolmarks from Item 1, locking blade folding knife, were microscopically examined in conjunction with the toolmarks present on Items 2 and 3. Based on these comparative examinations and observed class and individual characteristics, it was determined that the toolmarks on Items 2 and 3 had been produced by Item 1.
XE7HTC	The questioned toolmarks, located approximately on the middle of each of the items 2 and 3 hoses, were caused by the item 1 knife.
XJYG89	The evidence in items 1, 2, and 3 was analyzed by physical and microscopic examination. The toolmarks present on the two (2) punctured hoses in items 2 and 3 were determined to have been made by the lockback pocket knife in item 1.
XJZE4	1. On 2016-04-21 during the performance of my official duties I received a sealed evidence bag with number PA4001426057 from Case Administration of the Ballistics Section containing the following exhibits: 1.1 One (1) Lockback pocket knife marked by me "126161/16"1. 1.2 One (1) blue punctured hose marked by me "126161/16"2. 1.3 One (1) black punctured hose marked by me "126161/16 3". 2. The intention and scope of this forensic examination comprise the following: 2.1 Microscopic individualization of toolmarks. 3. I examined the Lockback pocket knife mentioned in paragraph 1.1 and made replications for test purposes and marked it "A2", "A3", "B2" and B3" respectively. 4. I compared the individual and class characteristic markings on the blue punctured hose and black punctured hose mentioned in paragraphs 1.2 and 1.3 with the tests mentioned in paragraph 5 using a comparison microscope and found: 4.1 The marks on the blue punctured hose marked "12616/16 2" were produced by the Lockback knife mentioned in paragraph 1.1. 4.2 The marks on the black punctured hose marked "126161/16 3" were produced by the Lockback pocket knife mentioned in paragraph 1.1.
XTKHP3	I compared the class and individual makes and found: The marks on the hoses mentioned in item 2 and item 3 were produced by the pocket knife mentioned in item 1
XUG2R6	The hose pieces marked Item 2 & Item 3 were produced by the pocket knife marked item 1
Y8MCW7	The cut surface of the hose in item 2 (blue) was examined when its general characteristics were noted. The cut surface was compared to test cuts made by the knife in Item 1 when they were found to show



TABLE 2

WebCode	Conclusions
	agreement in class, sub-class and individual characteristics such that the Item 1 knife was responsible for cutting the hose in Item 2. The cut surface of the hose in item 3 (black) was examined when its general characteristics were noted. The cut surface was compared to test cuts made by the knife in Item 1 when they were found to show agreement in class, sub-class and individual characteristics such that the Item 1 knife was responsible for cutting the hose in Item 3.
YKAG43	The marks on the punctured hoses (item 2 and item 3) were produced by the lockback pocket knife (item 1).
YXZD7Z	Items 1 & 2 were punctured by Item 1
Z6DL82	5. I examined the rubber hoses mentioned in paragraphs 3.2 and 3.3 using a comparison microscope and found microscopic comparable marks which can possibly be utilized for individualization. 5.1 I examined the rubber hoses mentioned in paragraphs 3.2 and 3.3 and made replications for test purposes which I marked 578T1 and 578T2 respectively. 6. I compared the individual and class characteristics markings on the rubber hoses mentioned in paragraphs 3.2 and 3.3 with the replications mentioned in paragraph. 5.1 using a comparison microscope and found: 6.1 The marks on the rubber hoses mentioned in paragraphs 3.2 and 3.2 were produced by the pocket knife mentioned in paragraph 3.1.
ZJT2VJ	The submitted tool marks on Items #2 and #3 were made by the submitted knife, Item #1.
ZQDXY9	Item 1 is a Tac-Force brand speedster model, lockback folding knife. Two (2) test marks were produced using item 1 and are being returned as item 1T. These test marks should be maintained for possible future examinations. The toolmarks present on items 1T, 2, and 3 were identified as having been produced by the item 1 knife.
ZTJHQE	The knife (Item 1) was used to make test cuts (punctures) in blue hose material, which is similar in size, shape, and flexibility to Item 2 and Item 3. The toolmarks in these test cuts were then microscopically compared with the toolmarks in the cuts (punctures) in Item 2 and Item 3. These microscopic comparisons revealed that the cuts have the same class of knife-produced marks and sufficient corresponding individual marks to conclude that the knife (Item 1) produced the puncture toolmarks in the blue hose (Item 2) and the black hose (Item 3).
ZXQVK8	[No Conclusions Reported.]

