



Firearms Examination Test No. 18-527 Summary Report

Each sample set consisted of three known expended cartridge cases (Item 1) test-fired from a suspect weapon and four questioned expended cartridge cases (Items 2-5). Participants were requested to examine these items and report their findings. Data were returned from 278 participants and are compiled into the following tables:

	<u>Page</u>
<u>Manufacturer's Information</u>	<u>2</u>
<u>Summary Comments</u>	<u>3</u>
<u>Table 1: Examination Results</u>	<u>4</u>
<u>Table 2: Conclusions</u>	<u>12</u>
<u>Table 3: Additional Comments</u>	<u>55</u>
<u>Appendix: Data Sheet</u>	

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 five items: Item 1 consisted of three cartridge cases fired in the suspect's firearm. Items 2, 3, 4 and 5 each consisted of one cartridge case recovered from the scene. Federal® American Eagle® 40 S&W 180 grain full metal jacket (FMJ) centerfire ammunition was used for all five items. Participants were requested to determine which, if any, of the recovered questioned cartridge cases (Items 2-5) were fired from the same firearm as the known cartridge cases (Item 1).

The cartridge cases in Item 1 and 5 were fired in a Beretta PX4 Storm .40 S&W handgun (Serial Number PY01299). Items 2 and 4 were fired in a Beretta PX4 Storm .40 S&W handgun (Serial Number PY79160). Item 3 was fired in a Smith & Wesson SW40VE handgun (Serial Number DSUU615)

ITEMS 1, 5 (IDENTIFICATION): Multiple magazines were loaded with Federal® American Eagle® ammunition for firing with the Beretta PX4 Storm .40 S&W handgun. After the ammunition was expended, the cartridge cases were collected and packaged together as a batch. This process was repeated until the required number was produced. Out of each batch, the necessary number of cartridge cases was selected and inscribed with a "1" (three cartridge cases) or "5" (one cartridge case), then sealed into their respective boxes.

ITEMS 2, 4 (ELIMINATION): Multiple magazines were loaded with Federal® American Eagle® ammunition for firing with the Beretta PX4 Storm .40 S&W handgun different from what was used to fire Items 1 & 5. After the ammunition was expended, the cartridge cases were collected. This process was repeated until the required number was produced. Out of each batch, the necessary number of cartridge cases was selected and inscribed with a "2" (one cartridge case) or "4" (one cartridge case), then sealed into their respective boxes.

ITEM 3 (ELIMINATION): Multiple magazines were loaded with Federal® American Eagle® ammunition for firing with the Smith & Wesson SW40VE handgun. After the ammunition was expended, the cartridge cases were collected. This process was repeated until the required number was produced. Out of each batch, the necessary number of cartridge cases was selected and inscribed with a "3" (one cartridge case) then sealed into their respective boxes.

SAMPLE SET ASSEMBLY: For each sample set, Items 2 and 4 of the same elimination batch, Item 3, along with Items 1 and 5 of the same association batch were placed in a sample pack box. This process was repeated until all of the sample sets were prepared. Once verification was completed, the sample packs were sealed with evidence tape and initialed "CTS."

VERIFICATION: During test production, 10% of the cartridge cases from each batch were selected and intercompared to confirm that markings were consistent. All three predistribution laboratories reported the expected Identifications/Eliminations.

Summary Comments

This test was designed to allow participants to assess their proficiency in a comparison of expended cartridge cases. Participants were provided with four questioned expended Federal® American Eagle® 40 S&W 180 grain full metal jacket (FMJ) centerfire cartridge cases (Items 2, 3, 4, and 5), which they were requested to compare with three known expended cartridge cases (Item 1) that were fired in the suspect's weapon, a Beretta PX4 Storm .40 S&W handgun. For each sample set, the Item 5 cartridge case was fired in the same firearm as the Item 1 known cartridge cases. The Item 3 cartridge case was fired in a different firearm from that which discharged the Item 1 and Item 5 cartridge cases. Item 2 and Item 4 cartridge cases were fired in a third firearm, different from the one that discharged the Item 1 and Item 5 cartridge cases and the firearm that discharged the Item 3 cartridge case. (Refer to Manufacturer's Information for preparation details.)

In Table 1 Response Summary, 269 of 278 responding participants (97%) identified Item 5 and either eliminated or were inconclusive for Items 2, 3 and 4 as having been fired from the same firearm as the Item 1 cartridge cases. Seven participants identified Items 2, 4 and 5 and eliminated Item 3 as having been fired from the same firearm as the Item 1 cartridge cases. One participant was inconclusive for Items 2 and 3 and identified Items 4 and 5 as having been fired in the same firearm as the Item 1 test-fired cartridges. The remaining participant identified Items 2, 3, 4 and 5 as having been fired from the same firearm as the Item 1 cartridge cases.

Many participants went further to compare Items 2 and 4 and determined that they were fired from the same, unknown gun.

CTS is aware that many labs will not, as a matter of policy, report an elimination without access to the firearm or when class characteristics match.

Examination Results

Were any of the questioned expended cartridge cases (Items 2-5) discharged from the same firearm as the known expended cartridge cases (Item 1)?

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
2B4QZ4	Yes	No	Yes	Yes	44HNWX	No	No	No	Yes
2BUP7H	No	No	No	Yes	48VHJH	No	No	No	Yes
2CYAZJ	No	No	No	Yes	4HJ2BA	No	No	No	Yes
2DXLR7	No	No	No	Yes	4J9FQ8	Inc	No	Inc	Yes
2MJLDH	No	No	No	Yes	4KHMRE	No	No	No	Yes
2PTRRW	No	No	No	Yes	4MBFTP	No	No	No	Yes
2VXB9A	No	No	No	Yes	4MJ7BA	No	No	No	Yes
2WNTTG	No	No	No	Yes	4MXVC2	No	No	No	Yes
32LFG4	No	No	No	Yes	4UWECB	No	No	No	Yes
3B9E8A	No	No	No	Yes	4XWMN9	Yes	No	Yes	Yes
3D8WYA	No	No	No	Yes	4Y6UQ2	Yes	No	Yes	Yes
3DTGWU	No	No	No	Yes	63KMJE	Yes	Yes	Yes	Yes
3MTARE	No	No	No	Yes	676HCY	No	No	No	Yes
3NWGNF	No	No	No	Yes	68Y7TA	Inc	No	Inc	Yes
3RFQJY	No	No	No	Yes	6A6QGA	No	No	No	Yes
3Z6BQT	No	No	No	Yes	6DQ93Z	No	No	No	Yes
3Z6JN6	No	No	No	Yes	6HEDZA	No	No	No	Yes
3ZH7TC	No	No	No	Yes	6HGMN2	Inc	No	Inc	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
6PJRJR	No	No	No	Yes	9AAEAW	No	No	No	Yes
72PANZ	No	No	No	Yes	9BLBMN	No	No	No	Yes
7AF2QX	No	No	No	Yes	9EQMXV	No	No	No	Yes
7CQUP8	Inc	No	Inc	Yes	9FKBE7	Inc	No	Inc	Yes
7FN8HX	Yes	No	Yes	Yes	9H3NN8	No	No	No	Yes
7GG7LN	No	No	No	Yes	9HLFRQ	No	No	No	Yes
7GWHCF	No	No	No	Yes	9K9ADT	No	Inc	No	Yes
7M9E94	Inc	No	Inc	Yes	9L3XWN	No	No	No	Yes
7MJAJA	No	No	No	Yes	9L6M2L	No	Inc	No	Yes
7TN9VY	No	No	No	Yes	9QJ4MW	No	No	No	Yes
7WQ88D	No	No	No	Yes	9QWZR2	No	No	No	Yes
8H7ZWX	No	No	No	Yes	9Z6AKZ	No	No	No	Yes
8JYVEZ	No	No	No	Yes	A9W8LU	No	No	No	Yes
8PJZ29	No	No	No	Yes	AA86M4	No	No	No	Yes
8WT8VJ	No	No	No	Yes	AD7J89	No	No	No	Yes
8XJ7AH	No	No	No	Yes	AG97EJ	No	No	No	Yes
922RHV	No	No	No	Yes	ALW3QN	No	No	No	Yes
96EL6F	No	No	No	Yes	ALYRUK	No	No	No	Yes
96XK3D	No	No	No	Yes	AMXQDT	No	No	No	Yes
984YYJ	Inc	No	Inc	Yes	AP62CH	No	No	No	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
AUCJHX	No	No	No	Yes	DRDKQT	No	No	No	Yes
AUDE7A	No	No	No	Yes	DVZ33L	No	No	No	Yes
AVA3AQ	No	No	No	Yes	E3CJC8	No	No	No	Yes
AXT9JL	No	No	No	Yes	E4LRVR	No	No	No	Yes
AXVTF2	No	No	No	Yes	E8QDUQ	No	No	No	Yes
B96TH9	No	No	No	Yes	EBNWU3	Inc	No	Inc	Yes
BL2M74	No	No	No	Yes	EDBPF7	No	No	No	Yes
BNQUQZ	No	No	No	Yes	EDTAR4	No	No	No	Yes
BQWCVN	No	No	No	Yes	EDUD9L	No	No	No	Yes
BUU3TM	No	No	No	Yes	ET9NVN	No	No	No	Yes
BYGY8C	No	No	No	Yes	EUFYF7	No	No	No	Yes
C2MMJG	No	No	No	Yes	F6RJFR	Inc	No	Inc	Yes
C76NZL	No	No	No	Yes	F8WCBC	No	No	No	Yes
CDHXRM	No	No	No	Yes	F9F2PQ	No	No	No	Yes
CHMTCM	No	No	No	Yes	FB4FEZ	No	No	No	Yes
CTBMNK	No	No	No	Yes	FCHXEK	No	No	No	Yes
DCRXMP	No	No	No	Yes	FP42U4	No	No	No	Yes
DCZAYZ	Inc	No	Inc	Yes	FTZXBH	No	No	No	Yes
DGH68J	No	No	No	Yes	FUE8EG	Inc	No	Inc	Yes
DJYW2	No	No	No	Yes	FVR2UH	No	No	No	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
FWHAV7	No	No	No	Yes	HR2NZ4	No	No	No	Yes
FXDJEN	No	No	No	Yes	HTANDX	No	No	No	Yes
FZFTX4	No	No	No	Yes	HTDEBU	Inc	No	Inc	Yes
GAKZD4	No	No	No	Yes	HYGA3G	No	No	No	Yes
GCQL24	No	No	No	Yes	HZBTDU	No	No	No	Yes
GF7ZMP	No	No	No	Yes	J44G3Z	No	No	No	Yes
GG4AUE	No	No	No	Yes	J7TTXZ	No	No	No	Yes
GKMA6M	Inc	No	Inc	Yes	JAG9F9	Inc	No	Inc	Yes
GLF89N	No	No	No	Yes	JEPLAZ	No	No	No	Yes
GQDL36	No	No	No	Yes	JLV4XT	Inc	No	Inc	Yes
GRZGCQ	Inc	Inc	Yes	Yes	JUJYVM	No	No	No	Yes
GY9H9F	No	No	No	Yes	JW7M63	No	No	No	Yes
HBC8G2	No	No	No	Yes	JXK3MA	No	No	No	Yes
HCBELE	No	No	No	Yes	JXLW7F	No	No	No	Yes
HECP92	No	No	No	Yes	JY9PRH	No	No	No	Yes
HF9VX9	No	No	No	Yes	JYBEWF	No	No	No	Yes
HM2FP3	No	No	No	Yes	K2XBZZ	No	No	No	Yes
HM9FXJ	Yes	No	Yes	Yes	K4LPMN	No	No	No	Yes
HPUBCB	No	No	No	Yes	KANYV3	No	No	No	Yes
HQ7WBD	No	No	No	Yes	KBL8ZF	No	No	No	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
KBMZ2U	No	No	No	Yes	MCPJW8	No	No	No	Yes
KDET2J	No	No	No	Yes	MLEDZG	No	Inc	No	Yes
KH67Y2	No	No	No	Yes	MNJVDR	No	No	No	Yes
KMH2PW	Inc	No	Inc	Yes	MNMQHY	No	No	No	Yes
KMWNZJ	No	No	No	Yes	MPCQU9	No	No	No	Yes
KVEWMU	No	No	No	Yes	MRPA6Q	Inc	No	Inc	Yes
KXWAWW	No	No	No	Yes	MX9TTY	No	No	No	Yes
L7PNRF	No	No	No	Yes	MYRE2G	No	No	No	Yes
LAAMXX	No	No	No	Yes	N68J7M	No	No	No	Yes
LHGHHX	No	No	No	Yes	N88WJE	No	No	No	Yes
LMUCL2	No	No	No	Yes	NAHMYA	No	No	No	Yes
LPHR9G	No	No	No	Yes	NGY8XF	No	No	No	Yes
LRN2ER	No	No	No	Yes	NKD2LZ	No	No	No	Yes
LWLRNC	No	No	No	Yes	NMPMHG	No	No	No	Yes
M6BLEF	No	No	No	Yes	NWDCNG	No	No	No	Yes
M6DEDM	No	No	No	Yes	PCHGWD	No	No	No	Yes
M6RZMP	No	No	No	Yes	PET6PP	No	No	No	Yes
M7NAPE	No	No	No	Yes	PGGCFE	No	No	No	Yes
M9PF3Z	No	No	No	Yes	PH67GM	No	No	No	Yes
MA7KMJ	Inc	No	Inc	Yes	PJ2J6F	Yes	No	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
PQ6AY8	No	No	No	Yes	TBVU4D	Inc	No	Inc	Yes
PQLLGC	No	No	No	Yes	TDJHDT	No	No	No	Yes
PTLTQN	No	No	No	Yes	TFTCKE	No	No	No	Yes
PTNHVL	No	No	No	Yes	TJBCZU	No	No	No	Yes
PYE24V	Inc	No	Inc	Yes	TLVG6H	No	No	No	Yes
Q4PA7K	No	No	No	Yes	TM93ZD	No	No	No	Yes
Q6C4EL	No	No	No	Yes	TYAEL8	No	No	No	Yes
Q9GGPT	No	No	No	Yes	TZVJHJ	No	No	No	Yes
Q9J7TQ	Inc	No	Inc	Yes	U3KVA3	No	No	No	Yes
QREU78	No	No	No	Yes	U7WRNC	No	No	No	Yes
QUFXKM	No	No	No	Yes	U7YKKY	No	No	No	Yes
QYDBQL	No	No	No	Yes	UCBEPW	No	No	No	Yes
R2DWZ4	No	No	No	Yes	UEBMU7	No	No	No	Yes
R44X8C	No	No	No	Yes	UEP6LQ	No	No	No	Yes
R47KKJ	No	No	No	Yes	UHWEYG	No	No	No	Yes
R4FYJD	No	No	No	Yes	UKV27Q	No	No	No	Yes
RDNBXV	No	No	No	Yes	ULACBB	No	No	No	Yes
RDNDJT	Inc	No	Inc	Yes	UNFN8Q	Inc	No	Inc	Yes
RGQ8PB	No	No	No	Yes	UU6A3J	Inc	No	Inc	Yes
T33RVB	No	No	No	Yes	UVKFHA	No	No	No	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
UVXAVN	No	No	No	Yes	XN697L	No	No	No	Yes
V66A8B	No	No	No	Yes	XUDGMQ	Inc	No	Inc	Yes
VAH6VL	Inc	No	Inc	Yes	Y693CL	Inc	Inc	Inc	Yes
VCZ9JH	No	No	No	Yes	YCCZ7J	No	No	No	Yes
VKF2Y9	Inc	No	Inc	Yes	YDL4NN	No	No	No	Yes
W2Y2LX	No	No	No	Yes	YHE2GL	No	No	No	Yes
W3PEV4	No	No	No	Yes	YJU9TV	No	No	No	Yes
W4LNR7	No	No	No	Yes	YKHVX4	No	No	No	Yes
WC2EKD	No	No	No	Yes	YKMDYM	No	No	No	Yes
WJJPVT	No	No	No	Yes	YWD87B	Inc	No	Inc	Yes
WP28Y3	No	No	No	Yes	YWGKXD	No	No	No	Yes
WRXQY9	No	No	No	Yes	YYGZ3U	No	No	No	Yes
WXZR8P	No	No	No	Yes	Z2MTN7	Yes	No	Yes	Yes
WYCETB	No	No	No	Yes	Z4QHY2	No	Inc	No	Yes
X2EMP8	No	No	No	Yes	Z6K7HX	No	No	No	Yes
X849DL	No	No	No	Yes	Z76T6L	No	No	No	Yes
X84CV4	No	No	No	Yes	Z7YLTD	No	No	No	Yes
XCRV6K	No	No	No	Yes	Z8XGP3	No	No	No	Yes
XG8A2R	No	No	No	Yes	ZB8UBH	No	No	No	Yes
XK7RVD	No	No	No	Yes	ZKELNH	No	No	No	Yes

TABLE 1

WebCode	Item 2	Item 3	Item 4	Item 5	WebCode	Item 2	Item 3	Item 4	Item 5
ZKZ6PJ	No	No	No	Yes					
ZNHGA8	No	No	No	Yes					

Response Summary					Participants: 278
<i>Were any of the questioned expended cartridge cases (Items 2-5) discharged from the same firearm as the known expended cartridge cases (Item 1)?</i>					
		<u>Item 2</u>	<u>Item 3</u>	<u>Item 4</u>	<u>Item 5</u>
Responses	Yes	8 (2.9%)	1 (0.4%)	9 (3.2%)	278 (100.0%)
	No	240 (86.3%)	271 (97.5%)	240 (86.3%)	0 (0.0%)
	Inc	30 (10.8%)	6 (2.2%)	29 (10.4%)	0 (0.0%)

Conclusions

TABLE 2

WebCode	Conclusions
2B4QZ4	From the sample that had been received, it can be concluded that three expended cartridge (item 2, 4 & 5) that had been recovered from the crime scene have same characteristics as three expended cartridge (item 1) that had been discharged from the firearm (Beretta Px4 Storm .40) which had been seized from the suspect. Meanwhile, one expended cartridge (item 3) did not have same characteristics as three expended cartridge (item 1). Therefore, from the comparison and finding, it can be conclude that 2 firearm are been used in the crime scene including the suspect firearm that had been seized.
2BUP7H	Item 01-05 was fired in the same firearm as the submitted tests, Items 01-01. Item 01-02 and Item 01-04 were fired in the same firearm. Item 01-02 and Item 01-04 were not fired in the same firearm as Items 01-01 and Item 01-05, nor were they fired in the same firearm as Item 01-03. Item 01-03 was not fired in the same firearm as Item 01-01 and Item 01-05, nor was it fired in the same firearm as the other cartridge cases submitted, Items 01-02 and Item 01-04. The class characteristics noted on Item 01-03 are consistent with those produced by some Smith and Wesson firearms.
2CYAZJ	In my opinion, a microscopic comparison of firing marks has shown there is sufficient agreement of class and individual characteristic markings to conclusively determine that the fired cartridge case, item 5, was discharged in item 1. In my opinion, a microscopic comparison of firing marks has shown there is agreement of class characteristic markings but disagreement of individual characteristic markings to conclusively determine that the three fired cartridge cases, items 2-3, were not discharged in item 1.
2DXLR7	Item 5 was fired in the weapon that fired item 1. Item 2 and 4 were fired in another same weapon. Item 3 was fired in another weapon.
2MJLDH	1.The cartridge cases described in item 1 and the cartridge case described in item 5, are .40 S&W caliber and were fired by the same firearm. 2.The cartridge case described in item 2 and the cartridge case described in item 4, are .40 S&W caliber and were fired by the same firearm. 3.The cartridge case described in item 3, is .40 S&W caliber and was fired by a firearm. 4. The cartridge case described in item 3, is .40 S&W caliber and was not fired by the firearm used to fired the cartridge cases described in item 1 and the cartridge case described in item 5, neither was fired by the firearm used to fired the cartridge case described in item 2 and the cartridge case described in item 4.
2PTRRW	The Item 5 cartridge case was identified, within the limits of practical certainty*, as having been fired in the same firearm as the Item 1 test fired cartridge cases (See Notes/Remarks ^). The Item 2, 3 and 4 cartridge cases were not fired in the same firearm as the Item 1 test fired cartridge cases. The Item 2 and 4 cartridge cases were identified, within the limits of practical certainty*, as having been fired in the same firearm. The Item 3 cartridge case was not fired in the same firearm as the Item 1, 2, 4 or 5 cartridge cases. Three (3) firearms are represented by the Item 2 through 5 cartridge cases.
2VXB9A	The fired cartridge case of item #5 was microscopically identified as having been fired in the Beretta pistol that fired items #1 (A-C). The fired cartridge cases of items #2 and #4 were microscopically identified as having been fired in the same unknown 40 S&W caliber firearm. The fired cartridge case of item #3 was found to have been fired in a second unknown 40 S&W caliber firearm.
2WNTTG	By means of cartridge case, microscopic and comparison examinations it was determined that: 1. The cartridge cases marked E-1 to E-3, described in Item 1 and the cartridge case marked E-7, described in the Item 5, are caliber .40 S&W and were fired by the same firearm. 2. The cartridge case marked E-4, described in Item 2 and the cartridge case marked E-6, described

TABLE 2

WebCode	Conclusions
	in the Item 4, are caliber .40 S&W and were fired by the same firearm. 3. The cartridge case marked E-5, described in Item 3, is .40 S&W caliber and was fired by a firearm. It was not fired by the firearm used to fire the cartridge cases marked E-1 to E-3, E-4, E-6 and E-7, described in Items 1, 2, 4 and 5 respectively.
32LFG4	Four of the 40 Smith & Wesson caliber cartridge cases (1A, 1B, 1C, 5) were fired in the same firearm. Two of the 40 Smith & Wesson caliber cartridge cases (2, 4) were fired in the same firearm. Two of the 40 Smith & Wesson caliber cartridge cases (2, 4) were not fired in the same firearm as were four of the other 40 Smith & Wesson caliber cartridge cases (1A, 1B, 1C, 5). One of the 40 Smith & Wesson caliber cartridge cases (3) was not fired in the same firearm as were any of the other six 40 Smith & Wesson caliber cartridge cases (1A, 1B, 1C, 2, 4, 5). Possible firearms in which one of the 40 Smith & Wesson caliber cartridge cases (3) may have been fired include, but are not limited to, 40 Smith & Wesson caliber pistols marketed by Smith & Wesson.
3B9E8A	Item 5 was fired in the same firearm as Item 1 (identification). This conclusion was verified by Firearms Examiner (name). Items 2 and 4 were fired in the same firearm (identification). This conclusion was verified by Firearms Examiner (name). Items 2-4 were not fired in the same firearm as Item 1 (elimination). This conclusion was verified by Firearms Examiner (name). Item 3 was not fired in the same firearm as Items 2 and 4 (elimination). This conclusion was verified by Firearms Examiner (name).
3D8WYA	Item 5 was discharged from the same pistol which discharged Item 1. Item 2 and Item 4 were discharged from the same pistol (different pistol that discharged Item 1). Item 3 was discharged from a third pistol (different pistol that the others).
3DTGWU	The Item 5 cartridge case was identified, within the limits of practical certainty ¹ , as having been fired in the same firearm that generated the Item 1 test fired cartridge cases. The Item 2 and 4 cartridge cases were identified, within the limits of practical certainty ¹ , as having been fired in the same firearm, but not the firearm that generated the Item 1 test fired cartridge cases. The Item 3 cartridge case was not fired in the firearm that fired Items 1 and 5 or in the firearm that fired Items 2 and 4. Items 1 through 5 represent three (3) different firearms.
3MTARE	The questioned expended cartridges cases described as Item 2, Item 3, and Item 4 were not discharged from the same firearm as the known cartridges cases described as Item 1. The questioned expended cartridge case described as Item 5 did was discharged from the same firearm as the known cartridges cases described as Item 1.
3NWXNF	The Items 01-02 and 01-04 cartridge cases were identified as having been fired in the same unknown firearm. The Items 01-02 and 01-04 cartridge cases were eliminated as having been fired in the same firearm as the Items 01-01 and 01-05 cartridge cases. The Item 01-03 cartridge case was eliminated as having been fired in the same firearm(s) as the Items 01-01, 01-02, 01-04, or 01-05 cartridge cases. A possible manufacturer of the firearm that could have fired this cartridge case includes, but is not limited to, Smith & Wesson. The Item 01-05 cartridge case was identified as having been fired in the same firearm as the Item 01-01 cartridge cases.
3RFQJY	The cartridge case evidence submitted as item 5 was identified as having been fired in the same firearm used to produce the test fire specimens, item 1. The cartridge cases submitted as items 2 and 4 were fired in one firearm, but not the firearm used to produce the test fire specimens, item 1. The cartridge case submitted as item 3 was fired in a third firearm.
3Z6BQT	2. I examined the fired cartridge cases marked Item 1 to Item 5 and compared the individual and class characteristic markings transferred to them by firearm components during the firing process using a comparison microscope and found they were fired in different firearms as follows: 2.1 The cartridge cases marked Item 5 and Item 1 were fired in the same firearm. 2.2

TABLE 2

WebCode	Conclusions
	The cartridge cases marked Item 2 and Item 4 were fired in a second firearm. 2.3 The cartridge case marked Item 3 was fired in a third firearm.
3Z6JN6	The examination of the recovered (questioned) expended cases under a comparison microscope, allows us to conclude that the item 5 was fired from the seized BERETTA Px4 STORM. The examination also showed that items 2 and 4, were fired from a second firearm.
3ZH7TC	The item 5 was discharged by the same firearm as the item 1. The items 2,3,4 were not discharged by the same firearm as the item 1.
44HNWX	1. Exhibits 2, 3, 4, and 5 (four Federal brand 40 S&W cartridge cases) were microscopically compared to Exhibit 1 (three Federal brand 40 S&W cartridge cases labeled as test fires from the recovered Beretta PX4 Storm pistol). a. It was concluded that Exhibits 1 and 5 were identified as having been fired in the same firearm based upon agreement of class characteristics and sufficient agreement of individual characteristics. b. It was concluded that Exhibits 2 and 4 were identified as having been fired in the same firearm based upon agreement of class characteristics and sufficient agreement of individual characteristics. c. Exhibits 2 and 4 were eliminated as having been fired from the firearm that fired Exhibits 1 and 5 based upon disagreement of individual characteristics. Observing this amount of disagreement from the same source is considered extremely remote. d. It was concluded that Exhibit 3 was eliminated as having been fired in the same firearm that fired Exhibits 1 and 5 as well as the firearm that fired Exhibits 2 and 4 based upon disagreement of class characteristics. TECHNICAL NOTES: Class characteristics are defined as measureable features of a firearm or tool, which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm or tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm or tool surfaces. These random imperfections or irregularities can be either produced incidental to manufacture or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm or tool are not to the absolute exclusion of all other firearms or tools, because it is not feasible to examine all firearms or tools in the world. However, observing this amount of agreement between different sources is considered extremely remote.
48VHJH	(1) Only item 5 expended cartridge case (1) was fired from the firearm(A) which was used to fire item 1 expended cartridge cases. Item 2, 3, 4 expended cartridge cases were not fired from firearm(A). (2) Item 2, 4 expended cartridge cases were fired from the same firearm(B) which was different from that used to fire item 1 expended cartridge cases. (3) Item 3 expended cartridge case was fired from firearm(C) that was different from firearm(A) and firearm(B).
4HJ2BA	Corresponding marks were found on Item 5 and Item 1. Items 2, 3 and 4 showed clearly distinctive marks. Therefore, the observed marks on These Items originated from another weapon than the one which created the marks on Item 1. The cartridge recovered from the yard was shot by the suspect's weapon, while the cartridges recovered from the driveway were fired by another weapon.
4J9FQ8	Firearm marks on the Item no 05 were agreed with firearm marks on the item no 01. Firearm marks on the Item no 03 were disagreed with firearm marks on the Item no 01.
4KHMRE	1. The cartridge cases described in Item 1 and the cartridge case described in Item 7, are .40 S&W caliber and were fired by the same firearm. 2. The cartridge case described in Item 2 and the cartridge case described in Item 4, are .40 S&W caliber and were fired by the same firearm. 3. The cartridge case described in Item 3, is .40 S&W caliber, were fired by a firearm, were not fired by the firearm that fired the cartridge cases described in Item 1, the cartridge case described in Item 5, neither by the firearm that fired the cartridge case described in Item 2 and the cartridge case described in Item 4.

TABLE 2

WebCode	Conclusions
4MBFTP	The submitted expended cartridge cases were microscopically examined in conjunction with each other. It is our conclusion that items 2, 3 and 4 were not fired in the suspect's firearm Item 1. The submitted Items 2 and 4 were fired by the same firearm different from that the suspect's weapon. The submitted Item 3 was fired from a second firearm different from that the suspect's and different from the firearm that expended items 2 and 4. The submitted item 5 was fired from the suspect's weapon.
4MJ7BA	Item 5 was fired in the same firearm as Item 1 (identification). This conclusion was verified by Firearms Examiner (name). Items 2-4 were not fired in the same firearm as Item 1 (elimination). This conclusion was verified by Firearms Examiner (name). Items 2 and 4 were fired in the same firearm (identification). This conclusion was verified by Firearms Examiner (name). Item 3 was not fired in the same firearm as Items 2 and 4 (elimination). This conclusion was verified by Firearms Examiner (name).
4MXVC2	Items 2 and 4 were eliminated to Item 1 based on the disagreement of individual characteristics observed in the breechface marks, firing pin aperture shear marks and firing pin impression. Items 2 and 4 were identified to the same unknown firearm based on the agreement of class characteristics, and individual characteristics observed in the breechface marks, firing pin aperture shear marks and firing pin impression. Item 3 was eliminated as having been fired by Item 1 or the unknown firearm that fired Items 2 and 4 based on differences in individual characteristics observed in the firing pin impression. Item 5 was identified to Item 1 based on the agreement of class characteristics, and individual characteristics observed in the breechface marks, firing pin aperture shear marks and firing pin impression.
4UWECB	Examinations showed that Item 2, Item 3, and Item 4 were not discharged within the recovered firearm. Examinations showed that Item 5 was discharged within the recovered firearm.
4XWMN9	Once the items received for study in the lab were checked, the following was determined: Group 1: cartridge case 2, 4 and 5 were shooting by the firearm that percutio item 1. Group 2: cartridge case number 3. These items were shooting by two different firearms.
4Y6UQ2	From the sample that had been received, it can be concluded that three expended cartridge (item 2, 4 & 5) that had been recovered from the crime scene have same characteristics as three expended cartridge (item 1) that had been discharged from the firearm (Beretta Px4 Storm .40) which had been seized from the suspect. Meanwhile, one expended cartridge (item 3) did not have same characteristics as three expended cartridge (item 1). Therefore, from the comparison and finding, it can be conclude that 2 firearm are been used in the crime scene including the suspect firearm that had been seized.
63KMJE	Items 2, 3, 4 and 5 correspond to the firearm found in the scene. all were fired by the same firearm. Los items 2,3,4, y 5, fueron disparados por la misma arma de fuego que se encontró con el detenido de la escena. Es decir los testigos obtenidos del arma de fuego si corresponden y fueron disparados por el arma de fuego a estudio.
676HCY	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
68Y7TA	Comparative microscopic examination of the cartridge cases in Item 1 with the cartridge cases in Items 2-5 revealed that: a) Items 2 and 4 bear some agreement of individual characteristics and all discernible class characteristics, but insufficient for an identification. b) Item 3 bears no marks to link to Item 1. c) Item 5 was fired in the same firearm as the cartridge cases in Item 1. d) Items 2 and 4 were fired in the same firearm.
6A6QGA	Examinations showed that the discharged cartridge case in Item 5 was discharged within the same firearm used to discharge the test fired cartridge cases in Item 1. Examinations showed

TABLE 2

WebCode	Conclusions
	that the discharged cartridge cases in Items 2, 3 and 4 were not discharged within the same firearm used to discharge the test fired cartridge cases in Item 1.
6DQ93Z	Cartridge Case Analysis: Methodology - Comparison Microscopy: Item 5, the cartridge case, was fired in the same firearm as Item 1, the test fired cartridge cases, based upon corresponding class and individual microscopic characteristics. Items 2 and 4, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. A reference from this group will be entered into NIBIN. Items 2 and 4, the cartridge cases, were not fired in the same firearm as Item 1, the test fired cartridge cases, based upon different individual microscopic characteristics. Item 3, the cartridge case, was not fired in the same firearm as Item 1, the test fired cartridge cases, nor Items 2 and 4, the cartridge cases, based upon different class characteristics.
6HEDZA	The fired cartridge case (item #5) exhibits sufficient matching information to the test fired cases from item #1 to reveal that item 5 was fired from the same firearm as item 1. The fired cartridge cases (items 2 and 4) exhibit sufficient matching information to each other to reveal that items 2 & 4 were fired from a second different firearm that set 1. The fired cartridge case (item #3) does not exhibit matching information to the test fired cases from item #1 or to the items 2/4 and represents a third firearm.
6HGMMN2	The fired cartridge case, item 1.3, was eliminated as having been fired in the Beretta pistol, item 1.1, based on a difference in class characteristics (firing pin impression). The fired cartridge case, item 1.5, was identified as having been fired in the Beretta pistol, item 1.1. The two (2) fired cartridge cases, items 1.2 and 1.4, were consistent in all observable class characteristics (breechface marks, caliber, and firing pin impression) as the Beretta pistol, item 1.1. However, due to a lack of reproducible individual microscopic markings, the cartridge cases could neither be eliminated nor identified as having been fired in the Beretta pistol. The results are inconclusive. The fired cartridge case, item 1.2, was consistent in all observable class characteristics (breechface marks, caliber, and firing pin impression) as the fired cartridge case, item 1.4. While there is some agreement of microscopic markings, the markings present are insufficient to identify them as having been fired in the same firearm. The results are inconclusive.
6PJRJR	Cartridge Case Analysis: Methodology – Comparison Microscopy: Item 5, the cartridge case, was fired in Item 1, the Beretta pistol, based upon corresponding class and individual microscopic characteristics. Items 2 and 4, the cartridge cases, were not fired in Item 1, the Beretta pistol, based upon different individual microscopic characteristics. Item 3, the cartridge case, was not fired in Item 1, the Beretta pistol, based upon different class characteristics. Items 2 and 4, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. A reference from this group will be entered into NIBIN. Items 2 and 4, the cartridge cases, were not fired in the same firearm as Item 3, the cartridge case, based upon different class characteristics. NIBIN: Items 2 and 3, the cartridge cases, will be entered into NIBIN. A test fired cartridge case from Item 1, the Beretta pistol, will be entered into NIBIN. The results of NIBIN entries and searches will be the subject of a separate report.
72PANZ	Item A1-5 was compared to item A1-1. Items A1-1 and A1-5, .40 S&W caliber, Federal cartridge cases were identified as having been fired in the same firearm, firearm not submitted. Items A1-2, A1-3 and A1-4 were compared to item A1-1. Items A1-1, A1-2, A1-3, and A1-4 exhibit similar class characteristics; however, microscopic examination revealed sufficient differences in individual characteristics to eliminate them as having been fired in the same firearm, firearm not submitted.
7AF2QX	QC-4 (Item 5) was fired in K-1 (Item 1) based on agreement of class characteristics and

TABLE 2

WebCode	Conclusions
	sufficient agreement of individual characteristics in the breech face and firing pin impressions. QC-1 (Item 2) and QC-3 (Item 4) were fired in a second firearm, firearm unknown based on agreement of class characteristics and sufficient agreement of individual characteristics in the breech face and firing pin impressions. QC-2 (Item 3) was fired in a third firearm, firearm unknown. Based on a difference in class characteristic of the firing pin impressions.
7CQUP8	Examination and comparison of the test fired cartridge cases in Item 1 and the cartridge cases in Items 2, 3, 4, and 5 revealed that: A. The cartridge case in Item 5 had been fired in the same firearm as the test cartridge cases in Item 1. B. The cartridge cases in Items 2 and 4 had been fired in the same firearm as one another. These cartridge cases bear the same class characteristics as the cartridge cases in Items 1 and 5; however, there are no marks to link them as having been fired in the same firearm as Items 1 and 5. C. Due to a difference in class characteristics, the cartridge case in Item 3 had not been fired in the same firearms as Items 1, 2, 4, or 5. Class characteristics present on Item 3 are most common to some Smith & Wesson pistols.
7FN8HX	From the sample that had been received, it can be concluded that three expended cartridge (item 2, 4 & 5) that had been recovered from the crime scene have same characteristics as three expended cartridge (item 1) that had been discharged from the firearm (Beretta Px4 Storm .40) which had been seized from the suspect. Meanwhile, one expended cartridge (item 3) did not have same characteristics as three expended cartridge (item 1). Therefore, from the comparison and finding, it can be conclude that 2 firearm are been used in the crime scene including the suspect firearm that had been seized.
7GG7LN	Item #1 was microscopically compared to Items # (2-5). Item # 1 and #5 are an identification, therefore, Item #5 was fired in the submitted Beretta Px4 Storm firearm (Item #1). Item #1 and Items # (2-4) are an elimination, therefore, were not fired in the recovered Beretta Px4 Storm firearm (Item #1).
7GWHCF	a) Item no. 5 is positive with Item no. 1 breechface marks corresponds. b) Item no. 2 and Item no. 4 were fired in a second unknown firearm. Firing pin marks and breechface marks corresponds. c) Item no. 3 was fired in a third unknown firearm. Different characteristics.
7M9E94	Before examination the expended cartridge cases recovered after a shooting outside of a residence were marked TH1 (Item 2), TH2 (Item 3), TH3 (Item 4) and TH4 (Item 5). The cartridge cases test fired from the suspect's handgun were marked VH1, VH2 and VH3. These cartridge cases were compared using a Leica FSC comparison Microscope. The cartridge cases bear appropriate marks that make them suitable for comparative analysis. Identification of the firearm used, based on these marks, appears to be possible. Based on the observed similarities in the individual characteristics of TH4 compared to VH1, VH2 and VH3 it is concluded that cartridge case Item 5 was fired from the suspect's firearm. Based on the observed differences in the individual characteristics of TH2 compared to VH1, VH2 and VH3 it is concluded that cartridge case Item 3 was not fired from the suspect's firearm. The observed similarities of TH1 and TH 3 compared to VH1, VH2 and VH3 are not sufficient for an identification of the suspects firearm.
7MJAJA	Cartridge case identified as item 5, have been fired by the Beretta gun type firearm, Px4 Storm model, .40 family caliber. Cartridges cases identified as 2, 3, 4, have not been fired by Beretta Pistol, model Px4 Storm, caliber .40. Their class characteristics indicate that they were fired using caliber .40 S & W. pistols.
7TN9VY	The Item 5 cartridge case was fired in the same firearm which fired the Item 1 test fired cartridge cases. The Item 2 and Item 4 cartridge cases were fired in the same firearm. The Item 3 cartridge case was not fired in the firearm which fired the Item 1 and Item 5 cartridge cases, nor the firearm which fired the Item 2 and Item 4 cartridge cases.

TABLE 2

WebCode	Conclusions
7WQ88D	Compared the test shells marked #1 against the shell marked #5 with positive results. The shell marked #5 was discharged in the submitted pistol. Compared the test shells marked #1 against the three shells marked #2, #3 & #4 with negative results. The three shells marked #2, #3 & #4 were not discharged in the submitted pistol. Compared the two shells marked #2 & #4 against each other with positive results. The two shells marked #2 & #4 were discharged in the same firearm. Compared the two shells marked #2 & #4 against the shell marked #3 with negative results. The shell marked #3 was not discharged in the same firearm as the two shells marked #2 & #4.
8H7ZWX	Comparison microscope examinations were conducted on the evidence items listed. The findings of this examiner are the following: Item 1 and Item 5 were fired with the .40 S&W Beretta Px4 Storm pistol based on sufficient agreement of individual characteristics present. (Firearm 1). Item 2 and Item 4 were fired with the same unknown firearm based on sufficient agreement of individual characteristics present. (Firearm 2). Item 3 was not fired with the same firearm the fired Exhibits 1 and 5, or Exhibits 2 and 4 due to the differences in class characteristics on firing pin impressions. (Firearm 3)
8JYVEZ	Item 5 is identified as having been fired in the same firearm that fired item 1. Items 2, 3 and 4 are eliminated from having been fired in the same firearm that fired item 1. Items 2 and 4 are identified as having been fired in the same unknown firearm. Item 3 is eliminated from items 2 and 4. Item 3 was fired in a 3rd firearm.
8PJZ29	The cartridge cases labeled as Item 2, Item 3 and item 4 were NOT discharged from the same firearm that known cartridges cases labeled as item 1. The cartridge cases labeled as Item 5 WERE discharged from the same firearm that known cartridges cases labeled as item 1.
8WT8VJ	Item 1 consists of three (3) fired .40 S&W caliber cartridge cases, Federal brand. The Item 1 cartridge cases were submitted as the (known) samples for this test. Item 5 is one (1) fired .40 S&W caliber cartridge case, Federal brand, that was identified as having been fired in the Item 1 (known) firearm. Items 2 and 4 are two (fired) .40 S&W caliber cartridge cases, Federal brand, that were identified as having been fired in the same firearm and not the Item 1 (known) or the Item 3 firearm. Item 3 is one (1) fired .40 S&W caliber cartridge case, Federal brand, that was eliminated as having been fired in the Item 1 (known) firearm and the same firearm as the Items 2 and 4.
8XJ7AH	The discharged cartridge casing mentioned in item 5 was fired by the weapon that fired the tests in item 1. The discharged cartridge casings mentioned in item 1-2 and 1-4 were both fired by the same unknown weapon, not the weapon that fired the tests in item 1-1 or the weapon that fired item 1-3
922RHV	The item 5 cartridge case was identified as having been fired in the same firearm that fired the item 1 cartridge cases based on microscopic comparisons and the correspondence of individual characteristics. The items 2 and 4 cartridge cases were identified as having been fired in the same unknown firearm based on microscopic comparisons and the correspondence of individual characteristics. The item 3 cartridge case was microscopically compared to the items 1, 2, 4, and 5 cartridge cases and eliminated based on differences in class characteristics.
96EL6F	Comparison microscopic examination between the recovered cartilage cases from the scene and those test fired from the suspect's weapon revealed that: 1) The cartridge case recovered from the yard in item 5 only fired the suspects weapon. 2) The cartilage cases recovered from the driveway in item 2 and 4 fired from another firearm. 3) The cartridge case in item 3 fired from third firearm.
96XK3D	Cartridge case marked Item 5 was fired in the same firearm as tests (known) Item 1 breechface marks correspond. Cartridge cases marked Item 2 & Item 4 were fired in the second firearm

TABLE 2

WebCode	Conclusions
	firing pin and breechface marks corresponds. Cartridge case marked Item 3 was fired in the third firearm (unknown firearm).
984YYJ	The submitted cartridge cases were examined and microscopically compared to the test fired cartridge cases and to each other with the following results: The cartridge case (Item 5) was identified as having been fired in the same firearm that fired the test fired cartridge cases (Item 1). The cartridge case (Item 3) was eliminated as having been fired in the same firearm that fired the test fired cartridge cases (Item 1). The two cartridge cases (Items 2 and 4) were identified as having been fired in a single firearm. These cartridge cases shared similar general class characteristics with the test fired cartridge cases (Lab Item 1); however, there was insufficient agreement or disagreement in the individual characteristics for a conclusive identification to or elimination from these cartridge cases. These cartridge cases were not fired in the same firearm that fired Item 3.
9AAEAW	Examination of Items 2 & 4 revealed two (2) fired 40 caliber cartridge cases. Microscopic examination of Items 2 & 4 revealed they were fired in the same firearm. Microscopic examination of Items 2 & 4 with Item 1 (reported test fires) revealed Items 2 & 4 were not fired in the same firearm as Item 1. Examination of Item 5 revealed one (1) fired 40 caliber cartridge case. Microscopic examination of Item 5 with Item 1 (reported test fires) revealed Item 5 was fired in the same firearm as Item 1. Examination of Item 3 revealed one (1) fired 40 caliber cartridge case. Microscopic examination of Item 3 with Items 2 & 4 and Item 1 (reported test fires) revealed Item 3 was not fired in the same firearm as Items 2 & 4 or Item 1.
9BLBMN	Item 1 and item 5 were fired in the same firearm (BERETTA model PX4 Storm pistol). Item 2 and item 4 were fired in second firearm. Item 3 was fired in the third firearm.
9EQMXV	Item 5 was fired in the same firearm as the item 1 test fires (40 S&W caliber, Beretta, model Px4 Storm, no serial number given). Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
9FKBE7	Test fired cartridge cases from Item 1 were microscopically compared in conjunction with the cartridge cases submitted in Items 2 through 5. Based on these microscopic examinations, the following was determined: A. The cartridge case in Item 5 had been fired in the same firearm as the cartridge cases in Item 1. B. The cartridge case in Item 3 was excluded from being fired in the same firearm as the cartridge cases in Item 1 based on differences in class characteristics. C. The cartridge cases in Items 2 and 4 share some agreement of individual characteristics and discernible class characteristics as the cartridge cases in Item 1; however, these similarities are insufficient for a more conclusive examination. D. The cartridge cases in Items 2 and 4 had been fired in the same firearm.
9H3NN8	The questioned cartbridges case named Item 2, Item 3 and Item 4 were not discharged from the same firearm ("Beretta Px4 Strom, .40 S&W handgun") as the known cartbridge cases (Item 1). The questioned cartbridge case named item 5 were discharged form the same firearm ("Beretta Px4 Strom, .40 S&W handgun") as the known cartbridge cases (Item 1).
9HLFRQ	Item 001-5 was fired in the same firearm that reportedly produced the submitted test fired cartridge cases, Item 001-1. Item 001-2 and Item 001-4 were both fired in the same unknown firearm. Item 001-3 was fired in a second unknown firearm.
9K9ADT	3. On 2018-11-12 during the performance of my official duties I received a sealed evidence bag with number PA4001476943 from Case Administration of the Ballistics Section, containing the following: 3.1 One (1) white box written ITEM 1 containing the following exhibits: 3.1.1 Three (3) .40 Smith & Wesson calibre fired test cartridge cases marked by me "377983/18" each and "1A", "1B" and "1C" respectively. 3.2 One (1) white box written ITEM 2 containing the following exhibit: 3.2.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "377983/18 2". 3.3 One (1) white box written ITEM 3 containing the