# Additional Comments

## TABLE 3

WebCode	Additional Comments
3XGZRB	Toolmarks of the knife for comparison have been produced using the included sample hose pieces. The toolmarks produced with the pocket knife ("Item 1") and the questioned toolmarks on pieces of hose ("Item 2" and "Item 3") have been moulded using "AccuTrans" moulding material. The comparison has been performed with a comparative macroscope.
4QE9ZT	There is a slight difference in the toolmarks, which can be explained due to failure of determining exact knife direction, force and angle of knife in an experiment carried out.
74FL84	Tests generated during examination are being returned with Item 1.
7PFMJ8	Toolmarks observed on item 1-3-1 are inconclusive as having been produced by the item 1-1-1 knife due to insufficient agreement or disagreement of individual characteristics.
834ZH3	Patterns of marks similar to the patterns of marks in the puncture of the blue colored hose (2) and puncture of the black colored hose (3) were present in some of the test punctures produced with the lockback folder knife (1). Therefore, the puncture in the blue colored hose (2) and the puncture in the black colored hose (3) were not eliminated from the lockback folder knife (1).
AVAQ2Z	Portions of the Item 1 blue and black hose were used for testing. The remaining hose was not further examined.
CE3BVQ	The class characteristics of the puncture seem the same but to be conservative without any positive marks an inconclusive result is given. Possibly a different motion was used to puncture the hose with the knife or another very similar knife.
E9LMAK	(not for report). Inconsistent cutting patterns have complicated the I.D due to variable conditions such as: 3.1 Difference between stabbing method (holding) used by the "suspect" and examiner; and 3.2 Possible manufacturing burrs lost on the cutting edge of the blade during the stab produced by the "suspect" and examiner.
G2K492	Matching striae exceeds CMS criteria for identification.
HK6LBX	Per lab policy, examiner would have stopped after the first association of tool to Crime Scene.
JNHVTU	A control hose similar to that of the blue hose marked "Item 2" was punctured using the tip of the blade of the knife marked "Item 1". The striation marks on the cut surfaces of test cuts were examined and compared with those on the cut surfaces on the hoses marked "Item 2" and "Item 3".
JYYFDQ	Laboratory policy states that exclusions can only be made based on class characteristic differences.
K7FBTK	The conclusions are based on the tool, tool mark, microscopic and microscopic comparison examination.
KAFLPK	The conclusions are based on the tool, toolmark, microscopic and comparison microscopic examinations.
KVHNPU	The cut in the 0001-AC (Item 3) section of tubing exhibited the same class characteristics as the cuts made by the 0001-AA (Item 1) knife, and there was insufficient agreement or disagreement of individual characteristics to be able to either identify or eliminate the knife (Item 1) from making the cut in the black tubing (Item 3).
P7ZKUN	Laboratory policy states that exclusions can only be made based on class characteristic differences.
QBT6BC	Make sure that when you use the knife you are carefull as it is very sharp and can injure you.
QDV6BA	Strength of Associations Made in the Identification of Non-Firearm Toolmarks: Identifications of

TABLE 3

WebCode	Additional Comments
	toolmarks with a specific tool are made to the practical, not absolute, exclusion of all other tools. This is because it is not possible to examine all tools in the world, a prerequisite for absolute certainty. The conclusion that sufficient agreement for identification exists between two toolmarks means that the likelihood another firearm or tool could have made the questioned mark is so remote as to be considered a practical impossibility.
RBUAC	Different Individual characteristics in some areas noted on tests (known) vs. evidence, however we don't necessarily eliminate on individual characteristics only.
XE7HTC	The items 2 & 3 hoses were punctured by the item 1 knife.

# Appendix: Data Sheet

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## Collaborative Testing Services ~ Forensic Testing Program Test No. 16-528: Toolmarks Examination

DATA MUST BE RECEIVED BY June 13, 2016 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

### Accreditation Release Section

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

- This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section on the last page must be completed and submitted.)
- This participant's data is **NOT** intended for submission to ASCLD/LAB, ANAB or A2LA.

Scenario:

Police are investigating the vandalism at a fuel distribution center in which two of the fuel supply hoses were punctured. A suspect was apprehended later that day and a lockback pocket knife was recovered from his possession. Investigators are submitting the knife along with the sections of punctured hose and are requesting that you examine the toolmarks on the submitted hose sections to determine if either could have been cut using the pocket knife recovered from the suspect.

Please note the following:

- The knife is a sharp object, and all precautions should be taken to handle it 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.
- Two 6" sections of both hose substrates are included for possible test mark purposes.

Items Submitted (Sample Pack T1):

- Item 1: Lockback pocket knife recovered from the suspect.
- Item 2: First punctured hose recovered from the fuel distribution center.(blue)
- Item 3: Second punctured hose recovered from the fuel distribution center.(black)

1.) Did the suspect's lockback pocket knife (Item 1) produce the questioned puncture toolmarks on either of the submitted pieces of hose (Items 2 or 3)?

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

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

**Please return all pages of this data sheet.**

Participant Code:

WebCode:

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

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3.) Additional Comments

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<p><b>Return Instructions:</b> Data must be received via online data entry, fax (please include a cover sheet), or mail by <b>June 13, 2016</b> to be included in the report. Emailed data sheets are not accepted.</p>	<p>Participant Code:          ONLINE DATA ENTRY: <a href="http://www.cts-portal.com">www.cts-portal.com</a></p>
<p>QUESTIONS?          TEL: +1-571-434-1925 (8 am - 4:30 pm EST)          EMAIL: <a href="mailto:forensics@cts-interlab.com">forensics@cts-interlab.com</a>  <a href="http://www.ctsforensics.com">www.ctsforensics.com</a></p>	<p>FAX: +1-571-434-1937          MAIL: Collaborative Testing Services, Inc.          P.O. Box 650820          Sterling, VA 20165-0820 USA</p>

Please return all pages of this data sheet.

## RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **16-528: Toolmarks Examination**

This release page must be completed and received by **June 13, 2016** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

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

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

**ASCLD/LAB** Certificate No. \_\_\_\_\_

**ANAB** Certificate No. \_\_\_\_\_

**A2LA** Certificate No. \_\_\_\_\_

### **Step 2: Complete the Laboratory Identifying Information in its entirety**

Signature and Title \_\_\_\_\_

Laboratory Name \_\_\_\_\_

Location (City/State) \_\_\_\_\_

### Accreditation Release

#### Return Instructions

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

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

**Please return all pages of this data sheet.**

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