TABLE 2

WebCode	Conclusions
	<p>following exhibit: 3.3.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "377983/18 3". 3.4 One (1) white box written ITEM 4 containing the following exhibit: 3.4.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "377983/18 4". 3.5 One (1) white box written ITEM 5 containing the following exhibit: 3.5.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "377983/18 5". 4. The intention and scope of this forensic examination comprises the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraphs 3.1.1, 3.2.1, 3.3.1, 3.4.1 and 3.5.1 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found: 5.1 The cartridge cases mentioned in paragraphs 3.1.1 and 3.5.1 were fired in the same firearm. 5.2 It cannot be determined if the cartridge case mentioned in paragraph 3.3.1 was fired or was not fired in the same firearm as the exhibits mentioned in paragraph 5.1. 5.3 It cannot be determined if the cartridge cases mentioned in paragraphs 3.2.1 and 3.4.1 were fired or were not fired in the same firearm but were not fired in the firearm or firearms that discharged the exhibits mentioned in paragraphs 5.1 and 5.2.</p>
9L3XWN	<p>Items 2 and 4 were fired in the same firearm (First firearm). Item 3 was fired in a second firearm. Item 5 and items 1 were fired in the same firearm (Third firearm).</p>
9L6M2L	<p>3. On 2018-11-16 during the performance of my official duties, I received a sealed evidence bag with number PA4001476951 from Case Administration of the Ballistics Section, containing the following item: 3.1 One (1) sealed cardboard box marked 2018 CTS Forensic Testing Program Test No. 18-527: FIREARMS EXAMINATION Sample Pack: F2 containing the following items: 3.1.1 One (1) cardboard box marked Test No. 18-527 Item 1, containing the following exhibits: 3.1.1.1 Three (3) .40 Smith & Wesson calibre fired cartridge cases marked "002TC1", "002TC2" and "002TC3" respectively. 3.1.2 One (1) cardboard box marked Test No. 18-527 Item 2, containing the following exhibit: 3.1.2.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "378002/18 2". 3.1.3 One (1) cardboard box marked Test No. 18-527 Item 3, containing the following exhibit: 3.1.3.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "378002/18 3". 3.1.4 One (1) cardboard box marked Test No. 18-527 Item 4, containing the following exhibit: 3.1.4.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "378002/18 4". 3.1.5 One (1) cardboard box marked Test No. 18-527 Item 5, containing the following exhibit: 3.1.5.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked by me "378002/18 5". 4. The intention and scope of this forensic examination comprises of the following: 4.1 Examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraphs 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and found: 5.2 The fired cartridge cases mentioned in paragraphs 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 were designed and manufactured to be fired by a centre-fire firearm. 6. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristics markings on them using a comparison microscope and found that the cartridge cases were fired in different firearms as follows: 6.1 The cartridge case mentioned in paragraph 3.1.5.1 was fired in the same firearm that discharged the cartridge cases mentioned in paragraph 3.1.1.1. 6.2 The cartridge cases mentioned in paragraphs 3.1.2.1 and 3.1.4.1 were fired in a second firearm. 6.3 It cannot be determined if the fired cartridge case mentioned in paragraph 3.1.3.1 was fired or was not fired in the same firearm as the cartridge cases mentioned in paragraph 6.1. 6.4 The cartridge case mentioned in paragraph 3.1.3.1 was not fired in the same firearm as the cartridge cases mentioned in paragraph 6.2. 7. The conclusions arrived at were based on facts, established by means of an examination and process which require a knowledge and skill in Forensic Ballistics. 8. The exhibits mentioned in paragraphs 3.1.1.1,</p>

TABLE 2

WebCode	Conclusions
	3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 were disposed of as follows: 8.1 On 2018-11-16 the exhibits mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 were sealed in an evidence bag with number PA4002358675 and handed over to Case Administration of the Ballistics Section.
9QJ4MW	Item 5, a Federal brand caliber 40 Smith & Wesson cartridge case, was microscopically examined and identified as having been fired in the firearm represented by the Item 1 cartridge cases. Items 2 and 4, each a Federal brand caliber 40 Smith & Wesson cartridge case, were microscopically examined and identified as having been fired in the same firearm. Due to differences in individual characteristics, Items 2 and 4 were eliminated as having been fired in the firearm represented by the Item 1 cartridge cases. Item 3, a Federal brand caliber 40 Smith & Wesson cartridge case, was microscopically examined. Due to differences in class characteristics, Item 3 was eliminated as having been fired in the firearm represented by the Item 1 cartridge cases and the same firearm as Items 2 and 4. Firearms that produce class characteristics like those present on this item includes Smith & Wesson (SD / SW Series) pistols chambered to fire caliber 40 Smith & Wesson cartridges. This is not all encompassing; it may be possible another brand of firearm produced class characteristics like those present and is not listed due to the content of the database searched.
9QWZR2	Based on agreement of class characteristics, the four cartridge cases, Item 2 through Item 5, were microscopically compared to each other and to test exemplars labeled as having been fired from the Item 1 Beretta pistol with the following results: Item 5 was identified on individual characteristics as having been fired from the Beretta pistol. Items 2 and 4 were identified on individual characteristics as having been fired from the same unknown firearm. The significance of these identifications are made to the practical, not absolute, exclusion of all other firearms. Item 3 was eliminated due to significant disagreement of individual characteristics as having been fired from the Item 1 pistol and the unknown firearm that fired Items 2 and 4. The evidence cartridge cases, Items 2 through Item 5, represent a total of three firearms. Additional 40 S&W caliber firearms recovered during the course of this investigation should be submitted along with Items 2, 3 and 4 for comparison purposes.
9Z6AKZ	Items 1 through 5: The Item 2, 3, 4 and 5 fired 40 S&W cartridge cases and test fires (Item 1) were examined and microscopically compared to each other with the following results: Item 5 was identified as having been fired in the same firearm that fired the Item 1 test fires. Items 2 and 4 were fired in the same unknown firearm and therefore eliminated as having been fired in the same firearm that fired the Item 1 test fires. Item 3 was eliminated as having been fired in the firearms that fired both the Item 1 test fires and the Item 2 and 4 cartridge cases.
A9W8LU	Item 5 was fired in the same firearm as the item 1 test fires. Item 2 and item 4 were fired in a second firearm. Item 3 was fired in a third firearm.
AA86M4	Item #5 was identified as having been fired in Item #1 (pistol). Items #2, #3 and #4 were eliminated as having been fired in Item #1.
AD7J89	1. The cartridge cases described in the item 1, are .40S&W caliber and were fired by the firearm used to fired the cartridge case described in the item 5. 2. The cartridge case described in the item 2, is .40S&W caliber and was fired by the firearm used to fired the cartridge case described in the item 4. 3. The cartridge case described in the item 3, is .40 S&W caliber and was fired by a firearm. 4. The cartridge case described in the item 3, is .40S&W caliber and was not fired by the firearm used to fired the cartridge cases described in the item 1 and the cartridge case described in the item 5. 5. The cartridge case described in the item 3, is .40S&W caliber and was not fired by the firearm used to fired the cartridge case described in the item 2 and the cartridge case described in the item 4.
AG97EJ	Items 1 and 5 were microscopically intercompared, finding class and individual distinguishing

TABLE 2

WebCode	Conclusions
	characteristic correspondence. It was concluded that Items 1 and 5 were all fired by the same firearm (firearm not submitted). Items 2 and 4 were microscopically intercompared, finding class and individual distinguishing characteristic correspondence. It was concluded that Items 2 and 4 were both fired by the same firearm (firearm not submitted). Item 3 was microscopically compared to Items 1, 2, 4, and 5, finding class characteristic differences. It was concluded that Item 3 was fired by a different firearm than Items 1, 2, 4, and 5 (firearms not submitted). Item 1 was microscopically compared to Items 2 and 4, finding class characteristic differences. It was concluded that Item 1 was fired by a different firearm than Items 2 and 4 (firearms not submitted).
ALW3QN	CARTRIDGE CASES ITEM 1 AND ITEM 5 WERE FIRED FROM THE SAME FIREARM. CARTRIDGE CASES ITEM 2 AND ITEM 4 WERE FIRED FROM THE SECOND FIREARM. CARTRIDGE CASE ITEM 3 WAS FIRED FROM THE THIRD FIREARM.
ALYRUK	EXHIBIT ITEM 5 POSITIVE WITH TESTS ITEM 1 EXHIBITS ITEM 2 AND ITEM 4 WERE FIRED IN THE SECOND FIREARM EXHIBIT ITEM 3 WAS FIRED IN THE THIRD FIREARM.
AMXQDT	Items 1 & 5- The cartridge cases were identified as having been fired in the same firearm. Items 2 & 4- The cartridge cases were identified as having been fired in the same firearm. However, the cartridge cases were not fired in the same firearm as items 1, 3 and 5. Item 3- The cartridge case was fired in a different firearm than items 1, 2, 4 and 5.
AP62CH	Items #1-TF2 and #2, #3, and #4 were microscopically examined and compared. Based on the observed disagreement of their class and/or individual characteristics, Items #2, #3, and #4 are eliminated as having been fired in the same firearm as Item #1-TF2. Items #1-TF2 and #5 were microscopically examined and compared. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Items #1-TF2 and #5 are identified as having been fired in the same firearm. Item #2 and Item #3 were microscopically examined and compared. Based on the observed disagreement of class and individual characteristics, Items #2 and #3 are eliminated as having been fired in the same firearm. Item #2 and Item #4 were microscopically examined and compared. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Items #2 and #4 are identified as having been fired in the same firearm. The evidence will be returned to the submitter.
AUCJHX	The test fired .40 S&W caliber fired cartridge cases from the Beretta pistol, specimen #1, were microscopically compared to the .40 S&W caliber fired cartridge cases, specimens #2 through #5. The following was determined: Specimen #5 was fired in the Beretta pistol, specimen #1. Specimen #2 and #4 were not fired in the Beretta pistol, specimen #1, due to differences in the markings from the breech faces, the firing pin impressions, and the ejectors; however, they were fired in the same weapon. Specimen #3 was not fired in the Beretta pistol, specimen #1, nor the same gun as specimens #2 and #4, due to differences in the firing pins.
AUDE7A	The items 2, 3, 4 and 5 cartridge were compared microscopically to the items 1 tests. The item 5 was fired from the same as items 1. The items 2 & 4 was fired from a second firearm. The item 3 was fired from a third firearm different from the previous ones, have fired item 2, 3 and 4 include pistol. Manufactured from Beretta caliber .40 S&W among others.
AVA3AQ	Laboratory Items 001.B, 001.C and 001.D spent cartridge cases are eliminated as being fired by the same firearm as Laboratory Item 001.A test fires from suspect's firearm Beretta model pX4 Storm. Laboratory Items 001.B and 001.D spent cartridge cases are identified as being fired by the same firearm. Laboratory Item 001.C spent cartridge case is eliminated as being fired by the same firearm as Laboratory Items 001.B and 001.D spent cartridge cases. Laboratory Item 001.E spent cartridge case is identified as being fired by the same firearm as Laboratory Item 001.A test fires from suspect's firearm Beretta model pX4 Storm.

TABLE 2

WebCode	Conclusions
AXT9JL	The cartridge case marked Item 5 was fired in the same firearm as the cartridge cases marked Item 1. The cartridge cases marked Item 2 and 4 were fired in the same firearm, but not in the same firearm as Items marked 1, 3 and 5. The cartridge case marked Item 3 was not fired in the same firearm as the cartridge cases marked Item 1, 2, 4 and 5
AXVTF2	Cartridge case (5) and test fires (1.1 - 1.3) are identified as having been discharged from the above gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge cases (2, 4) are identified as having been discharged from a second gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge case (3) is identified as having been discharged from a third gun based on the observed disagreement of class characteristics when compared to test fires (1.1 - 1.3) and cartridge cases (2, 4, 5).
B96TH9	Results of Examinations: Item 1 consists of three cartridge cases reported to have been fired in a .40 S&W caliber Beretta pistol, Model Px4 Storm. The Item 5 cartridge case was identified as having been fired in the pistol that produced the Item 1 test fires. Item 2 and Item 4 are two .40 S&W caliber cartridge cases that bear the headstamp of Federal ammunition. The Item 2 and Item 4 cartridge cases were identified as having been fired in the same firearm but were eliminated from the pistol that produced the Item 1 test fires due to a difference in class characteristics. Item 3 is a .40 S&W caliber cartridge case that bears the headstamp of Federal ammunition. The Item 3 cartridge case was eliminated from the Item 2, Item 4 and Item 5 cartridge cases and the pistol that produced the Item 1 test fires due to a difference in class characteristics.
BL2M74	1. Examinations showed Item 5 was discharged within the same firearm as Item 1. 2. Examinations showed Items 2, 3, and 4 were not discharged within the same firearm as Item 1.
BNQUQZ	#1 - #5: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #5 has been identified as having been fired in the same firearm as the test cartridge cases, Item #1. #2 and #4: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #2 and #4 have been identified as having been fired in the same firearm. These items were compared microscopically to #1, #3, #5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #2 and #4 have been eliminated as having been fired in the same firearm as Items #1, #3 and #5. Item #3: This items was compared microscopically to #1, #2, #4 and #5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #3 has been eliminated as having been fired in the same firearm as Items #1, #2, #4 and #5.
BQWCVN	I made an examination of the three test fired cartridge cases using a comparison microscope. This type of examination allows two objects to be viewed simultaneously so that microscopic marks left behind on the fired cartridge cases during discharge can be compared and assessed. This was done to determine which marks on the test fired cartridge cases replicates. I then performed a similar comparison between these test fired cartridge cases and the question fired cartridge cases, Item 2 to Item 5. As a result of this examination I formed the following opinion: Item 5 was discharged by the same firearm that discharged the test fired cartridge cases, Item 1. Item 2 and Item 4 were discharged by the same firearm however this firearm was a different firearm that discharged the test fired cartridge cases, Item 1. Item 3 was discharged by a third firearm.
BUU3TM	The Item 1 and Item 5 cartridge cases were identified to each other. The Item 2 and Item 4 cartridge cases were identified to each other. They were eliminated from the Item 1 and Item 5

TABLE 2

WebCode	Conclusions
	cartridge cases The Item 3 cartridge case was eliminated from the Item 1 and Item 5 cartridge cases as well as the Item 2 and Item 4 cartridge cases.
BYGY8C	2.1 Item 1 and Item 5 were fired in one firearm (1st f/arm). 2.2 Item 2 and Item 4 were fired in one firearm (2nd f/arm). 2.3 Item 3 was fired in another firearm (3rd f/arm).
C2MMJG	As a result of microscopic comparisons it was established that: 1. Expended cartridge case item 5 was fired in the suspect's weapon Item 2. Expended cartridges cases Items 2 and 4 were not fired in the suspect's weapon Item 1, were fired from a second firearm. 3. Expended cartridge case Item 3 was not fired using the suspect's weapon Item 1, was fired from a third firearm.
C76NZL	The four exhibit .40 Smith & Wesson calibre fired cartridge cases (Items 2 to 5) were discharged in three firearms as follow: 1. The .40 Smith & Wesson fired calibre cartridge case (Item 5) was discharged in the .40 Smith & Wesson calibre BERETTA Model PX4 Storm self loading pistol (serial number not provided). 2. The .40 Smith & Wesson fired calibre cartridge cases (Items 2 and 4) were discharged in a second unknown firearm. 3. The .40 Smith & Wesson fired calibre cartridge cases (Item 3) was discharged in a third unknown firearm.
CDHXRM	Item 5 fired from the suspects weapon (known) 1st f/arm Item 1.
CHMTCM	Item 5 was discharged from the same firearm as Item 1 (first firearm). Item 2 and Item 4 were both fired in a second firearm. Item 3 was fired in a third firearm.
CTBMNK	I examined the test cartridge cases marked Item 1 and exhibit cartridge cases marked Item 2 to Item 5 and compared the individual and class characteristic markings on them using a comparison microscope and found that the cartridge cases marked Item 2 to Item 5 were fired from different firearms as follows: 1 The test cartridge cases marked Item 1 and exhibit cartridge case Item 5 were fired in the same firearm. 2 The exhibit cartridge cases marked Item 2 and Item 4 were fired in a second firearm. 3 The exhibit cartridge case marked Item 3 was fired in a third firearm.
DCRXMP	The fired cartridge case in Item 5 (questioned) was microscopically compared to the test fires in Item 1 (known). It was determined that the fired cartridge case in Item 5 was fired in the same firearm as the test fires in Item 1. The fired cartridge cases in Items 2, 3, and 4 (questioned) were microscopically compared to the test fires in Item 1 (known). It was determined that the fired cartridge cases in Items 2, 3, and 4 were not fired in the same firearm as the test fires in Item 1. It was additionally determined that the fired cartridge cases in Items 2 and 4 were fired in the same unknown firearm.
DCZAYZ	Comparative microscopic examination of the cartridge cases in Items 1, 2, 3, 4, and 5 revealed the following: 1. The cartridge cases in Item 1 and Item 5 had been fired from the same 40 S&W caliber firearm. 2. The cartridge cases in Item 2 and Item 4 had been fired from the same 40 S&W caliber firearm. These cartridge cases had the same class characteristics as Item 1 and Item 5 and some agreement of individual characteristics was noted, but these similarities were insufficient for a more conclusive examination. 3. Due to differences in class characteristics, the cartridge case in Item 3 was eliminated as having been fired from the same firearm as Item 1 and Item 5 as well as Items 2 and 4.
DGH68J	Cartridge Case Analysis: Methodology - Comparison Microscopy: Items 1 and 5, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. Items 2 and 4, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. Item 3, the cartridge case, was not fired in the same firearm as Items 1, 2, 4, and 5, the cartridge case s, based upon different class characteristics. Items 1 and 5, the cartridge cases, were not fired in the same firearm as Items 2 and 4, the cartridge cases, based upon different individual

TABLE 2

WebCode	Conclusions
	microscopic characteristics.
DJYV2	First of all, we compared the known cartridges from Item 1 among each other. They all showed enough reproducible individual details for a comparison. The questioned bullets items 2 -5 each show enough details for a comparison. By comparing items 2 - 5 to item 1 we found that it is certain, that item 5 has been fired by the same gun as item 1. Item 2 and item 4 haven't been fired by the recovered gun, but it is highly probable, that item 2 and item 4 have been fired by the same gun. Item 3 has not been fired by the recovered gun and cannot be related to item 2 or 4.
DRDKQT	The recovered questioned expended cartridge case Item 5 have been discharged from the same firearm as the known expended cartridge cases (Item 1). The recovered questioned expended cartridge cases Items 2, 3 and 4 have not been discharged from the same firearm as the known expended cartridge cases (Item 1). Expended cartridge cases Items 2 and 4 have been discharged from the same firearm.
DVZ33L	The cartridge case reportedly recovered from the yard, Item 001-05, was discharged from the suspect's firearm. The cartridge cases reportedly recovered from the driveway, Items 001-02, 001-03, and 001-04, were not discharged from the suspect's firearm.
E3CJC8	Item 5 was identified microscopically as having been fired in the same firearm as Items 1A-1C based on the agreement of the combination of individual characteristics and all discernible class characteristics. Items 2 and 4 were identified microscopically as having been fired in the same unknown firearm based on agreement of the combination of individual characteristics and all discernible class characteristics. Items 2 and 4 were microscopically eliminated as having been fired in the same firearm as Items 1A -1C due to disagreement of discernible individual characteristics. Item 3 was microscopically eliminated as having been fired in the same firearm as Items 1A - 1C and 2 and 4 due to disagreement of discernible class characteristics. Visual and microscopic examination of Item 3 revealed that the class characteristics indicate that it could have been fired in a Smith & Wesson Sigma Series brand of 40 S&W semi-automatic pistol.
E4LRVR	Item 5 was microscopically examined and identified as having been fired in the Item 1 firearm based on agreement of the combination of individual characteristics and all discernible class characteristics. Item 2 and Item 4 were microscopically examined and identified as having been fired in the same unknown firearm based on agreement of the combination of individual characteristics and all discernible class characteristics. Item 2 and Item 4 were eliminated as having been fired in the same firearm as Items 1 and 5 and the same unknown firearm as Item 3 due to disagreement of discernible class and individual characteristics. Item 3 was microscopically examined and eliminated as having been fired in the same firearm as Items 1 and 5 and the same unknown firearm as Items 2 and 4 due to disagreement of discernible class and individual characteristics.
E8QDUQ	The cartridge cases in Item 1 and Item 5 were identified as having been fired in the same firearm.
EBNWU3	The 40 S&W caliber cartridge case (Agency Item 5) was fired by the same firearm as the three 40 S&W caliber cartridge cases (Agency Item 1). The two 40 S&W caliber cartridge cases (Agency Items 2,4) were fired by the same firearm. The two 40 S&W caliber cartridge cases (Agency Items 2,4) were neither identified nor eliminated as being fired by the same firearm as the three 40 S&W caliber cartridge cases (Agency Item 1). There is agreement in the discernable class characteristics; however, there is a lack of agreement or disagreement in the individual characteristics. The 40 S&W caliber cartridge case (Agency Item 3) was not fired by the same firearm as the three 40 S&W caliber cartridge cases (Agency Item 1) or the three 40 S&W caliber cartridge cases (Agency Items 2,4,5). The list of firearms that potentially fired the

TABLE 2

WebCode	Conclusions
	.40 S&W caliber cartridge case (Agency Item 3) would include but is not limited to firearms marketed by Smith & Wesson.
EDBPF7	a) The expended cartridge case caliber .40 S&W identified as Item No 5 presents identity characteristics equal to those observed in the known expended cartridge cases identified as Item No. 1. So it is established that the expended cartridge cases caliber .40 S&W identified as Item No. 5 was fired for the same firearm as the known expended cartridge cases identified as Item 1. b) The two expended cartridge cases, caliber .40 S&W identified as Item No. 2 and 4 present between them equal identity characteristics, but different to those observed in the rest of the expended cartridge cases studied in this analysis. So it is concluded that were fired for a second firearm. c) The ballistic identity characteristics observed in the expended cartridge case identified as Item No. 3 are different to the rest of the expended cartridge cases studied in this analysis. So it is concluded that it belongs to the caliber .40 S&W and it was fired for a third firearm.
EDTAR4	Items 2, 3 and 4 were not discharged in the suspect weapon, that is, the firearm used to discharge Item 1. However, Items 2 and 4 were discharged in the same weapon. Item 5 was discharged in the suspect weapon, that is, the firearm used to discharge Item 1.
EDUD9L	Items 2 and 4 (fired cartridge cases): Microscopic comparison of these fired cartridge cases to a test-fired cartridge case, item 1a, from the Beretta pistol revealed that they have similar class of firearm-produced marks, but significant disagreement in individual marks. These cartridge cases were not discharged in this Beretta pistol. Microscopic comparison of items 2 and 4 revealed that they have the same class of firearm-produced marks and sufficient corresponding individual marks to conclude they were discharged in the same unknown firearm. Item 3 (fired cartridge case). Microscopic comparison of this cartridge case to items 1a, 2, 4 and 5 revealed significant differences in class of firearm-produced marks. This cartridge case was discharged in a different unknown firearm. Item 5 (fired cartridge case). Microscopic comparison of this fired cartridge case to a test-fired cartridge case, item 1a, revealed that they have the same class of firearm-produced marks and sufficient corresponding individual marks to conclude they were discharged in the same Beretta pistol.
ET9NVN	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
EUFYF7	Microscopic comparison made between test fires (Item #1) and four (4) recovered Cartridge Cases Items #2 thru #5 with the following results: Item #5 Positive to Item #1. Fired from the submitted Firearm. Item #2 Negative to Item #1. Fired from a different (second) Firearm. Item #4 Negative to Item #1. Fired from a different (second) Firearm. Item #3 Negative to Item #1. Fired from a different (third) Firearm.
F6RJFR	Due to agreement of class characteristics and sufficient agreement of individual characteristics, it was determined that the Item 1 and Item 5 cartridge cases were fired in the same firearm. For the same reasons, it was determined that the Item 2 and Item 4 cartridge cases were both fired from the same gun. Due to agreement of class characteristics, but insufficient agreement of individual characteristics, it could not be determined whether or not Items 1 and 5 were fired in the same firearm as Items 2 and 4 or in a different firearm. Due to a difference in class characteristics, it was determined that the Item 3 cartridge case was NOT fired in the same firearm as either the item 1 and 5 cartridge cases or the item 2 and 4 cartridge cases.
F8WCBC	As a result of microscopic comparisons it was established that: A- The cartridge case Item 5 was fired in the suspect's weapon Item 1. B- The cartridge cases Items 2 and 4 were fired from a second firearm. C- The cartridge case Item 3 was fired from a third firearm, different from that of suspect's and different from the firearm that expended items 2 and 4.
F9F2PQ	Item 2 is eliminated as being fired in the firearm that fired item 1. Item 3 is eliminated as being

TABLE 2

WebCode	Conclusions
	fired in the firearm that fired item 1. Item 4 is eliminated as being fired in the firearm that fired item 1. Item 5 is identified as being fired in the firearm that fired item 1. Items 2 and 4 are identified as being fired in the same unknown firearm. Item 3 was fired in a 2nd unknown firearm.
FB4FEZ	The fired cartridge cases from Items 1 and 5 were microscopically compared and identified as having been fired in the same firearm based on sufficient individual characteristics present to conclude an identification. The fired cartridge cases from Items 2 and 4 were microscopically compared and identified as having been fired in the same firearm based on sufficient individual characteristics present to conclude an identification. The fired cartridge cases from Items 2 and 4 were microscopically compared and eliminated as having been fired in the same firearm as Items 1 and 5 based on different individual characteristics present. The fired cartridge case from Item 3 was microscopically compared and eliminated as having been fired in the same firearm as Items 1,2,4, and 5 based on different class characteristics.
FCHXEK	Items 1 and 5 were identified as having been fired in the same firearm as each other. Items 2 and 4 were identified as having been fired in the same firearm as each other. The identifications were confirmed by another qualified examiner. Items 2 and 4 were eliminated from having been fired in the same firearm as Items 1 and 5. The eliminations were confirmed by another qualified examiner. Based on differences in class characteristics, Item 3 was eliminated from having been fired in the same firearm as any of the other submitted cartridge cases.
FP42U4	1. Cartridge case(item 1, 5) discharged from the same firearms. 2. Cartridge case(item 2, 4) discharged from another firearms. 3. Cartridge case(item3) discharged from the third firearms.
FTZXBH	I examined items 1 to 5 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found: a Items 1 and 5 were fired in the same firearm. b Items 2 and 4 were fired in a second firearm. c Item 3 was fired in a third firearm.
FUE8EG	ITEM 5 WAS FIRED IN THE SAME .40 S&W FIREARM AS TEST FIRED CASINGS, ITEM 1. ITEM 2 AND ITEM 4 WERE FIRED IN THE SAME .40 S&W FIREARM. ITEM 2 AND ITEM 4 COULD HAVE BEEN FIRED IN THE SAME .40 S&W FIREARM AS TEST FIRED CASINGS, ITEM 1, BASED ON CLASS CHARACTERISTICS; HOWEVER, THERE ARE NO SIGNIFICANT SIMILARITIES IN INDIVIDUAL CHARACTERISTICS TO SUGGEST THAT THEY WERE. ITEM 3 WAS NOT FIRED IN THE SAME .40 S&W FIREARM AS TEST FIRED CASINGS, ITEM 1 OR THE SAME .40 S&W FIREARM AS ITEM 2 AND ITEM 4 BASED ON DIFFERENCES IN CLASS CHARACTERISTICS.
FVR2UH	Item 1, Item 5 -The Item 1 and Item 5 cartridge cases were Identified to each other. Item 2, Item 4 -The Item 2 and Item 4 cartridge cases were Identified to each other.The Item 2 and Item 4 cartridge cases were Eliminated from the Item 1 and Item 5 cartridge cases. Item 3 -The Item 3 cartridge case was Eliminated from the Item 1 and Item 5 cartridge cases and Eliminated from the Item 2 and Item 4 cartridge cases.
FWHAV7	Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridges cases, Items 1 and 5, were identified as having been fired from the same firearm. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridge cases, Items 2 and 4, were identified as having been fired from the same firearm. Based on significant disagreement of individual detail, the fired 40 S&W caliber cartridge cases, Items 1 and 5 could not have been fired from the same firearm as the fired 40 S&W caliber cartridges cases, Items 2 and 4. Based on significant disagreement of class characteristics, the fired 40 S&W caliber cartridge case, Item 3, could not have been fired in the same firearm as the fired 40

TABLE 2

WebCode	Conclusions
	S&W caliber cartridge cases, Items 1 and 5, or from the same firearm as the fired 40 S&W caliber cartridge cases, Items 2 and 4.
FXDJEN	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
FZFTX4	The questioned expended cartridge case (Item 5) was discharged from the same firearm as the known expended cartridge cases (Item 1). The questioned expended cartridge cases (item 2 and item 4) were not discharged from the recovered firearm but fired from the same firearm.
GAKZD4	Items 1 (test fired cartridge cases) and 5 were microscopically examined and compared. Based on observed agreement of class characteristics and sufficient agreement of individual characteristics, Item 5 was identified as having been fired in the same firearm that fired Item 1 (Beretta Px4 Storm semiautomatic pistol). Items 2 and 4 were microscopically examined and compared. Based on observed agreement of class characteristics and sufficient agreement of individual characteristics, the cartridge cases were identified as having been fired in the same firearm. Items 1 (test fired cartridge cases), 2, and 3 were microscopically examined and compared. Based on observed disagreement of class and individual characteristics, the cartridge cases were eliminated as having been fired in the same firearm.
GCQL24	Items 2 and 4 were microscopically examined and compared. Based on observed agreement of class characteristics and sufficient agreement of individual characteristics, the cartridge cases were identified as having been fired in the same firearm. Items 2, 4 and 1 (test fired cartridge cases) were microscopically examined and compared. Based on disagreement of individual characteristics, the cartridge cases Items 2 and 4 were eliminated as having been fired in Item 1 (Beretta Px4 Storm semiautomatic pistol). Item 3 was microscopically examined and compared to Items 2, 4 and 1 (test fired cartridge cases). Based on observed disagreement of class and individual characteristics, the cartridge case Item 3 was eliminated as having been fired in the same firearms as Items 2, 4 or 1 (Beretta Px4 Storm semiautomatic pistol). Item 5 and Items 1 (test fired cartridge cases) were microscopically examined and compared. Based on observed agreement of class characteristics and sufficient agreement of individual characteristics, the cartridge case was identified as having been fired from the same firearm that fired Item 1 (Beretta Px4 Storm semiautomatic pistol).
GF7ZMP	A microscopic comparative examination of Item #5 against Item #1 (Pistol), disclosed that Item #5 was discharged in Item #1. A microscopic comparative examination of Item #2 and Item #4 against each other, disclosed that Item #2 and Item #4 were discharged in the same unknown firearm. Item #3 was discharged in a different firearm the Items #1, #2, #4 and #5, due to differences in class characteristics.
GG4AUE	Methodology – Comparison Microscopy: Items 2 and 4, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. A reference from this group will be entered into NIBIN. Items 2 and 4, the cartridge cases, were not fired the same firearm as Item 1, the test fired cartridge cases, based upon different individual microscopic characteristics. Item 3, the cartridge case, was not fired the same firearm as Items 2 and 4, the cartridge cases, nor Item 1, the test fired cartridge cases, based upon different class and individual microscopic characteristics. Item 5, the cartridge case, was fired in Item 1, the test fired cartridge cases, based upon corresponding class and individual microscopic characteristics.
GKMA6M	The cartridge case in Item 5 was fired in the gun that fired the test fires in Item 1, based on agreement observed in individual characteristics. The cartridge case in Item 3 was not fired in the gun that fired the test fires in Item 1, based on disagreement in class characteristics. The cartridge cases in Items 2 and 4 bear similarities in class characteristics with the test fires in Item 1. However, the cartridge cases in Items 2 and 4 could not be positively included or

TABLE 2

WebCode	Conclusions
	excluded as having been fired in the same gun that produced the test fires in Item 1 to the exclusion of all other firearms bearing the same class characteristics.
GLF89N	Test fired cartridge cases, Item 1, fired in a Beretta PX4 pistol were compared microscopically to spent cartridge cases, items 2,3,4 and 5. Item 5 was found to match item 1 so had been fired in the recovered Beretta PX4. Items 2 and 4 were fired in the same pistol but not the recovered Beretta PX4. Item 3 did not match any other fired cartridge case so was not fired in either of the firearms that produced the other cartridge cases.
GQDL36	Item 5 was identified microscopically as having been fired in the same firearm as the test fires, Item 1, based on agreement of the combination of individual characteristics and all discernible class characteristics. Items 2 and 4 were microscopically eliminated as having been fired in the same firearm as the test fires, Item 1, due to disagreement of discernible individual characteristics. Items 2 and 4 were identified microscopically as having been fired in the same unknown firearm based on agreement of the combination of individual characteristics and all discernible class characteristics. Item 3 was microscopically eliminated as having been fired in the same firearm as the test fires, Item 1, or the same unknown firearm as Items 2 and 4 due to disagreement of discernible class characteristics.
GRZGCQ	Item 4 and Item 5 were identified as having been discharged from the same firearm as the expended cartridge cases Item 1 Item 2 and Item 3 could neither be conclusively be identified nor excluded as having been discharged in the firearm that discharged the known tests in Item 1.
GY9H9F	The questioned cartridge case labeled "Item 5" is discharged in the same firearm that discharged the three cartridge cases labeled "Item 1".
HBC8G2	The submitted fired cartridge case, Item 5, was fired in the same pistol as the submitted test fired cartridge cases, Item 1, reported to be from a Beretta PX4 Storm semiautomatic pistol. The submitted fired cartridge cases, Items 2 and 4, were both fired in the same unknown firearm. They were eliminated as having been fired in the same firearm as the submitted fired cartridge case, Item 5 and the test fired cartridge cases, Item 1. The submitted fired cartridge case, Item 3, was eliminated as having been fired in the same firearm(s) as the submitted fired cartridge cases, Items 2, 4 and 5 and the submitted test fired cartridge cases, Item 1.
HCBELE	1.Casing P (Item 5) was fired in the submitted .40 S&W Beretta pistol, model Px4 Storm, serial number unknown (Item 1). 2.Casings M (Item 2) and O (Item 4) were fired in a second .40 S&W pistol with similar class characteristics as the submitted .40 S&W pistol, model Px4 Storm. 3.Casing N (Item 3) was fired in a third .40 S&W pistol, suspect weapons include S&W Sigma series pistols; however, any suspect weapon should be submitted to the laboratory for analysis.
HECP92	Item 5 was fired by the submitted 40 S&W caliber firearm that fired the Item 1 test-fired cartridge cases. Items 2 and 4 were fired by a second 40 S&W or 10mm Auto caliber firearm. Differences in class and individual characteristics were sufficient to conclude that Items 2 and 4 were not fired by the same firearm that fired Items 1 and 5. Class characteristics are not specific enough to provide a list of possible firearm manufacturers/origins that may have fired these cartridge cases. Item 3 was fired by a third 40 S&W or 10mm Auto caliber firearm. Differences in class and individual characteristics were sufficient to conclude that Item 3 was not fired by the firearm that fired Items 1 and 5, nor was it fired by the firearm that fired Items 2 and 4. Class characteristics found on Item 3 are consistent with those produced by some Smith & Wesson SD-series and late production Sigma Model pistols.
HF9VX9	The discharged cartridge casing mentioned in item 5 was fired by the weapon that fired the tests in item 1. The discharged cartridge casings mentioned in item 1-2 and 1-4 were both fired by the same unknown weapon, not the weapon that fired the tests in item 1-1 or the weapon that fired item 1-3

TABLE 2

WebCode	Conclusions
HM2FP3	All three cartridge cases recorded as item 1 displayed good detail suitable for positive identifications. All case head markings which occurred during the load, fire and eject sequence were in phase. Item 5 was identified as having a common origin with item 1 and was fired from the suspects firearms. Item 2, item 3 and item 4 CONCLUSION-Excluded. The significant disagreement of discernible individual characteristics indicates that item 1, item 3 and item 4 do not share a common origin and were not fired from the suspects firearm.
HM9FXJ	The discharged cartridge cases were examined and compared using the comparison microscope. Based on this comparison and the observed correspondence of class and individual characteristics between the discharged cartridge cases in Items 1, 2, 4 and 5 it is the opinion of this examiner that the discharged cartridge cases in questioned items 2, 4 and 5 were fired in the same firearm as the discharged cartridge cases in the known, Item 1. The discharged cartridge case in the questioned Item 3 was found to exhibit different class characteristics than those of the discharged cartridge cases in Item 1 and, therefore, was not fired in the same firearm as the discharged cartridge cases in Item 1.
HPUBCB	3. On 2018-11-08 during the performance of my official duties I received a sealed evidence bag with number PA4001476949 from Case Administration of the Ballistics Section, containing the following items: 3.1 One (1) sealed white box marked "2018 CTS Forensic Testing Program TEST NO. 18-527: FIREARMS EXAMINATION Sample Pack: F2" containing the following items: 3.1.1 One (1) sealed white box marked "Test No. 18-527 Item 1", containing the following: 3.1.1.1 Three (3) .40 Smith & Wesson calibre fired test cartridge cases each marked "TC1". 3.1.2 One (1) sealed white box marked "Test No. 18-527 Item 2", containing the following: 3.1.2.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked "378003/18 2". 3.1.3 One (1) sealed white box marked "Test No. 18-527 Item 3", containing the following: 3.1.3.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked "378003/18 3". 3.1.4 One (1) sealed white box marked "Test No. 18-527 Item 4", containing the following: 3.1.4.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked "378003/18 4". 3.1.5 One (1) sealed white box marked "Test No. 18-527 Item 5", containing the following: 3.1.5.1 One (1) .40 Smith & Wesson calibre fired cartridge case marked "378003/18 5". 4. The intention and scope of this forensic examination comprise of the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. The cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 were manufactured and designed to be fired by a centre-fire firearm. 6. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found: 6.1 The cartridge case mentioned in paragraph 3.1.5.1 was fired in the same firearm that fired the cartridge cases mentioned in paragraph 3.1.1.1. (1st Firearm) 6.2 The cartridge cases mentioned in paragraphs 3.1.2.1 and 3.1.4.1 were fired in a second (2nd) firearm. 6.3 The cartridge case mentioned in paragraph 3.1.3.1 was not fired in the same firearms that fired the cartridge cases mentioned in paragraphs 6.1 and 6.2. (3rd Firearm)
HQ7WBD	Item 1 (three 40 S&W caliber cartridge cases said to be fired from a Beretta Model Px4 Storm 40 S&W caliber handgun) and Item 5 (a 40 S&W caliber cartridge case) were fired by the same firearm. Items 2 and 4 (two 40 S&W caliber cartridge cases) were fired by the same firearm. Items 2 and 4 were not fired by the same firearm as Items 1 and 5. Item 3 (a 40 S&W caliber cartridge case) was not fired by the same firearm as Items 1, 2, 4, or 5.
HR2NZ4	After microscopic comparison, it was determined that item #5 was fired from (Item # 1), the submitted firearm test fires, based on sufficient agreement of class and individual characteristics of breechface and firing pin markings. Item #2, #3, and # 4, were not

TABLE 2

WebCode	Conclusions
	discharged from Item #1 based on differences of individual characteristics. After microscopic comparison, it was determined that #2 and #4 were fired from the same (not submitted) firearm based on sufficient agreement of class and individual characteristics of breechface and firing pin markings. Item # 3 was fired from a different (not submitted) distinct firearm. This was based upon class characteristics of the firing pin impression.
HTANDX	The three questioned expended cartridge cases recovered from the driveway (identified as Item 2, Item 3 and Item 4) were not discharged from the Beretta Px4 Storm .40 caliber handgun (known expended cartridge cases identified as Item 1). The questioned expended cartridge case recovered from the yard (identified as Item 5) was discharged from the Beretta Px4 Storm .40 caliber handgun (known expended cartridge identified as Item1).
HTDEBU	Item 5 and Item 1 were fired in the same firearm. Item 4 and Item 2 were fired in the same firearm. Item 3 was not fired in the same firearm as Items 1,2,4, or 5. Items 1 and 5 could not be identified or eliminated as having been fired in the same firearm as Items 2 and 4.
HYGA3G	The cartridge case mentioned in 3.1 marked 5 and 3.2 were fired in the same firearm. The cartridge cases mentioned in 3.1 marked 2, 3, 4, and 3.2 were not fired in the same firearm.
HZBTDU	Item 1 and Item 5 were discharged from the suspect's weapon. Item 2 and Item 4 were discharged from an unknown firearm. Item 3 was discharged from a second unknown firearm.
J44G3Z	Results of Examination: Item 1 through Item 5 are .40 S&W caliber cartridge cases that bear the headstamp of Federal ammunition. The Item 5 cartridge case was identified as having been fired in the Item 1 pistol. The Item 2 and Item 4 cartridge cases were identified as having been fired in the same firearm. The Item 3 cartridge case was excluded as having been fired in the same firearms as the Item 1, Item 2, Item 4, and Item 5 cartridge cases. The Item 1 and Item 5 cartridge cases were excluded as having been fired in the same firearm as the Item 2 and Item 4 cartridge cases.
J7TTXZ	1. The cartridge cases marked from E-1 to E-3, described in Item #1 and the cartridge case marked E-7, described in the Item #5, are .40 S&W caliber and were fired by the same firearm. 2. The cartridge case marked E-4, described in the Item #2 and the cartridge case marked E-6, described in the Item #4, are .40 S&W and were fired by the same firearm. 3. The cartridge case marked E-5, described in the Item #3, is .40 S&W caliber and was fired by a firearm; it was not fired by the firearms that fired the cartridge cases described in Items #1, #2, #4 and #5.
JAG9F9	The scene cartridge cases (Lab Items 2, 3, 4 and 5) were examined and microscopically inter-compared to each other and with the test fired cartridge cases from the suspect's firearm (Lab Item 1). Based on these examinations, the following was determined: One cartridge case (Lab Item 5) was identified as having been fired in the suspect's firearm. Two cartridge cases (Lab Items 2 and 4) were identified as having been fired in the same firearm. However, they could not be identified or eliminated as having been fired in the suspect's firearm due to the placement of the corresponding individual characteristics. One cartridge case (Lab Item 3) was eliminated as having been fired in the firearm related with items 1 and 5, or the firearm related with items 2 and 4.
JEPLAZ	The four expended cartridge cases (Items 2, 3, 4 and 5) were compared one to the others to determine common origin. The cartridge case (Item 5) was fired by the suspect's firearm Item 1. The two cartridge cases (Item 2 and 4) were not fired by the suspect's firearm Item 1, were fired from a second firearm. The cartridge case Item 3 was not fired by the suspect's firearm Item 1, was fired from a third firearm.
JLV4XT	Item 5 was fired in the same firearm as Item 1 (identification). This conclusion was verified by Firearms Examiner (name). Item 4 was fired in the same firearm as Item 2 (identification). This

TABLE 2

WebCode	Conclusions
	conclusion was verified by Firearms Examiner (name). Items 1 and 5 could not be identified or eliminated as having been fired in the same firearm as Items 2 and 4 (inconclusive). This conclusion was verified by Firearms Examiner (name). Items 1, 2, 4, and 5 were not fired in the same firearm as Item 3 (elimination). This conclusion was verified by Firearms Examiner (name).
JUJYVM	1. Casing P (Item 5) was fired in the submitted .40 S&W Beretta pistol, model PX4 Storm. 2. Casings M and O (Items 2 and 4) were fired in a second .40 S&W firearm. Suspect weapons include .40 S&W Beretta pistols; however, any suspect weapons should be submitted to the laboratory for examination. 3. Casing N (Item 3) was fired in a third .40 S&W firearm. Suspect weapons include .40 S&W Smith & Wesson Sigma series pistols; however, any suspect weapon should be submitted to the laboratory for examination.
JW7M63	a) The expended cartridge case marked 392519/18A5 was fired in the same firearm as those marked Item 1, i.e. tests (known). b) The expended cartridge case marked 392519/18A2 (Item 2) and 392519/18A4 (Item 4) were fired in the same firearm (second unknown firearm), i.e. firing pin and breechface correspond. c) The expended cartridge case marked 392519/18A3 (Item 3) was fired in the third firearm (unknown firearm).
JXK3MA	Item 1.1 consists of three fired Federal brand 40 S&W cartridge cases stated to have been fired by a Beretta brand 40 S&W pistol, model Px4 Storm. Items 1.2, 1.3, 1.4 and 1.5 are four fired Federal brand 40 S&W cartridge cases. They were microscopically compared to each other and to Item 1.1. Item 1.5 was identified as having been fired by the same firearm that was stated to have fired the cartridge cases from Item 1.1. It was eliminated as having been fired by the same firearms that fired Items 1.2, 1.3 and 1.4. Items 1.2 and 1.4 were identified as having been fired by the same firearm. They were eliminated as having been fired by the same firearm that fired Item 1.3 and the same firearm stated to have fired the cartridge cases from Item 1.1. Item 1.3 was eliminated as having been fired by the same firearm that was stated to have fired the cartridge cases from Item 1.1.
JXLW7F	Item 1 T1 and its cast was compared to Item 5 and its cast using a comparison microscope. Corresponding class characteristics and individual detail sufficient for an identification were observed. Item 5 was fired by the Beretta PX4 Storm pistol. Item 2 and its cast was compared to Item 4 and its cast using a comparison microscope. Corresponding class characteristics and individual detail sufficient for an identification were observed. Item 2 and Item 4 were fired by the same firearm. Item 2 and 4 were compared to Items 1 T1, T2, and T3 using a comparison microscope. Class characteristics corresponded; however, differences of individual detail (breech face and aperture) was observed to conclude that Items 2 and 4 were not fired by the Beretta PX4 Storm. Item 3 was compared to Items 1 T1, T2, and T3 using a comparison microscope. Differences of class characteristics (firing pin, aperture, and ejector) were observed to conclude that Item 3 was not fired by the Beretta PX4 Storm. Item 3 was compared to Items 2 and 4 using a comparison microscope. Differences of class characteristics (firing pin, aperture, and ejector) were observed to conclude that Item 3 was not fired by the same firearm that fired Items 2 and 4.
JY9PRH	3. On 2018-06-07 during the performance of my official duties I received a sealed evidence bag with number PA4002342055 from Case Administration of the Ballistics Section, containing the following exhibit: 3.1 One (1) sealed cardboard box marked "Test No. 18-526: FIREARMS EXAMINATION", containing the following: 3.1.1 One (1) small white box marked "Test No. 18-526 Item 1", containing the following exhibit: 3.1.1.1 Three (3) .40/ 10mm calibre test fired bullets marked by me "211280/18" each and "TB1A", "TB1B" and "TB1C" respectively. 3.1.2 One (1) small white box marked "Test No. 18-526 Item 2", containing the following exhibit: 3.1.2.1 One (1) .40/ 10mm calibre fired bullet marked by me "211280/18 2". 3.1.3 One (1) small white box marked "Test No. 18-526 Item 3", containing the following

TABLE 2

WebCode	Conclusions
	<p>exhibit: 3.1.3.1 One (1) .40/ 10mm calibre fired bullet marked by me "211280/18 3". 3.1.4 One (1) small white box marked "Test No. 18-526 Item 4", containing the following exhibit: 3.1.4.1 One (1) .40/ 10mm calibre fired bullet marked by me "211280/18 4". 3.1.5 One (1) small white box marked "Test No. 18-526 Item 5", containing the following exhibit: 3.1.5.1 One (1) .40/ 10mm calibre fired bullet marked by me "211280/18 5". 4. The intention and scope of this forensic examination comprise of the following: 4.1 The examination and identification of fired bullets. 4.2 Microscopic individualization of fired bullets. 5. I examined the fired bullets mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found: 5.1 The bullets mentioned in paragraphs 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 were fired from the same firearm but not from the firearm that discharged the bullets mentioned in paragraph 3.1.1.1. 6. The conclusions arrived at were based on facts, established by means of an examination and process which require a knowledge and skill in Forensic Ballistics.</p>
JYBEWF	<p>2. (i) Item 5 is positive to tests. (ii) Both Item 2 and Item 4 are positive to each other and negative to tests. (iii) Item 3 is negative to all exhibits and tests.</p>
K2XBZZ	<p>Results of Examinations: Item 1 consists of three cartridge cases reported to have been fired in a .40 S&W caliber Beretta pistol, Model Px4 Storm. The Item 5 cartridge case was identified as having been fired in the pistol that produced the Item 1 test fires. Item 2 and Item 4 are two .40 S&W caliber cartridge cases that bear the headstamp of Federal ammunition. The Item 2 and Item 4 cartridge cases were identified as having been fired in the same firearm but were eliminated from the pistol that produced the Item 1 test fires due to a difference in class characteristics. Item 3 is a .40 S&W caliber cartridge case that bears the headstamp of Federal ammunition. The Item 3 cartridge case was eliminated from the Item 2, Item 4 and Item 5 cartridge cases and the pistol that produced the Item 1 test fires due to a difference in class characteristics.</p>
K4LPMN	<p>Items 2 and 4 were not fired by the firing pin and breechface that fired the known cartridge cases (Item 1), but they were fired by the same firing pin and breechface as each other. Item 3 was not fired by the firing pin and breechface that fired the known cartridge cases (Item 1) or the firing pin and breechface that fired Items 2 and 4. Item 5 was fired by the same firing pin and breechface that fired the known cartridge cases (Item 1).</p>
KANYV3	<p>I examined the cartridge cases mentioned in par 3.1-3.2 and compare the individual characteristics and class characteristics marks transferred to them by firearm. Components during the fire process using comparison microscope and find: Item 5 was fired by tests as Item 1. Item 2 and 4 were fired by one firearm and not fired by any of the items received. Item 3 was fired by separate firearm and also not fired by any of the items received.</p>
KBL8ZF	<p>The exhibits marked 383295/18 '2 & 4' were fired in the same firearm. The exhibit marked 383295/18 '5' was fired in the same firearm that fired the cartridge cases marked Item 1. The exhibit marked 383295/18 '3' was not fired in the same firearms that fired the cartridge cases marked 383295/18 1, 2, & 4.</p>
KBMZ2U	<p>The cartridge cases identified above as Items 2 through 5 were microscopically compared to one another and to the test fired cartridge cases contained in Item 1 with the following results: Item 2 was not fired in the same firearm that generated the test fired cartridge cases contained in Item 1 based on a lack of individual detail agreement. Item 3 was not fired in the same firearm that generated the tests fired cartridge cases contained in Item 1 based on class characteristic differences. Item 4 was not fired in the same firearm that generated the test fired cartridge cases contained in Item 1 based on a lack of individual detail agreement. Item 5 was identified as having been fired in the same firearm that generated the test fired cartridge cases</p>

TABLE 2

WebCode	Conclusions
	contained in Item 1 based on agreement of all discernible class characteristics and agreement of individual characteristics. Items 2 and 4 were identified as having been fired in the same unknown firearm based on agreement of all discernible class characteristics and agreement of individual characteristics. Item 3 was determined to have been fired by a second unknown firearm based on class characteristic differences observed between Item 3 and Items 2 and 4.
KDET2J	MICROSCOPIC COMPARISON EXAMINATIONS OF EVIDENCE CARTRIDGE CASES ITEM 2 THROUGH ITEM 5 AND THE TEST FIRED CARTRIDGE CASES ITEM 1 FROM BERETTA PX4 STORM .40 S&W PISTOL K1 REVEALED SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY THE FOLLOWING: THE EVIDENCE .40 S&W CARTRIDGE CASE ITEM 5 WAS FIRED WITH THE BERETTA .40 S&W PISTOL K1. THE EVIDENCE .40 S&W CARTRIDGE CASES ITEM 2 THROUGH ITEM 4 CAN BE ELIMINATED AS HAVING BEEN FIRED WITH THE BERETTA .40 S&W PISTOL K1 DUE TO DIFFERENCES IN BREECHFACE AND FIRING PIN IMPRESSIONS. THE EVIDENCE .40 S&W CARTRIDGE CASES ITEM 2 AND ITEM 4 WERE FIRED WITH THE SAME UNKNOWN FIREARM (FIREARM #1). THE EVIDENCE .40 S&W CARTRIDGE CASE ITEM 3 WAS FIRED WITH A SECOND UNKNOWN FIREARM (FIREARM #2). ITEM 3 IS SUITABLE FOR FUTURE COMPARISONS. SHOULD ANY OTHER SUSPECT FIREARM(S) BE RECOVERED PLEASE SUBMIT AND REFERENCE THE ABOVE CC#. Sufficient agreement is related to the significant duplication of random toolmarks as evidence by a pattern or combination of patterns of surface contours. "Sufficient agreement" exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility.
KH67Y2	All the items(#1,#2,#3,#4,#5) were microscopically compared to each other. Based On these comparative examinations and observed class and individual characteristics, it was determined that : Only Item #5 was discharged from the same firearm as the known expended cartridge cases(Item #1).
KMH2PW	The Item 5 cartridge case was identified as having been fired in the same firearm as the known Item 1 cartridge cases. The Item 3 cartridge case was not fired in the same firearm as the known Item 1 cartridge cases or the Item 2 and 4 cartridge cases due to significant disagreement of class and individual characteristics (see #3). The Item 2 & Item 4 cartridge cases were identified as having been fired in the same firearm as each other; but they could not be identified or eliminated as having been fired in the same firearm as the Item 1 & Item 5 cartridge cases due to agreement of class and disagreement of individual characteristics, but insufficient for an elimination.
KMWNZJ	Item 5 was identified as having been fired from item 1 based on the agreement of class and individual characteristics seen in the breech face marks. Items 2 through 4 were eliminated as having been fired by item 1 based on the differences seen in the breech face and extractor marks.
KVEWMU	1. Examinations showed Item 5 was discharged within the same firearm as Item 1. 2. Examinations showed Items 2, 3, and 4 were not discharged within the same firearm as Item 1.
KXWAWW	Items 2, 3 and 4 had been fired out of other weapons than the known cartridge cases. Item 5 had been fired in the same weapon than the known cases.
L7PNRF	Items 2 through 5 (1.2-1.5) have been examined and compared microscopically with the test fired cartridge cases, Item 1 (1.1). Based on the observed agreement of their class characteristics and sufficient agreement of individual characteristics, Item 5 (1.5) is identified as having been fired in the same firearm as the tests, Item 1 (1.1). Based on a difference of individual characteristics Items 2 (1.2) and 4 (1.4) were not fired in the same firearm as the tests, Item 1 (1.1). However, based on the observed agreement of their class characteristics

TABLE 2

WebCode	Conclusions
	and sufficient agreement of individual characteristics, Items 2 (1.2) and 4 (1.4) are identified as having been fired in the same firearm but not the same as Item 3 (1.3) or Item 5 (1.5). Based on a difference of individual characteristics Item 3 (1.3) was not fired in the same firearm as the tests, Item 1 (1.1). Item 3 (1.3) was also not fired in the same firearm as Item 2 (1.2), Item 4 (1.4) or Item 5 (1.5) based on a difference of individual characteristics.
LAAMXX	After examination I found, The characteristic marks on cartridge case Item 5 was matched with the test fired cartridge case Item 1. Hence I am of the opinion that the cartridge case Item 5 was fired using the same handgun that fired cartridge case Item 1. The characteristic marks on cartridge case Item 2, Item 3 and Item 4 were not matched with the test fired cartridge case Item 1.
LHGHH	1. Examination of Exhibit 1 revealed three .40S&W fired cartridge cases marketed by Federal. 2. Examination of Exhibits 2, 3, 4, and 5 revealed each exhibit contained one .40S&W fired cartridge case marketed by Federal. 3. Microscopic comparison of Exhibits 1 and 5 revealed they were fired in the same firearm due to an agreement of class characteristics and a sufficient agreement of individual characteristics. 4. Microscopic comparison of Exhibits 2 and 4 revealed they were fired in the same firearm due to an agreement of class characteristics and a sufficient agreement of individual characteristics; however, they were not fired in the same firearm as Exhibits 1 and 5 due to an agreement of class characteristics and a sufficient disagreement of individual characteristics. Observing this amount of disagreement from the same source is considered extremely remote. 5. Microscopic comparison of Exhibit 3 revealed it was not fired from the same firearm as Exhibits 1 and 5 nor Exhibits 2 and 4 due to a disagreement of class characteristics. TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm are not to the absolute exclusion of all other firearms because it is not feasible to examine all possible firearms. However, observing this amount of agreement from a different source is considered extremely remote.
LMUCL2	Item 5 is fired from the suspect weapon (know item 1). Item 2, Item 3, Item 4 aren't fired from the suspect weapon (know Item 1). Item 2 and Item 4 are fired from the same second firearm. Item 3 is fired from the third another firearm
LPHR9G	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
LRN2ER	The evidence in items 1,2, 3, 4, and 5 was analyzed by physical and microscopic examination. The fired 40 caliber cartridge case in item 5 was determined to have been fired in the same weapon as the three (3) fired 40 caliber cartridge cases in item 1. The three (3) fired 40 caliber cartridge cases in items 2, 3, and 4 were determined not to have been fired in the same weapon as the three (3)fired 40 caliber cartridge cases in item 1. The two (2) fired 40 caliber cartridge cases in items 2 and 4 were fired in one weapon; however, the two (2) fired 40 caliber cartridge cases in items 2 and 4 were fired in a different weapon than the fired 40 caliber cartridge case in item 3. Further analysis of the three (3) fired 40 caliber cartridge cases in items 2, 3, and 4 is pending submission of two (2) weapons for additional comparison.
LWLRNC	A comparison was conducted between the test fired cartridge cases (Item 1) and the exhibit fired cartridge cases (Items 2, 3, 4 and 5). The comparison showed – That the firing pin

TABLE 2

WebCode	Conclusions
	<p>impressions of the tests and exhibits were of the same shape, size and depth. That the tests and Item 5 displayed strong correspondence in the individual characteristics within the firing pin impression. That the tests (Item 1) and Items 2, 3 and 4 displayed no correspondence of individual characteristics within the firing pin impression or breech face marks. As a result, I say that the fired cartridge case (Item 5) was discharged in the same firearm that discharged the tests fired cartridge cases (Item 1). Items 2, 3 and 4 were discharged in a different firearm.</p>
M6BLEF	<p>The following submitted evidence was visually and microscopically examined: Exhibit 1: Three cartridge cases; 40 S&W. Exhibit 2: One cartridge cases; 40 S&W. Exhibit 3: One cartridge cases; 40 S&W. Exhibit 4: One cartridge cases; 40 S&W. Exhibit 5: One cartridge cases; 40 S&W. 1. The Exhibits 1 through 5 cartridge cases are marketed by Federal. The Exhibit 1 cartridge cases are test fired standards from a known firearm and were compared to Exhibits 2 through 5. a. Due to an agreement of class characteristics and a sufficient disagreement of individual characteristics, it was concluded that Exhibits 2, 3 and 4 were not fired in the same firearm as the Exhibit 1 cartridge cases. Observing this amount of disagreement from the same source is considered extremely remote. b. Due to the agreement of class characteristics and the sufficient agreement of individual characteristics, it was concluded that the Exhibit 5 cartridge case was fired from the same firearm as the Exhibit 1 cartridge cases. TECHNICAL NOTES: Class characteristics are defined as measureable features of a firearm or tool, which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm or tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm or tool surfaces. These random imperfections or irregularities can be either produced incidental to manufacture or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm or tool are not to the absolute exclusion of all other firearms or tools, because it is not feasible to examine all firearms or tools in the world. However, observing this amount of agreement between different sources is considered extremely remote.</p>
M6DEDM	<p>The fired cartridge case, Item 5, was microscopically examined and compared with the test fired cartridge cases, Item 1. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Item 5 is identified as having been fired in the same firearm as the test fired cartridge cases, Item 1. The fired cartridge cases, Items 2 and 4, were microscopically examined and compared with one another. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Items 2 and 4 are identified as having been fired in the same firearm. The fired cartridge cases, Items 2 and 4, were further microscopically examined and compared with the test fired cartridge cases, Item 1. There is observed agreement of their class characteristics. However, based on the observed disagreement of individual characteristics, Items 2 and 4 were not identified as having been fired in the same firearm as Item 1. The fired cartridge case, Item 3, was microscopically examined and compared with the test fired cartridge cases, Item 1. Based on the observed disagreement of their class characteristics, Item 3 is eliminated as having been fired in the same firearm as Item 1. The fired cartridge case, Item 3, was further microscopically examined and compared with the recovered fired cartridge cases, Items 2 and 4. Based on the observed disagreement of their class characteristics, Item 3 is eliminated as having been fired in the same firearm as Items 2 and 4.</p>
M6RZMP	<p>Item 5 was fired in the same firearm as Item 1 (identification). This conclusion was verified by Firearms Examiner (name). Items 2 - 4 were not fired in the same firearm as Item 1 (elimination). This conclusion was verified by Firearms Examiner (name). Items 2 and 4 were fired in the same firearm (identification). This conclusion was verified by Firearms Examiner (name). Item 3 was not fired in the same firearm as Items 2 and 4 (elimination). This</p>

TABLE 2

WebCode	Conclusions
	conclusion was verified by Firearms Examiner (name).
M7NAPE	Items 2 - 4 were not fired from the same weapon as item 1. Item 5 was fired from the same weapon as item 1.
M9PF3Z	The four fired questioned cartridge cases, Items 2, 3, 4, and 5, were examined and determined to be brass 40 S&W caliber cartridge cases marketed by Federal. The fired questioned cartridge cases were microscopically compared to the submitted test-fired cartridge cases from the 40 S&W caliber Beretta Px4 Storm pistol. The test-fired cartridge cases had the same class characteristics as the Item 5 questioned cartridge case. Item 5, the cartridge case recovered from the yard at the scene, was determined to have been fired in the Beretta pistol based on sufficient microscopic agreement of individual characteristics in the breech face marks. The remaining fired questioned cartridge cases, Items 2, 3, and 4, were not fired in the Beretta pistol based on differences in firearm-produced markings.
MA7KMJ	The below listed spent cartridge case was macroscopically and microscopically examined and compared with test cartridge cases fired by the Beretta 40 caliber pistol, Property# [Participant Code], Lab Evidence# 001-A1. Numerous corresponding individual characteristics were observed. Therefore, it is my opinion that the below listed item was fired by this firearm. Property# Lab Evidence# Item# Item Description [Participant Code] 001-A5 5 Spent Federal 40 S&W cartridge case The below listed spent cartridge cases were macroscopically and microscopically examined and compared with test cartridge cases fired by the Beretta 40 caliber pistol, Property# [Participant Code], Lab Evidence# 001-A1. These items could neither be identified nor eliminated as having been fired from this firearm due to a lack of corresponding individual characteristics. These items were further microscopically compared to each other. Numerous corresponding individual characteristics were observed. Therefore, it is my opinion that the below listed items were fired by the same firearm. Property# Lab Evidence# Item# Item Description [Participant Code] 001-A2 2 Spent Federal 40 S&W cartridge case [Participant Code] 001-A4 4 Spent Federal 40 S&W cartridge case The below listed spent cartridge case was macroscopically and microscopically examined and compared with test cartridge cases fired by the Beretta 40 caliber pistol, Property# [Participant Code], Lab Evidence# 001-A1. It is my opinion that this item was not fired by this firearm. The below listed item was further microscopically compared to Lab evidence# 001-A2. It is my opinion that these items were not fired by the same firearm. Property# Lab Evidence# Item# Item Description [Participant Code] 001-A3 3 Spent Federal 40 S&W cartridge case. [Participant submitted data in a format that could not be reproduced in this report].
MCPJW8	3. On 2018-11-19 during the performance of my official duties I received a sealed evidence bag with number PA4001476952 from Case Administration of the Ballistics Section containing the following exhibits: 3.1 Three (3) .40 Smith & Wesson calibre fired cartridge cases marked by me "377996/18 Item 1" each and "TC1", "TC2", "TC3" respectively. 3.2 Four (4) .40 Smith & Wesson calibre fired cartridge cases marked by me "377996/18 Item 2", "377996/18 Item 3", "377996/18 Item 4" and "377996/18 Item 5" respectively. 4. The intention and scope of this forensic examination comprises of the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the cartridge cases mentioned in paragraphs 3.1 and 3.2 and found: The cartridge cases were manufactured or designed to be fired by a centre-fire firearm. 6. I examined the fired cartridge cases mentioned in paragraphs 3.1 and 3.2 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found that they were fired in different firearms as follows: 6.1 The cartridge cases marked "Item 1" and "Item 5" were fired in the same firearm. 6.2 The cartridge cases marked "Item 2" and "Item 4" were fired in a second (2nd) firearm. 6.3 The cartridge case marked "Item 3" was fired in a third

TABLE 2

WebCode	Conclusions
	(3rd) firearm.
MLEDZG	Item 2 was not fired from the evidence firearm. However, items 2 and 4 were fired from the same firearm. In the Item 3, individual characteristics cannot be determined because there are too few features to compare. Item 4 was not fired from the evidence firearm. However, items 2 and 4 were fired from the same firearm. In the item 5 class characteristics match and the individual characteristics are distinctive. Item 5 was fired from the evidence firearm.
MNJVDR	The evidence in items 1 through 5 was analyzed by physical and microscopic examination. The three (3) fired 40 caliber cartridge cases in items 2, 3, and 4 were determined not to have been fired in the same weapon as the three (3) known fired 40 caliber cartridge cases in item 1. The fired 40 caliber cartridge case in item 5 was determined to have been fired in the same weapon as the three (3) known fired 40 caliber cartridge cases in item 1. The two (2) fired 40 caliber cartridge cases in items 2 and 4 were fired in one weapon. The fired 40 caliber cartridge case in item 3 was fired in a different weapon than the two (2) fired 40 caliber cartridge cases in items 2 and 4. Further analysis of the three (3) fired 40 caliber cartridge cases in items 2, 3, and 4 is pending submission of two (2) other weapons for additional comparison.
MNMHQY	Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridge cases from Items 1 and 5 were identified as having been fired in the same firearm. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridge cases, Items 2 and 4, were identified as having been fired in the same firearm. Based on significant disagreement of class characteristics, the fired 40 S&W caliber cartridge case, Item 3, could not have been fired in the same firearm(s) as the fired 40 S&W caliber cartridge cases from Items 1, 2, 4, or 5. Based on significant disagreement of individual characteristics, the fired 40 S&W caliber cartridge cases from Items 1 and 5 could not have been fired in the same firearm as the fired 40 S&W caliber cartridge cases, Items 2 and 4
MPCQU9	5.1 The cartridge case mentioned in 3.2 marked 371852/18 5A was fired in the same firearm as the cartridge cases mentioned in 3.1. 5.2 The cartridge cases mentioned in 3.2 marked 371852/18 2A and 4A were fired in a second firearm. 5.3 The cartridge case mentioned in 3.2 marked 371852/18 3A were fired in a third firearm.
MRPA6Q	The cartridge cases in Items 1, 2, 3, 4, and 5 were microscopically examined in conjunction with one another. Based on these comparative examinations and observed class and individual characteristics, it was determined that: A. The cartridge case in Item 5 had been fired in the same firearm as the cartridge cases in Item 1. B. The cartridge cases in Items 2 and 4 had both been fired in the same firearm. These cartridge cases bear similar class characteristics as the cartridge cases in Items 1 and 5. However, no similar individual characteristics were found to link these cartridge cases as having been fired in the same firearm as the cartridge cases in Items 1 and 5. C. The cartridge case in Item 3 bears different class characteristics than the cartridge cases in Items 1, 2, 4, and 5. Therefore Item 3 had not been fired in the same firearms as the cartridge cases in Items 1, 2, 4, and 5. Class characteristics present on the cartridge case in Item 3 are common to Smith & Wesson Sigma and SD series pistols.
MX9TTY	In my opinion, a microscopical comparison of firing marks has shown there is sufficient agreement of class and individual characteristic markings (breech face & firing pin) to conclusively determine that the cartridge case ITEM 5 was fired from same firearm as ITEM 1 (test fires).
MYRE2G	Items 2 and 4 were identified as having been fired from the same unknown firearm. Items 2 and 4 were neither fired from the same firearm as Items 1, 3, nor 5. Item 3 was eliminated as having been fired from the same firearm as Items 1, 2, 4, and 5. Item 5 was identified as

TABLE 2

WebCode	Conclusions
	having been fired from Item 1.
N68J7M	A microscopic examination and comparison of Items #2, 3, 4, 5 the submitted expended casings to test expended casings, Item #1, fired from a known Beretta semiautomatic pistol, 40 S & W caliber model PX4 Storm, revealed the following: Item #5 displayed sufficient agreement of individual characteristics to conclude it was fired from the submitted Beretta pistol, Item #1. Items #2 and #4 displayed sufficient disagreement of individual characteristics to conclude they had not been fired from the submitted Beretta pistol but had both been fired from a second unknown gun. Item #3 displayed sufficient disagreement of individual characteristics to conclude it had not been fired in the submitted Beretta pistol but had been fired in a third unknown gun.
N88WJE	The known cartridge cases Item 1 and the questioned cartridge case Item 5 have matching individual markings, so it is undoubtedly proved, that the cartridge case Item 5 were fired from the same firearm as the cartridge cases Item 1. The known cartridge cases Item 1 and the questioned cartridge cases Item 2, Item 3 and Item 4 have different individual markings, so it is undoubtedly proved, that the cartridge cases Item 2, 3 and 4 were not fired in the same firearm as the cartridge cases Item 1 and the cartridge case Item 5. The questioned cartridge cases Item 2 and 4 have with each other matching individual markings, so it is undoubtedly proved, that these cartridge cases were fired in the same unknown firearm (second firearm). The cartridge case Item 3 were fired in another unknown firearms (third firearm).
NAHMYA	I examined and compared the test fired cartridge cases of Item 1 with the exhibit items 2, 3, 4 & 5. As a result of my examination using a comparison microscope, I am of the opinion that Items 2,3 and 4 were not discharged in the same firearm that produced Item 1. There was significant differences in the individual characteristics observed and they are therefore eliminated. Item 5, I observed, had multiple areas of sufficient agreement with that of Item 1 and is a match. Item 5 is identified as having been discharged in the same firearm that produced the marks on Item 1. Items 2 and 4 were identified as a match to each other and were discharged in the same firearm but not the one that discharged Items 1 & 5. Item 3 could not be matched to any other Item and was discharged in an as yet to be submitted and identified, third firearm.
NGY8XF	The Item 5 cartridge case was microscopically compared to and identified as having been fired in the Beretta Px4 Storm (Item 1 test fires) based on the correspondence of individual characteristics. The Item 2 and Item 4 cartridge cases were microscopically compared to each other and the other submitted cartridge cases in this case. The Item 2 and Item 4 were identified as having been fired in a second, unknown firearm based on the correspondence of individual characteristics. The Item 3 cartridge case was microscopically compared to the other submitted cartridge cases in this case. The Item 3 cartridge case was fired in a third, unknown firearm based on the correspondence of individual characteristics. *** This report contains the opinions and interpretations of the individual whose signature appears on the report.
NKD2LZ	The findings provide very strong support for the proposition that the cartridge case '5' was fired in the same gun as the 'known' cartridge cases '1', rather than some other gun.
NMPMHG	the hypothesis that expended cartridge cases item 1 and item 5 were discharged from the same firearme is very strongly supported.
NWDCNG	The following findings reflect the professional opinion of the examiner authoring this report. Examination of Item 1 revealed three (3) fired 40 caliber cartridge cases reportedly test fired from the recovered Beretta 40 caliber semi-automatic pistol. Examination of Items 2 & 4 revealed two (2) fired 40 caliber cartridge cases. Microscopic examination of Items 2 & 4 revealed they were fired in the same firearm; however they were not fired in the same firearm as Item 1. Examination of Item 3 revealed one (1) fired 40 caliber cartridge case. Microscopic

TABLE 2

WebCode	Conclusions
	<p>examination of Item 3 with Item 1 revealed Item 3 was not fired in the same firearm as Item 1. Examination of Item 5 revealed one (1) fired 40 caliber cartridge case. Microscopic examination of Item 5 with Item 1 revealed Item 5 was fired in the same firearm as Item 1.</p>
PCHGWD	<p>3. On 2018-11-12 during the performance of my official duties I received a sealed evidence bag with number PA4001476948 from Case Administration of the Ballistics Section, containing the following items: 3.1 One (1) sealed white cardboard box, marked "2018 CTS Forensic Testing Program TEST NO. 18-527: FIREARMS EXAMINATION Sample Pack: F2", containing the following items: 3.1.1 One (1) sealed box marked "Test No. 18-527 Item 1", containing the following exhibits: 3.1.1.1 Three (3) .40 Smith & Wesson calibre test fired cartridge cases, marked by me 1. 3.1.2 One (1) sealed box marked "Test No. 18-527 Item 2", containing the following exhibit: 3.1.2.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "377992/18 2". 3.1.3 One (1) sealed box marked "Test No. 18-527 Item 3", containing the following exhibit: 3.1.3.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "3". 3.1.4 One (1) sealed box marked "Test No. 18-527 Item 4", containing the following exhibit: 3.1.4.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "4". 3.1.5 One (1) sealed box marked "Test No. 18-527 Item 5", containing the following exhibit: 3.1.5.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "5". 4. The intention and scope of this forensic examination comprise the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualisation of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and found that they were designed and manufactured to be fired by a centre- fire firearm. 6. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, and 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristic markings on them using a comparison microscope and found: 6.1 The cartridge case mentioned in paragraph 3.1.5.1 marked "5" was fired in the same firearm that discharged the cartridge cases mentioned in paragraph 3.1.1.1. (1st firearm) 6.2 The cartridge cases mentioned in paragraph 3.1.2.1 and 3.1.4.1 marked "2" and "4" were fired in the same firearm. (2nd firearm). 6.3 The cartridge case mentioned in paragraph 3.1.3.1 marked "3" was not fired in the firearm that discharged the cartridge cases mentioned in paragraphs 6.1 and 6.2. (3rd firearm).</p>
PET6PP	<p>Examinations showed that Item 5 was discharged within the same firearm that Item 1 was discharged within. Examinations showed that Item 2, Item 3 and Item 4 were not discharged within the same firearm that Item 1 was discharged within.</p>
PGGCFE	<p>The fired cartridge cases in item 1(a-c) and item 5 were all fired in the same firearm. The fired cartridge case in item 3 was excluded as having been fired in the same firearm that fired the cartridge cases in item 1(a-c) and item 5. The fired cartridge cases in item 2 and item 4 were all fired in the same firearm; however, a different firearm than the one that fired the cartridge cases in items 1(a-c) and item 5. The fired cartridge case in item 3 was excluded as having been fired in the same firearm that fired the cartridge cases in item 2 and item 4.</p>
PH67GM	<p>One of the questioned cartridge cases (item 5) was discharged from the suspect's weapon (item 1). Two of the questioned cartridge cases (item 2- item 4) were discharged from a same firearm apart from the suspect's weapon. One of the questioned cartridge cases (item 3) was discharged from a firearm apart from the suspect's weapon.</p>
PJ2J6F	<p>From the sample that had been received, it can be concluded that three expended cartridge (item 2, 4 & 5) that had been recovered from the crime scene have same characteristics as three expended cartridge (item 1) that had been discharged from the firearm (Beretta Px4 Storm .40) which had been seized from the suspect. Meanwhile, one expended cartridge (item 3) did not have same characteristics as three expended cartridge (item 1). Therefore, from the comparison and finding, it can be conclude that 2 firearm are been used in the crime scene</p>

TABLE 2

WebCode	Conclusions
	including the suspect firearm that had been seized.
PQ6AY8	Item #5 is a caliber .40 S&W fired cartridge case bearing the Federal headstamp, that was microscopically compared to Item #1 caliber .40 S&W cartridge cases bearing the Federal headstamp (known). As a result of microscopic comparison it was concluded that Item 5 was fired in the same firearm as Item 1. Items #2 and #4 are two caliber .40 S&W fired cartridge cases bearing the Federal headstamp. Items #2 and #4 were microscopically crossed compared. As a result of microscopic comparison it was concluded that Items #2 and #4 were identified as having been fired in a second firearm. Item #3 is a fired caliber .40 S&W cartridge case bearing the Federal headstamp. Item #3 was not fired in the same firearm as Items #1, #2, #4 and #5.
PQLLGC	After microscopic comparison of Items 1 to 5 (fired cartridge cases) the following was determined: Items 1 and 5 were fired in the same firearm.(First firearm); Items 2 and 4 were fired in the same firearm. (Second firearm); Item 3 was not fired in the same firearm as either Items 1 and 5 or Items 2 and 4 due to differences in class and individual characteristics. (Third firearm)
PTLTQN	There are totally four(4) cartridge case. Classification of the cartridges: 1(item 5): discharged from the same firearm(item 1). 1(item 3): discharged unknown firearm(unknown). 2(item 2, item 4):discharged from same firearm(unknown)
PTNHVL	The expended cartridge case,which is numbered Item 5, match with three expended cartridge cases which are numbered Item 1. The expended cartridge case,which is numbered Item 3 doesn't, match with three expended cartridge cases which are numbered Item 1. Both numbered expended cartridge cases (Items 2-4) match with each other, they are discharged from the same firearm but they dont match with three expended cartridge cases which are numbered Item 1.
PYE24V	Item 5 was identified microscopically as having been fired in the same firearm as Items 1A-1C based on agreement of the combination of individual characteristics and all discernible class characteristics. Item 2 and 4 were identified microscopically as having been fired in the same unknown firearm based on agreement of the combination of individual characteristics and all discernible class characteristics. Microscopic examination and comparison reveal that Items 2 and 4 could neither be identified or eliminated as having been fired in the same firearm that fired Items 1A-1C due to insufficient agreement/disagreement of individual characteristics; however, similar class characteristics were noted. Item 3 was microscopically eliminated as having been fired in the same firearm as Items 1A-1C and from the same firearm as Items 2 and 4 due to disagreement of discernible class characteristics.
Q4PA7K	#1 and #5: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #5 has been identified as having been fired in the same firearm as the test cartridge cases, Item #1. #2 and #4: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #2 and #4 have been identified as having been fired in the same firearm. These items were compared microscopically to #1,#3,#5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #2 and #4 have been eliminated as having been fired in the same firearm as Items #1,#3 and #5. Item #3: This item was compared microscopically to #1,#2,#4 and #5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #3 has been eliminated as having been fired in the same firearm as Items #1,#2,#4 and #5.

TABLE 2

WebCode	Conclusions
Q6C4EL	The cartridge which is recovered from the yard (number 5) is discharged from the suspect's weapon (number 1). The cartridges which are recovered from the driveway (number 2,3,4) is not discharged from the suspect's weapon (number 1). The cartridges (number 2 and 4) is discharged from the same weapon but the weapon, of which they are discharged can not be found in these items. The cartridge (number 3) is discharged from another weapon neither item 1 nor the weapon which is used for the cartidges number 2 and number 4.
Q9GGPT	The submitted cartridge case, item 5 was fired in the same firearm which fired the three cartridge cases, item 1. The submitted cartridge cases, items 2 and 4, were fired in the same firearm. Items 2 and 4 cartridge cases were not fired in the same firearm which fired items 1 and 5 cartridge cases. The submitted cartridge case, item 3, was not fired in the firearm which fired the submitted items 1 and 5 cartridge cases. Additionally, the submitted cartridge case, item 3, was not fired in the same firearm which fired the submitted cartridge cases, items 2 and 4. A class characteristic observed on the item 3 cartridge case is commonly seen in some Smith and Wesson "Sigma" pistols.
Q9J7TQ	The submitted fired .40 S&W caliber cartridge cases, Items 2 and 4, were neither identified nor eliminated as having been fired in the same firearm as the submitted known cartridge cases, Items 1.1, 1.2, and 1.3, due to insufficient corresponding individual characteristics. The submitted fired .40 S&W caliber cartridge cases, Items 2 and 4, were not fired in the same unknown firearm as the submitted cartridge case, Item 3. The submitted fired .40 S&W caliber cartridge cases, Items 2 and 4, were identified as having been fired in the same unknown firearm. The submitted fired .40 S&W caliber cartridge case, Item 3, was not fired in the same firearm as the submitted known cartridge cases, Items 1.1, 1.2, and 1.3. The submitted fired .40 S&W caliber cartridge case, Item 5, was identified as having been fired in the same firearm as the submitted known cartridge cases, Items 1.1, 1.2, and 1.3.
QREU78	1. The test fired cartridge cases are producing sufficient significant individual characteristics that enable an examiner to make a reliable identification. 2. The exhibit items listed as items 2, 3, and 4 were eliminated as having been fired in the exhibit Beretta make, PX4 Storm model, 40 S&W calibre self loading pistol. 3. The exhibit item listed as item 2 and exhibit item 4 were identified within the limits of practical certainty as having been fired in the same firearm. 4. The exhibit item listed as item 5 was identified within the limits of practical certainty as having been fired in the exhibit Beretta make, PX4 Storm model, 40 S&W calibre self loading pistol.
QUFXKM	According to our examination; Cartridge cases recovered at the scene are three group. (2+1+1) 1 (item 5) one group has one cortridge case were fired with the suspect fireorm. The others not. All of the items has the same proof and markings consequently; In these premises; either suspect had three pistols or there were an other persons at the scene.
QYDBQL	Cartridge casing (5) and the test fires (1.1 - 1.3) are identified as having been discharged from the above pistol based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge casings (2, 4) are identified as having been discharged from a second gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge casing (3) is identified as having been discharged from a third gun based on the observed disagreement of class characteristics when compared to test fires (1.1 - 1.3) and cartridge casings (2, 4, 5).
R2DWZ4	Results: Identification: The following items were compared and were found to show the presence of matching features: Item 1 (TFs from Beretta); Item 5 (DCC yard). Identification: The following items were compared and were found to show the presence of matching features: Item 2 (DCC driveway); Item 4 (DCC driveway). Elimination: Item 1 (TFs from Beretta) was eliminated as having fired Items 2 - 4 (DCCs) based on differences in class and individual characteristics. Elimination: Item 3 (DCC) was eliminated as having been fired in the same

TABLE 2

WebCode	Conclusions
	firearm as Items 2 & 4 (DCCs) based on differences in class and individual characteristics.
R44X8C	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
R47KKJ	#1 and #5: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #5 has been identified as having been fired in the same firearm as the test cartridge cases, Item #1. #2 and #4: These items were compared microscopically to each other. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, Item #2 and #4 have been identified as having been fired in the same firearm. These items were compared microscopically to #1,#3,#5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #2 and #4 have been eliminated as having been fired in the same firearm as Items #1,#3 and #5. Item #3: This item was compared microscopically to #1,#2,#4 and #5. Based on the agreement of all discernible class characteristics and sufficient disagreement of corresponding individual characteristics, Item #3 has been eliminated as having been fired in the same firearm as Items #1,#2,#4 and #5.
R4FYJD	Item 1 was fired by the same weapon than item 5. (Item 1 = Item 5 = weapon A).
RDNBXV	Item #5 was fired from the submitted Beretta PX4 Storm .40 caliber pistol based on sufficient agreement of breechface marks. Item #s 2 and 4 were fired from a 2nd unknown firearm based on sufficient agreement of breechface marks and FP (firing pin) marks. Item #3 was fired from a 3rd unknown firearm. Item #s 2, 3 and 4 were not fired from the submitted firearm based on differences of breechface marks. Item #3 was fired from a different gun than Item #s 2 and 4 based on differences of breechface and firing pin marks.
RDNDJT	Item 5 was fired in Item 1 based on corresponding discernible class and individual characteristics (identification). Items 2 and 4 were fired in the same unknown firearm based on corresponding discernible class and individual characteristics (identification). Item 3 was not fired in Item 1 or Item 5, nor in the same unknown firearm as Items 2 and 4, based on corresponding discernible class and individual characteristics (Exclusion). Items 2 and 4 could not be identified or eliminated as having been fired in Item 1 and Item 5 due to insufficient corresponding individual characteristics.
RGQ8PB	1. Examination revealed that Exhibit 1 contains three Federal brand .40 S&W caliber fired cartridge cases and Exhibits 2, 3, 4, and 5 each contain one Federal brand .40 S&W caliber fired cartridge case. These cartridge cases were microscopically compared. A. It was concluded that Exhibits 1 and 5 were fired from the same firearm due to an agreement of class characteristics and a sufficient agreement of individual characteristics. B. It was concluded that Exhibits 2 and 4 were fired from the same firearm due to an agreement of class characteristics and a sufficient agreement of individual characteristics. C. It was concluded that Exhibits 1 and 5 were not fired from the same firearm as Exhibits 2 and 4 based on an agreement of class characteristics and a sufficient disagreement of individual characteristics. Observing this amount of disagreement from the same source is considered extremely remote. D. Exhibit 3 was not fired from the same firearm as Exhibits 1, 2, 4, or 5 due to a disagreement of class characteristics. Technical Notes: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating

TABLE 2

WebCode	Conclusions
	that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
T33RVB	MICROSCOPIC COMPARISON EXAMINATIONS OF Q1 THROUGH Q4 AND TEST FIRED CARTRIDGE CASES FROM SUSPECT'S FIREARM REVEALED; SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY Q4 AS HAVING BEEN FIRED WITH THE SAME FIREARM AS THE TEST FIRED CARTRIDGE CASES. SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY Q1 AND Q3 AS HAVING BEEN FIRED WITH THE SAME UNKNOWN FIREARM, FIREARM # 2. THEY WERE NOT FIRED WITH THE SAME FIREARM AS THE TEST FIRED CARTRIDGE CASES DUE TO DIFFERENCES IN FIRING PIN AND BREECH FACE MARKINGS. Q2 WAS FIRED WITH A DIFFERENT FIREARM THAN Q1, Q3, Q4, OR THE TEST FIRED CARTRIDGE CASES DUE TO DIFFERENT SHAPED FIRING PIN IMPRESSIONS. SHOULD SUSPECT FIREARMS BECOME AVAILABLE PLEASE SUBMIT. SUFFICIENT AGREEMENT: Sufficient agreement exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility. Sufficient agreement is related to the significant duplication of random toolmarks as evidence by a pattern or combination of patterns of surface contours.
TBVU4D	Item 5 was fired in the suspect firearm that fired casings labeled Item 1. Items 2 and 4 were fired in one firearm. Items 2 and 4 could have been fired in the same firearm as Item 1 casings based on class characteristics; however, there are no significant individual similarities to suggest that they were. Item 3 was not fired in the firearm that fired Item 1 casings, based on differences in class characteristics. Suspect weapons include .40 S&W Smith & Wesson Sigma Series pistols; however, any suspect weapon should be submitted for examination.
TDJHDT	Cartridge case marked item 5 was fired in the same firearm as the tests (known) marked item 1. Cartridge cases marked item 2 & item 4 were fired in the second firearm - (unknown firearm). Cartridge case marked item 3 was fired in the third firearm - (unknown firearm).
TFTCKE	The cartridge case from Item#5 has been fired in the weapon recovered from the scene. The cartridge cases from Items #2 and #4 have been fired in a same weapon, different from the one recovered from the scene, but very likely of the same make and model. The cartridge case from Item#3 has been fired in a third weapon, a semi-automatic pistol from an unknown make and model.
TJBCZU	There is agreement of all discernible class characteristics and sufficient agreement of individual characteristics to identify Exhibit 5 as having been fired in the same firearm as the Exhibit 1 test fired cartridge cases. There is agreement of all discernible class characteristics and sufficient agreement of individual characteristics to identify Exhibits 2 and 4 as having been fired in the same firearm. Although there are similar class characteristics, due to significant differences in individual characteristics Exhibits 2 and 4 were eliminated as having been fired in the same firearm as the Exhibit 1 test fired cartridge cases. Due to a difference in class characteristics, Exhibit 3 was eliminated as having been fired in the same firearm as the Exhibit 1 test fired cartridge cases or the firearm that fired the Exhibits 2 and 4 cartridge cases.
TLVG6H	The cartridge case of item 5 was fired by the suspect's weapon; The cartridge case of item 3 was fired by a second weapon (unknown); The cartridge cases of items 2 and 4 were fired by a third weapon (unknown);
TM93ZD	Based on the agreement of class characteristics and sufficient agreement of individual characteristics, the questioned cartridge case marked "Item 5" was fired from the same firearm as the three known cartridge cases in the exhibit marked "Item 1". Based on disagreement of class characteristics and individual characteristics, the questioned cartridge cases marked "Item

TABLE 2

WebCode	Conclusions
	2", "Item 3" and "Item 4" were not fired from the same firearm as the three known cartridge cases in the exhibit marked "Item 1".
TYAEL8	Items A1 (a-c), A2, A3, A4, and A5 (expended cartridge cases): A test-fired cartridge case from Item A1 was microscopically compared to Items A2, A3, A4, and A5. Microscopic comparison of these cartridge cases revealed the following: a)Item A5 has the same class of firearm-produced marks and sufficient corresponding individual marks to conclude that Item A5 was discharged in the suspect's firearm. b)Items A2, A3, and A4 have significant differences in class of firearm-produced marks from those of Item A1a. Items A2, A3, and A4 were not discharged in the suspect's firearm. Microscopic comparison of Items A2 and A4 revealed that they have the same class of firearm-produced marks and sufficient corresponding individual marks to conclude that Item A2 and Item A4 were discharged in the same, unknown firearm. Microscopic comparison of Item A3 and Item A2 revealed significant differences in class of firearm-produced marks. Item A3 was not discharged in the same, unknown firearm as Item A2. These expended cartridge cases represent a total of three firearms, which include the suspect's firearm and two additional, unknown firearms.
TZVJHJ	The expended cartridge case, which is numbered Item 5, match with three expended cartridge cases which are numbered Item 1. The expended cartridge case which is numbered Item 3 doesn't match with three expended cartridge cases which are numbered Item 1. Both numbered expended cartridge cases (Items 2-4) match with each other, they are discharged from the same firearm but they don't match with three expended cartridge cases which are numbered Item 1.
U3KVA3	Item 1 - Three test fired cartridge cases from suspect's weapon. Item 2 - One fired cartridge case. Item 3 - One fired cartridge case. Item 4 - One fired cartridge case. Item 5 - One fired cartridge case. The submitted specimens marked as Items 2 through 5 were examined and identified as four fired 40 S&W caliber cartridge cases bearing the Federal headstamp. Items 2 through 5 were microscopically inter-compared and also compared to Item 1. As a result, Item 5 was identified as having been fired in the same firearm as Item 1. Items 2 and 4 were identified as having been fired in the same firearm but were eliminated as having been fired in the same firearm as Items 1 and 5 due to differences in individual characteristics. Item 3 was eliminated as having been fired in the same firearm as Items 1 and 5 and Items 2 and 4 due to differences in individual characteristics.
U7WRNC	1) The expended cartridge case identify as Item 5 belongs to a caliber .40 S&W and was discharged by the gun that discharged the cartridge case identify as Item 1, that belongs to the handgun Beretta Px4 Storm. 2) The expended cartridges cases identify as Item 2 and Item 4 belong to a caliber .40 S&W and were discharged by the same handgun, different that the one that discharged Item 1. 3) The expended cartridge case identify as Item 3 belong to a caliber .40 S&W and was discharged by a handgun different than the one that discharged Item 1 and different that the one that discharged Item 2 and Item 4.
U7YKKY	The four expended cartridge cases (Items 2, 3, 4 and 5) were compared one to the others to determine common origin and as a result of microscopic comparisons it was established that: The cartridge case (Item 5) was fired by the suspect's firearm item 1. The three cartridge cases (Items 2, 3, and 4) were not fired by the suspect's firearm, item 1. The cartridge cases items 2 and 4, were fired from using a second firearm. The cartridge case item 3, was fired by using a third firearm.
UCBEPW	The discharged cartridge casing mentioned in item 5 was fired by the weapon that fired the tests in item 1. The discharged cartridge casings mentioned in item 1-2 and 1-4 were both fired by the same unknown weapon, not the weapon that fired the tests in item 1-1 or the weapon that fired item 1-3

TABLE 2

WebCode	Conclusions
UEBMU7	I found sufficient corresponding individual microscopic marks between Item 1 and item 5 to conclude that the cartridge case Item 5 was fired by the suspect firearm that fired Item 1. Items 2 and 4 have the same class of marks and sufficient corresponding individual microscopic marks to conclude that that they were fired in a single firearm. Items 2 and 4 have significantly different individual marks to Item 1, and were not fired by the suspect firearm that fired Item 1. Item 3 has different class marks to Items 1,2,4 and 5. The suspect firearm is excluded as having fired Item 3. The class of marks on Item 3 are characteristic of Smith & Wesson pistols.
UEP6LQ	All items were microscopically examined and compared with the following conclusion: 1. Only one questioned expended cartridge case (Item 5) was discharged from the same firearm as the known expended cartridge cases (Item 1). 2. The questioned expended cartridge cases (Item 2 and Item 4) were discharged from the same firearm but not the suspect firearm. 3. The questioned expended cartridge cases (Item 3) was discharged from another unknown firearm.
UHWEYG	Cartridge case (5) and Test fires (1.1-1.3) are identified as being discharged from the above pistol based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge cases (2, 4) are identified as being discharged from a second gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge case (3) is identified as being discharged from a third gun based on the observed disagreement of class characteristics when compared to Test fires (1.1-1.3) and Cartridge cases (2, 4, 5).
UKV27Q	Using a microscope, I compared the firing marks on items 2, 3, 4, 5 with those produced on the test fires item 1. I found significant detailed agreement in the firing marks on item 1 and item 5; in my opinion item 5 was fired in the same gun as item 1. I found significant differences in the firing marks on items 2, 3, 4 compared to item 1. In my opinion these cartridge cases were not fired in item 1. In my opinion items 2 and 4 were fired in the same gun. Three guns were used: 1) item 1 and 5 2) item 2 and 4 3) item 3
ULACBB	Comparison microscope examinations were conducted on the evidence listed above. The findings of this examiner are the following: 1- Exhibit 5 was fired by the firearm used to fire Exhibit 1, based on sufficient agreement of individual characteristics. 2- Exhibit 2 and 4 were fired by a second .40 S&W caliber pistol based on sufficient agreement of individual characteristics. 3- Exhibit 3 was excluded from being fired by the firearms utilized to fire Exhibits 2, 4 and 5 based on disagreement of class characteristics.
UNFN8Q	Item 1 through Item 5 are .40 S&W caliber cartridge cases that bear the headstamp of Federal ammunition. The Item 5 cartridge case was identified as having been fired in the same firearm as the Item 1 cartridge cases. The Items 2 and 4 cartridge cases were identified as having been fired in the same firearm; however, due to a lack of sufficient corresponding microscopic marks of value, no conclusion could be reached as to whether the Items 2 and 4 cartridge cases were fired in the same firearm as the Items 1 and 5 cartridge cases. The Item 3 cartridge case was excluded as having been fired in the same firearm as the Items 1, 2, 4 and 5 cartridge cases due to differences in class characteristics.
UU6A3J	The cartridge cases in Item 1 were microscopically examined in conjunction with Items 2,3,4 and 5. Based on these comparative examinations, it was determined that: A. Item 5 had been fired in the same firearm as Item 1. B. Based on differences in class characteristics, it was determined that Item 3 had not been fired in the same firearm as Item 1. C. Items 2 and 4 had been fired in the same unknown firearm but a different firearm than Item 3. D. Items 2 and 4 bear the same type class characteristics as Items 1 and 5. However, no individual characteristics were found to link Items 2 and 4 as having been fired in the same firearm as Items 1 and 5.
UVKFHA	MICROSCOPIC COMPARISONS BETWEEN EVIDENCE CARTRIDGE CASES ITEM 2

TABLE 2

WebCode	Conclusions
	<p>THROUGH ITEM 5 (Q1 THROUGH Q4)AND TEST FIRED CARTRIDGE CASES ITEM 1 FROM RECOVERED BERETTA PX4 STORM,.40 S&W FIREARM K1, REVEAL THAT SUFFICIENT AGREEMENT OF INDIVIDUAL CHARACTERISTICS EXISTS TO IDENTIFY THE FOLLOWING: ITEM 5(Q4) WAS FIRED WITH ITEM 1(K1). ITEM 2(Q1) AND ITEM 4(Q3) WERE FIRED WITH THE SAME UNKNOWN FIREARM; HOWEVER, ITEM 2(Q1) AND ITEM 4(Q3) WERE NOT FIRED WITH ITEM 1(K1) DUE TO DIFFERENCES IN BREECHFACE AND FIRING PIN IMPRESSIONS. ITEM 3(Q2) WAS NOT FIRED WITH ITEM 1(K1)OR WITH THE SAME UNKNOWN FIREARM AS ITEM 2(Q1) AND ITEM 4(Q3)DUE TO DIFFERENCES IN BREECHFACE AND FIRING PIN IMPRESSIONS. ITEM 2 THROUGH ITEM 4 (Q1 THROUGH Q3)EXHIBITS MICROSCOPIC MARKS OF VALUE FOR FUTURE COMPARISONS.</p>
UVXAVN	<p>On examination, i found that the characteristics marks on the expanded cartridge case recovered from the yard (Item 5) was the same with the characteristics marks on the cartridge cases discharged from the suspect's weapon (Item 1). I also found the characteristics marks on the cartridges recovered from the driveway (Item 2, Item 3 and Item 4) were not same with the characteristics marks on Item 1.</p>
V66A8B	<p>Fired cartridge case Item 1 was identified as having been fired in the same firearm as Item 5 based on agreement of class characteristics and sufficient agreement of individual characteristics within the breech face impression marks and firing pin impression marks.. Fired cartridge case Item 2 was identified as having been fired in the same firearm as Item 4 based on agreement of class characteristics and sufficient agreement of individual characteristics within the breech face impression marks. Fired cartridge case Item 3 was eliminated as having been fired in the same firearm as Item 1, Item 2, Item 4 and Item 5 based on disagreement of class characteristics.</p>
VAH6VL	<p>1. The cartridge cases (Items 1 and 5) were identified as having been fired by a single firearm; the firearm was reportedly a "Beretta Px4 Storm .40 caliber handgun". 2. The cartridge cases (Items 2 and 4) were identified as having been fired by a single firearm; the firearm was not eliminated as being the "Beretta Px4 Storm" due to the agreement of all discernible class characteristics and disagreement of individual details, but insufficient for an elimination. 3. One of the cartridge cases (Item 3) was eliminated as having been fired by the same firearm(s) as the remaining cartridge cases (Items 1, 2, 4 and 5) due to differences in firing pin shape.</p>
VCZ9JH	<p>I microscopically compared Items 1A, 1B, and 1C to each other. I identified Items 1A, 1B, and 1C as being fired in the same firearm based on sufficient agreement of individual characteristics within the breech face marks. I microscopically compared Item 2 to Items 1A, 1B, and 1C. Item 2 can be eliminated from being fired in the same firearm as Items 1A, 1B, and 1C based on significant disagreement of individual characteristics within the breech face marks and firing pin impression. I microscopically compared Item 3 to Items 1A, 1B, and 1C. Item 3 can be eliminated from being fired in the same firearm as Items 1A, 1B, and 1C based on different class characteristics. I microscopically compared Item 4 to Items 1A, 1B, and 1C. Item 4 can be eliminated from being fired in the same firearm as Items 1A, 1B, and 1C based on significant disagreement of individual characteristics within the breech face marks and firing pin impression. I microscopically compared Item 5 to Items 1A, 1B, and 1C. I identified Item 5 as being fired in the same firearm as Items 1A, 1B, and 1C based on sufficient agreement of individual characteristics within the breech face marks. I microscopically compared Item 2 to Item 3. Item 2 and Item 3 can be eliminated as being fired in the same firearm based on different class characteristics. Item 3 was fired in a second firearm. I microscopically compared Item 2 and Item 4 to each other. I identified Item 2 and Item 4 as being fired in a third firearm based on sufficient agreement of individual characteristics within the breech face marks. Items 2 and 4 were fired in a third firearm. Sufficient agreement means the quantity and quality of the agreement of toolmarks produced by the firearm exceed the agreement of toolmarks</p>

TABLE 2

WebCode	Conclusions
	produced by different firearms, such that the likelihood another firearm could have produced these marks is so remote as to be considered practically impossible.
VKF2Y9	The 0001-AE (Item 5) expended cartridge case was microscopically compared to the 0001-AA (Item 1) three expended cartridge cases with POSITIVE RESULTS. The cartridge case was fired in the same firearm as the three cartridge cases. The 0001-AC (Item 3) expended cartridge case was microscopically compared to the 0001-AA (Item 1) three expended cartridge cases with NEGATIVE RESULTS. The cartridge case was not fired in the same firearm as the three cartridge cases. The 0001-AB (Item 2) and 0001-AD (Item 4) expended cartridge cases were microscopically compared to the 0001-AA (Item 1) three expended cartridge cases with INCONCLUSIVE RESULTS. Due to insufficient agreement or disagreement of individual characteristics, the two cartridge cases could neither be identified nor eliminated as having been fired in the same firearm as the three cartridge cases. The 0001-AB (Item 2) and 0001-AD (Item 4) expended cartridge cases were microscopically compared to one another with POSITIVE RESULTS. The two cartridge cases were fired in the same firearm. None of the items were entered into the National Integrated Ballistic Information Network (NIBIN) database.
W2Y2LX	The one 40 S&W cartridge case (Item 5) was fired in the same firearm as the test fired cartridge cases (Item 1). The two 40 S&W cartridge cases (Items 2 and 4) were fired in a second firearm. The one 40 S&W cartridge case (Item 3) was fired in a third firearm.
W3PEV4	1) The cartridge cases mentioned in 3.1 marked 5 and 3.2 (tests) were fired in the same firearm. 2) The cartridge cases mentioned in 3.1 marked 2 and 4 were fired in the same firearm. 3) The cartridge case mentioned in 3.1 marked 3 was not fired in the same firearm as cartridge cases marked 2, 4, 5 and 1a-1c.
W4LNR7	3. On 2018-11-07 during the performance of my official duties I received a sealed evidence bag with number PA4001476947 from Case Administration of the Ballistics Section, containing the following item: 3.1 One (1) sealed white cardboard box, marked "2018 CTS Forensic Testing Program TEST NO. 18-527: FIREARMS EXAMINATION Sample Pack: F2", containing the following items: 3.1.1 One (1) sealed jewel box marked "Test No. 18-527 Item 1", containing the following exhibits: 3.1.1.1 Three (3) .40 Smith & Wesson calibre test fired cartridge cases, marked by me TC1a, TC1b and TC1c respectively. 3.1.2 One (1) sealed jewel box marked "Test No. 18-527 Item 2", containing the following exhibit: 3.1.2.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "377963/18 2". 3.1.3 One (1) sealed jewel box marked "Test No. 18-527 Item 3", containing the following exhibit: 3.1.3.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "377963/18 3". 3.1.4 One (1) sealed jewel box marked "Test No. 18-527 Item 4", containing the following exhibit: 3.1.4.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "377963/18 4". 3.1.5 One (1) sealed jewel box marked "Test No. 18-527 Item 5", containing the following exhibit: 3.1.5.1 One (1) .40 Smith & Wesson calibre fired cartridge case, marked by me "377963/18 5". 4. The intention and scope of this forensic examination comprise the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristics markings transferred to them by firearm components during the firing process using a comparison microscope and found: 5.1 The cartridge case marked "377963/18 5" was fired in the same firearm that fired the cartridge cases mentioned in paragraph 3.1.1.1 (1st firearm). 5.2 The cartridge cases marked "377963/18" each and "2" and "4" respectively, were fired in a second (2nd) firearm. 5.3 The cartridge case marked "377963/18 3" was fired in a third (3rd) firearm.
WC2EKD	Upon request, test fired cartridge cases from Item 1 were microscopically examined and

TABLE 2

WebCode	Conclusions
	<p>compared with a recovered fired cartridge case, Item 5. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Item 5 is identified as having been fired in the same firearm as Item 1. Upon request, a recovered fired cartridge case, Item 2, was microscopically examined and compared with a recovered fired cartridge case, Item 4. Based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics, Item 2 and Item 4 are identified as having been fired in the same firearm. Upon request, test fired cartridge cases from Item 1 were microscopically examined and compared with recovered fired cartridge cases, Items 2 and 4. There is observed agreement of their class characteristics. However, based on the observed disagreement of individual characteristics, Items 2 and 4 were not identified as having been fired in the same firearm as Item 1. Upon request, test fired cartridge cases from Item 1 were microscopically examined and compared with a recovered fired cartridge case, Item 3. Based on the observed disagreement of their class characteristics, Item 3 is eliminated as having been fired in the same firearm as Item 1. Upon request, recovered fired cartridge cases, Items 2 and 4, were microscopically examined and compared with a recovered fired cartridge case, Item 3. Based on the observed disagreement of their class characteristics, Item 3 is eliminated as having been fired in the same firearm as Items 2 and 4.</p>
WJJPVT	<p>The discharged cartridge casing mentioned in item 5 was fired by the weapon that fired the tests in item 1. The discharged cartridge casings mentioned in item 1-2 and 1-4 were both fired by the same unknown weapon, not the weapon that fired the tests in item 1-1 or the weapon that fired item 1-3</p>
WP28Y3	<p>2.1 The cartridge cases marked 383263/18 '5', 263 Tc1, Tc2, Tc3 were fired in the same firearm (1st). 2.2 The cartridge cases marked 383263/18 '2', '4' were fired in one firearm but not the firearm in 3.1 (2nd). 2.3 The cartridge case marked 383263/18 '3' was not fired in the firearms mentioned in 3.1 & 3.2 (3rd).</p>
WRXQY9	<p>Cartridge Case Analysis: Methodology – Comparison Microscopy: Item 5, the cartridge case, was fired in Item 1, the suspect's firearm, based upon corresponding class and individual microscopic characteristics. Items 2 and 4, the cartridge cases, were fired in the same firearm based upon corresponding class and individual microscopic characteristics. Item 3, the cartridge case, was not fired in Item 1, the suspect's firearm, or in the same firearm as Items 2 and 4, the cartridge cases, based upon different class and individual microscopic characteristics. Items 2 and 4, the cartridge cases, were not fired in Item 1, the suspect's firearm, based upon different individual microscopic characteristics.</p>
WXZR8P	<p>Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridge cases, Items 1 and 5, were identified as having been fired in the same firearm. Based on agreement of discernible class characteristics and sufficient corresponding individual detail, the fired 40 S&W caliber cartridge cases, Items 2 and 4, were identified as having been fired in the same firearm. Based on significant disagreement of class characteristics, the fired 40 S&W caliber cartridge cases, Items 1, 2, 4 and 5, could not have been fired in the same firearm as the fired 40 S&W caliber cartridge case, Item 3. Based on significant disagreement of individual characteristics, the fired 40 S&W caliber cartridge cases, Items 1 and 5, could not have been fired in the same firearm as the fired 40 S&W caliber cartridge cases, Items 2 and 4.</p>
WYCETB	<p>The item 1 and 5 have been discharged from the same firearm. The item 4 and 2 have been discharged from the same firearm which is not the same as have been used for item 1 and 5. The item 3 have been discharged from a third unknow firearm which was probably an semi-automatic handgun.</p>
X2EMP8	<p>On examination I found; i) The characteristic marks on the questioned expended cartridge</p>

TABLE 2

WebCode	Conclusions
	<p>case recovered from yard (Item 5) to be similar to the characteristic marks on the known expended cartridge cases from the suspect's weapon (Item 1). ii) The characteristic marks on the questioned expended cartridge cases (Item 2, Item 3 and Item 4) are dissimilar to the characteristic marks on the known expended cartridge cases (Item 1). Hence, I am of opinion that the i) Questioned cartridge case recovered from the yard (Item 5) was fired from the recovered weapon. ii) Questioned cartridge cases Item 2, Item 3 and Item 4 were not fired from the recovered weapon.</p>
X849DL	<p>Microscopic examination and comparison of the cartridge cases (Items 1, 2, 3, 4 and 5) reveals sufficient evidence to conclude that the cartridge cases Items 2, 3 and 4, were not fired in the suspect's weapon Item 1 (Pistol Beretta PX4 Storm .40 caliber). The cartridge case Item 5 was fired by the suspect's firearm Item 1. The three expended cartridge cases Items 2, 4, and 5 were compared one the others to determine common origin. The two cartridge cases Items 2 and 4 were fired by the same firearm, different from that of the suspect's (item 1). The cartridge case Item 3 was fired from the second firearm different from that of the suspect's (Item 1) and different from the firearm that expended Items 2 and 4.</p>
X84CV4	<p>Using the Bayesian approach in casework we view our findings under two hypotheses. In this test we used the following hypotheses: H1: The questioned cartridge case is fired by the submitted firearm. H2: The questioned cartridge case is fired by another firearm of the same calibre and with the same class characteristics as the submitted firearm. The likelihood ratio (LR) of the findings is expressed in the following verbal scale: Approximately equally probable (LR = 1-2). Slightly more probable (LR = 2-10). More probable (LR = 10-100). Much more probable (LR = 100-10,000). Very much more probable (LR = 10,000-1,000,000). Extremely more probable (LR = >1,000,000). Conclusions: Item 2: The findings are at least very much more probable when H2 is true than when H1 is true. Item 3: The class characteristics in Item 3 differ from those in Item 1. Due to this difference the cartridge case (Item 3) cannot have been be fired by the same firearm as the test fired cartridge cases (Item 1). Item 4: The findings are at least very much more probable when H2 is true than when H1 is true. Item 5: The findings are extremely more probable when H1 is true than when H2 is true.</p>
XCRV6K	<p>1. The cartridge cases described in item 1 and the cartridge case described in item 5, are .40 S & W caliber and were fired by the same firearm. 2. The cartridge case described in item 2 and the cartridge cases described in item 4, are .40 S & W caliber and were fired by the same firearm. 3. The cartridge case described in item 3, is .40 S & W caliber and was fired by a firearm; was not fired by the firearm used to fired the cartridge cases described in item 1, the cartridge case described in item 5; nor was it fired by the firearm used to fired the cartridge case described in item 2 and the cartridge case described in item 4.</p>
XG8A2R	<p>The discharged cartridge casing mentioned in item 5 was fired by the weapon that fired the tests in item 1. The discharged cartridge casings mentioned in item 1-2 and 1-4 were both fired by the same unknown weapon, not the weapon that fired the tests in item 1-1 or the weapon that fired item 1-3</p>
XK7RVD	<p>Cartridge casing (Item # 5) and Test fires (Item #'s 1.1 - 1.3) are identified as having been discharged from the ABOVE pistol based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge casings (Item #'s 2, 4) are identified as having been discharged from a SECOND firearm based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge casing (Item # 3) is identified as having been discharged from a THIRD firearm based on the observed disagreement of class characteristics when compared to Test fires (Item #'s 1.1 - 1.3) and Cartridge casings (Item #'s 2, 4, 5).</p>
XN697L	<p>Items 1 and 5 were discharged in the same firearm. Items 2, 3 and 4 were not discharged in</p>

TABLE 2

WebCode	Conclusions
	the same firearm as items 1 and 5.
XUDGMQ	Based on the agreement of class characteristics, the item 1 test fired cartridge cases and the items 2, 4, and 5 fired cartridge cases were microscopically compared. Item 5 was identified as having been fired by the gun that fired item 1 based on the sufficient agreement of individual characteristics. Items 2 and 4 were identified as having been fired by the same gun based upon the sufficient agreement of individual characteristics; however, these two cartridge cases can neither be identified to nor eliminated from having been fired by the gun that fired item 1 (and 5). Some disagreement was noted, however not sufficient for elimination. Based on differences in class characteristics, item 3 was eliminated as having been fired by the gun that fired item 1 (and 5). Similarly, item 3 was eliminated as having been fired by the gun that fired items 2 and 4. The item 3 has characteristics known to be produced by some models of Smith & Wesson pistols.
Y693CL	Item 2-5 each consisted of one fired cartridge case in .40" S&W calibre. Microscopic examination on the fired cartridge cases in Item 1-5 showed that Item 5 was fired in the same firearm that had fired Item 1.
YCCZ7J	The Items 01-01 and 01-05 cartridge cases were identified as having been fired in the same firearm, which is reportedly a Beretta pistol, Model Px4 Storm, serial number unknown. The Items 01-02 and 01-04 cartridge cases were identified as having been fired in the same unknown firearm. The Items 01-02 and 01-04 cartridge cases were eliminated as having been fired in the same firearm as the Items 01-01 and 01-05 cartridge cases. The Item 01-03 cartridge case was eliminated as having been fired from the same firearm(s) as the Items 01-01, 01-02, 01-04, or 01-05 cartridge cases.
YDL4NN	I microscopically compared the test-fired cartridge cases to item 5. I found agreement in all discernable class characteristics, and sufficient agreement for identification in the individual marks, including breechface impressions. I concluded that item 5 was fired in the same firearm as the test-fires (item 1). I microscopically compared the test-fired cartridge cases to items 2 and 4. I found disagreement in the class characteristics, including the breechface marks and the firing pin aperture size. I concluded that items 2 and 4 were fired in a different firearm than the test-fires (item 1). I microscopically compared the test-fired cartridge cases to item 1-3. I found disagreement in the class characteristics, including the breechface marks, the firing pin impression shape, and the firing pin drag. I concluded that item 3 was fired in a different firearm than the test-fires (item 1). Items 2, 3, and 4 were not intercompared at this time.
YHE2GL	Results of Examinations: Items 1 through 5 are .40 S&W caliber cartridge cases that bear the headstamp of Federal ammunition. The Item 5 cartridge case was identified as having been fired in the Item 1 pistol. The Item 2 and Item 4 cartridge cases were identified as having been fired in the same pistol, but excluded as having been fired in the Item 1 pistol due to a difference in class characteristics (e.g. aperture shape). The Item 3 cartridge case was excluded as having been fired in the Item 1 pistol and from the same pistol as Items 2 and 4 due to a difference in class characteristics (e.g. firing pin shape).
YJU9TV	The 40 S&W cartridge cases (Items 1 and 5) were fired in the same firearm. The 40 S&W cartridge cases (Items 2 and 4) were fired in a second firearm. The remaining 40 S&W cartridge case (Item 3) was fired in a third firearm.
YKHVX4	3. On 2018-11-19 during the performance of my official duties I received a sealed evidence bag with number PA4001476946 from Case Administration of the Ballistics Section, containing the following: 3.1 One (1) sealed Cardboard box with no seal number, containing the following: 3.1.1 One (1) cardboard box marked "Item 1" containing the following exhibits: 3.1.1.1 Three (3) .40S&W calibre fired cartridge cases marked by me "972T1/1", "972T2/1" AND "972T3/1". 3.1.2 One (1) cardboard box marked "Item 2" containing the following

TABLE 2

WebCode	Conclusions
	<p>exhibit: 3.1.2.1 One (1) .40S&W calibre fired cartridge cases marked by me "377972/18C2". 3.1.3 One (1) cardboard box marked "Item 3" containing the following exhibit: 3.1.3.1 One (1) .40S&W calibre fired cartridge cases marked by me "377972/18C3". 3.1.4 One (1) cardboard box marked "Item 4" containing the following exhibit: 3.1.4.1 One (1) .40S&W calibre fired cartridge cases marked by me "377972/18C4". 3.1.5 One (1) cardboard box marked "Item 5" containing the following exhibit: 3.1.5.1 One (1) .40S&W calibre fired cartridge cases marked by me "377972/18C5". 4. The intention and scope of this forensic examination comprise of the following: 4.1 The examination and identification fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and found that they were manufactured and designed to be fired by a centre-fire firearm. 6. I examined the fired cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.3.1, 3.1.4.1 and 3.1.5.1 and compared the individual and class characteristics markings on them using a comparison microscope and found: 6.1 The fired cartridge cases mentioned in paragraphs 3.1.1.1 and 3.1.5.1 were fired in the same firearm. (First firearm) 6.2 The fired cartridge cases mentioned in paragraphs 3.1.2.1 and 3.1.4.1 were fired in the same firearm. (Second firearm) 6.3 The fired cartridge case mentioned in paragraph 3.1.3.1 were not fired in the same firearm as the cartridge cases mentioned in paragraphs 3.1.1.1, 3.1.2.1, 3.1.4.1 and 3.1.5.1. (Third firearm)</p>
YKMDYM	<p>Fired cartridge case marked Item 5 was fired in the same firearm as tests marked Item 1. Breech face marks corresponds. Fired cartridge cases marked Item 2 and Item 4 were fired in the second firearm firing pin marks corresponds. Fired cartridge case marked Item 3 was fired in the third firearm.</p>
YWD87B	<p>The cartridge case from the yard (Item 5) was fired in the suspect's Beretta PX-4 Storm. One of the cartridge cases from the driveway (Item 3) was fired in a second firearm. The remaining cartridge cases from the driveway (Items 2 and 4) could be identified to each other, but could not be identified to the suspect's pistol. They exhibit identical class characteristics as the suspect pistol, but exhibited no correspondence in individual detail. As a result, they were most likely fired in a third firearm similar to the suspect's Beretta PX-4 Storm.</p>
YWGXKD	<p>A microscopic examination and comparison of the evidence described above revealed the following: Test Fires (1.1-1.3) and Cartridge Casing (5) are identified as having been discharged from the ABOVE gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge Casings (2) and (4) are identified as having been discharged from a SECOND gun based on the observed agreement of their class characteristics and sufficient agreement of their individual characteristics. Cartridge Casing (3) is identified as having been discharged from a THIRD gun based on the observed disagreement of its class characteristics as compared to Test Fires (1.1-1.3) and Cartridge Casings (2, 4, 5)</p>
YYGZ3U	<p>3. On 2018-11-15 during the performance of my official duties I received a sealed evidence bag with number PA4001476950 from Case Administration of the Ballistics Section containing the following: 3.1 Three (3) test fired .40 S&W calibre cartridge cases which I marked TC each and 1 to 3 individually (Item 1). 3.2 Four (4) fired .40 S&W calibre cartridge cases which I marked "377714/18" each and "2" to "5" individually (Items 2 to 5). 4. The intention and scope of this forensic examination comprises of the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined and visually inspected the cartridge cases mentioned in paragraph 3.2 and found: 5.1 The cartridge cases were manufactured and designed to be fired by a centre-fire firearm. 6. I examined the cartridge cases mentioned in paragraphs 3.1 and 3.2 and compared the individual and class characteristics markings on them using a comparison</p>

TABLE 2

WebCode	Conclusions
	<p>microscope and found: 6.1 The cartridge case marked "377714/18 5" was fired in the firearm that fired the tests mentioned in paragraph 3.1. 6.2 The cartridge cases marked "377714/18" each and "2" and "4" individually were fired in the same firearm but they were not fired from the firearm that fired the tests mentioned in paragraph 3.1. 6.3 The cartridge case marked "377714/18 3" was not fired in the firearm that fired the tests mentioned in paragraph 3.1 or the firearm mentioned in paragraph 6.2.</p>
Z2MTN7	<p>We thus make the comparison between the cases resulting from the shots with the semi-automatic pistol (item 1) and the question cases from items 2, 3, 4 and 5. Comparative macroscopic examination of their individual characteristics has made it possible to establish that the elements from items 2, 4 and 5 were fired in the semi-automatic pistol. In contrast, the case of item 3 was not fired in the gun (item 1). This is another semi-automatic pistol without more information about the brand and the model.</p>
Z4QHY2	<p>3. On 2018-11-13 during the performance of my official duties I received a sealed evidence bag with number PA4001476944 from Case Administration of the Ballistics Section containing the following exhibits: 3.1 Seven (7) .40 Smith and Wesson calibre fired cartridge cases marked by me "377710/18" each and "2", "3", "4" and "5", 710TC1, 710TC2 and 710TC3 individually. 4. The intention and scope of this forensic examination comprise of the following: 4.1 The examination and identification of fired cartridge cases. 4.2 Microscopic individualization of fired cartridge cases. 5. I examined the fired cartridge cases mentioned in paragraph 3.1 and compared the individual and class characteristics markings on them using a comparison microscope and found: 5.1 The cartridge cases marked "377710/182" and "377710/184" individually were fired in a first (1st) firearm. 5.2 The cartridge cases marked "377710/185", 710TC1, 710TC2 and "710TC3" individually were fired in a second (2nd) firearm. 5.3 It cannot be determined if the cartridge case marked "377710/183" was or was not fired in the same firearm that discharged the cartridge cases mentioned in paragraph 5.2, but it was not fired in the same firearm that discharged the cartridge cases mentioned in paragraph 5.1. 5.4 The cartridge cases mentioned in paragraph 3.1 were designed and manufactured to be fired by a centre-fire firearm.</p>
Z6K7HX	<p>The fired cartridge case marked 5 is positive to the test fired cartridge cases marked 1 but negative to the fired cartridge cases marked 2, 3 and 4 -first firearm (known). The fired cartridge cases marked 2 and 4 are positive to each to each other but negative to the test fired cartridge cases marked 1 and negative to fired cartridge cases marked 3 and 5 (second firearm unknown). The fired cartridge case marked 3 is negative to the fired cartridge cases marked 2, 4 and 5 and test fired cartridge cases marked 1 (third firearm unknown).</p>
Z76T6L	<p>Exhibits 2, 3, 4, and 5 (four cartridge cases) were visually and microscopically compared to each other and to Exhibit 1 (three test-fired cartridge cases). Microscopic examination disclosed sufficient agreement of class and individual characteristics to conclude that Exhibit 5 was fired in the same firearm as Exhibit 1. Microscopic examination disclosed sufficient disagreement of class characteristics to conclude that Exhibits 2, 3, and 4 were not fired in the same firearm as Exhibit 1. Microscopic examination disclosed sufficient agreement of class and individual characteristics to conclude that Exhibits 2 and 4 were both fired in the same firearm. Microscopic examination disclosed sufficient disagreement of class characteristics to conclude that Exhibit 3 was not fired in the same firearm as Exhibits 2 and 4.</p>
Z7YLTD	<p>Item #5 was fired from the 40 S&W Beretta pistol (Item 1) based on the agreement of class characteristics and patterns of sufficient corresponding individual characteristics. Item #2 & #4 were both fired from one gun not the 40 S&W Beretta (Item #1) based on the agreement of class characteristics and patterns of sufficient corresponding individual characteristics. Items #2-3-4 are eliminated from being fired from the 40 S&W cal Beretta based on the disagreement of individual characteristics.</p>

TABLE 2

WebCode	Conclusions
Z8XGP3	Item 5 was fired in the same firearm as the item 1 test fires. Items 2 and 4 were fired in a second firearm. Item 3 was fired in a third firearm.
ZB8UBH	Item 1 contains three (3) fired 40 S&W caliber cartridge cases, Federal brand. Items 2-5 are four (4) fired 40 S&W caliber cartridge cases, Federal brand. Based on agreement of class characteristics, these items were microscopically compared. Items 1 and 5 were identified as having been fired in the same unknown firearm based on sufficient agreement of individual characteristics. Items 2 and 4 were identified as having been fired in the same unknown firearm based on sufficient agreement of individual characteristics. Items 1 and 5 could not have been fired in the same firearm as Items 2 and 4 based on sufficient disagreement of individual characteristics. Item 3 could not have been fired in the same unknown firearm as Items 1 and 5, or Items 2 and 4, based on sufficient disagreement of class characteristics.
ZKELNH	The expended cartridge case, Item 5 was discharged from the suspect's firearm that was used to discharge the known expended cartridge case, Item 1. The expended cartridge cases, Items 2, 3 and 4 were not discharged from the suspect's firearm. Items 2 and 4 were both discharged from the same firearm.
ZKZ6PJ	As a result of microscopic comparisons it was established that: 1. Expended cartridge case item 5 was fired in the suspect's weapon item 1. 2. Expended cartridge case item 3 was fired using another firearm, different from that of suspect's and different from the firearm that expended items 2 and 4. 3. Expended cartridge cases items 2 and 4, were fired by the same firearm, different from that of the suspect's and different from the firearm that expended item 3.
ZNHGA8	Comparative examination of Item 1 (cartridge case said to be fired in suspect firearm) against Item 5 (cartridge case said to be recovered from the yard) showed the presence of matching features. This means that Item 1 and Item 5 were fired in the same firearm. Comparative examination of Item 1 against Item 3 (a cartridge case said to be recovered from the driveway) showed the presence of different class characteristics. This means that Item 1 and Item 3 were not fired in the same firearm. Comparative examination of Item 2 (a cartridge case said to be recovered from the driveway) against Item 4 (a cartridge case said to be recovered from the driveway) showed the presence of matching features. This means that Item 2 and Item 4 were fired by the same firearm. Comparative examinations of Item 2 and Item 4 against cartridge cases test fired from Item 1 showed the presence of different individual features. This means that the firearm used to test fire Item 1, in its present condition, did not fire Item 2 and Item 4.

Additional Comments

TABLE 3

WebCode	Additional Comments
2CYAZJ	In my opinion, a microscopic comparison of firing marks has shown there is sufficient agreement of class and individual characteristic markings to conclusively determine that the two fired cartridge cases, items 2 & 4, were discharged in the same gun. In my opinion, a microscopic comparison of firing marks has shown there is agreement of class characteristic markings but disagreement of individual characteristic markings to conclusively determine that the fired cartridge case, item 3, was not discharged in the gun that discharged items 2 & 4.
2MJLDH	The conclusion are based in cartridge cases examination, microscopic examination and microscopic comparison examination.
2PTRRW	*Practical Certainty: Since it is not possible to collect and examine samples of all firearms, 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 firearms produce unique, identifiable characteristics which allow examiners to reliably make identifications. Notes/Remarks: ^ Information received by [Laboratory] indicates that the Item 1 cartridge cases were test fired by a .40 S&W calibre, Beretta, model Px4 Storm, semi-automatic pistol.
3DTGWU	1Practical Certainty: Since it is not possible to collect and examine samples of all firearms, 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 firearms 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.
4J9FQ8	Item no 02 and Item no 04 spent cartridges are not suitable for microscopic comparison because of insufficient tool marks on those spent cartridges.
4MXVC2	Characteristics observed on Item 3 indicate it was likely fired by a Smith & Wesson Sigma series pistol. Consistent parallel lines were observed on the headstamp areas of Items 1-5. These marks were not used in the comparison, as they could not be from the firing process - since they were also observed on Item 3, which was eliminated to Items 1, 2, 4 and 5. All identifications and eliminations concluded based on marks observed on the primer cup.
68Y7TA	Items 2 and 4 bear some agreement of individual characteristics and all discernible class characteristics, but insufficient for an identification. Items 2 and 4 did not bear enough individual characteristics to allow for an identification.
6DQ93Z	NIBIN: A test fired cartridge case from Item 1 will be entered into NIBIN. Item 3, the cartridge case, will be entered into NIBIN. The results of NIBIN entries and searches will be the subject of a separate report.
6HG MN2	Laboratory policy does not allow for eliminations based on individual characteristics. Additional, items 1.2 and 1.4 have minimal breechface IC present due to heavy aperture flow back.
7CQUP8	Items 2 & 4 bear the same class characteristics as Items 1 & 5; however, the individual characteristics present on Items 2 & 4 are not found on Items 1 & 5.

TABLE 3

WebCode	Additional Comments
8PJZ29	The cartridge case labeled as Item 2 WERE discharged from the same firearm that cartridge case labeled as item 4.
984YYJ	Items 2 and 4 had some differences in BF, FP and ejr to the test fired cartridge cases (item 1). However, there were some gross overall similarities in the BF marks. Without the gun, it is difficult to discern whether the differences were due to the difference in ammunition between item 1 and items 2 and 4. If a gun was submitted, the gun would be test fired with the same ammunition as items 2 and 4 to determine if the differences were due to the ammunition or not.
9FKBE7	Items 2 and 4 share the same class characteristics as Item 1 cartridge cases and some similar individual characteristics can be seen, but these similarities are insufficient for a more conclusive examination. However, there is still sufficient agreement between Items 2 and 4 for an identification between these two items.
9H3NN8	The questioned bullets named Item 2 and item 4 were discharged from the same firearm.
9L6M2L	Item 3 is inconclusive with the tests because the individual marks present on the breech face do not conform with AFTE's theory of identification. Although there is some similarity on the breech face there is also some disagreement of marks and a lack of marks. The individual marks present on the breech face are not in sufficient agreement or disagreement because they do not correspond with marks created by a known match and they do not exceed the marks present on the best known non-match.
AA86M4	Items #2 and #4 were identified as having been fired in the same unknown firearm #1. Item #3 exhibits marks of value for future microscopic comparisons, unknown firearm #2.
B96TH9	Methods: Cartridge/Shotshell Case: Two cartridge cases, either two evidence items or one evidence item and one cartridge case test fired in the Laboratory, undergo two stages of comparison. First, the cartridge cases are examined to determine and compare their class characteristics. The class characteristics of fired cartridge cases include caliber, shape of firing pin impression, shape and orientation of breech face marks, and relative locations of extractor and ejector marks. If the class characteristics of the two cartridge cases are not clearly different, the examination moves to a second stage using light and/or virtual comparison microscopy. A microscopic comparison examination consists of a search of the impressed and striated toolmarks present on two cartridge cases to determine if patterns of similarity exist. At the completion of these examinations, one of the following three opinions is issued: 1) Exclusion (Elimination): If two cartridge cases have clearly different class characteristics, an Exclusion opinion is rendered. Exclusion opinions based on general differences are not required to be verified. However, an exclusion opinion based on a minor difference in a measured class characteristic cannot be reported unless a second qualified firearms/toolmarks Examiner has examined the items in question and reached the same conclusion. 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 cartridge cases known to have been fired in different firearms. b) The degree of similarity is equivalent to that normally observed in cartridge cases known to have been fired in the same firearm. When these conditions are met the likelihood another tool (firearm) 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 firearms/toolmarks examiner has examined the

TABLE 3

WebCode	Additional Comments
	<p>items in question and reached the same conclusion. 3) Inconclusive (No Conclusion): If the conditions required for an Exclusion or Identification are not observed, one of two types of inconclusive results can be reported. An opinion of No Conclusion is rendered if the impressed and/or striated toolmarks present in either or both of the specimens are of poor quality, have limited microscopic marks of value, lack any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for Identification. Limitations: Cartridge/Shotshell Cases: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to possible changes in firearm operating surfaces from wear, corrosion, and ordinary fouling and differences in ammunition design and construction, cartridge cases fired in the same firearm are sometimes not identifiable as such. Additionally, some firearm manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value on fired cartridge cases. Virtual comparison microscopy (VCM) is restricted to the surface that the three-dimensional toolmark topographical instrument is capable of measuring to produce a digital reproduction. Additionally, individual characteristics may be present on the evidentiary item(s) and may not be reproduced during a scan. This may be due to interference from lacquer/sealant, environmental damage, debris, or measuring limits for an instrument. Furthermore, physical characteristics that are not measurable, such as the metallic qualities of an item, may not be available for evaluation.</p>
CDHXR	Item 2, 4 fired in one firearm (2nd f/arm). Item 3 fired in another firearm (3rd f/arm).
DCZAY	The 'test fires' in Item 1 were all very similar in the overall area of flowback. Police seized a PX4 Storm (Beretta) and test fired it, submitting the cartridge cases as Item 1. No firearm was submitted. The PX4 Storm is a double/single action pistol and no indication was given as to what mode the pistol was fired in. It is possible that single action versus double action could produce the variation in flowback and breechface marks pointed out in the case notes. However, failure to submit the firearm coupled with the failure to indicate which mode the 'test fires' were fired in precludes a more conclusive examination with respect to Items 2 and 4.
EBNWU	There was not enough information or sample size for me to eliminate the two 40 S&W caliber cartridge cases (Agency Items 2,4) from being fired by the Beretta pistol. There is agreement in the discernable class characteristics; however, there is a lack of agreement or disagreement in the individual characteristics.
F9F2P	All items other than item 3 display a hemispherical firing pin impression. Item 3 displays a "D" shaped firing pin impression.
GG4AU	NIBIN: A test fired cartridge case from Item 1, will be entered into NIBIN. Item 3, the cartridge case, will be entered into NIBIN. The results of NIBIN entries and searches will be the subject of a separate report.
GKMA6	The cartridge cases in Items 2 and 4 were fired in the same gun.
GY9H9	In addition two other firearms has been used: Item 2 and Item 4 is discharged from the one firearm. Item 3 is discharged in another, not the same as Item 1-5. In total three firearms.
HM2FP	Item 2 and item 4 were identified as having a common origin but were not fired from the suspects firearms.(firearm #2); Item 3 was not fired from the suspects firearm nor does it have the same origin as item 2 and item 4. (firearm #3)

TABLE 3

WebCode	Additional Comments
HR2NZ4	Three different firearms were used in this incident.
HTANDX	The questioned expended cartridges cases identified as Item 2 and Item 4 were discharged from the same firearm, although, they were not discharged from the firearm that discharged the questioned expended cartridge case identified as Item 3.
HTDEBU	Some differences were observed between Items 5 and 1 and Items 2 and 4; however, with such a limited number of items and a small amount of striae lining up, it did not seem appropriate to eliminate Items 2 and 4 to Items 1 and 5.
J44G3Z	<p>Methods: Cartridge/Shotshell Case: Two cartridge cases, either two evidence items or one evidence item and one cartridge case test fired in the Laboratory, undergo two stages of comparison. First, the cartridge cases are examined to determine and compare their class characteristics. The class characteristics of fired cartridge cases include caliber, shape of firing pin impression, shape and orientation of breech face marks, and relative locations of extractor and ejector marks. If the class characteristics of the two cartridge cases are not clearly different, the examination moves to a second stage using light and/or virtual comparison microscopy. A microscopic comparison examination consists of a search of the impressed and striated toolmarks present on two cartridge cases to determine if patterns of similarity exist. At the completion of these examinations, one of the following three opinions is issued: 1) Exclusion (Elimination): If two cartridge cases have clearly different class characteristics, an Exclusion opinion is rendered. Exclusion opinions based on general differences are not required to be verified. However, an exclusion opinion based on a minor difference in a measured class characteristic cannot be reported unless a second qualified firearms/toolmarks Examiner has examined the items in question and reached the same conclusion. 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 cartridge cases known to have been fired in different firearms. b) The degree of similarity is equivalent to that normally observed in cartridge cases known to have been fired in the same firearm. When these conditions are met the likelihood another tool (firearm) 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 firearms/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, one of two types of inconclusive results can be reported. An opinion of No Conclusion is rendered if the impressed and/or striated toolmarks present in either or both of the specimens are of poor quality, have limited microscopic marks of value, lack any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for Identification.</p> <p>Limitations: Cartridge/Shotshell Cases: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to possible changes in firearm operating surfaces from wear, corrosion, and ordinary fouling and differences in ammunition design and construction, cartridge cases fired in the same firearm are sometimes not identifiable as such. Additionally, some firearm manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value on fired cartridge cases. Virtual comparison microscopy (VCM) is restricted to the surface that the three-dimensional toolmark topographical instrument is capable of measuring to produce a digital reproduction. Additionally, individual characteristics may be present on the evidentiary item(s) and may not be reproduced during a scan. This may be due to interference from lacquer/sealant, environmental damage, debris, or measuring limits for an instrument. Furthermore, physical characteristics that are not measurable, such as the</p>

TABLE 3

WebCode	Additional Comments
	metallic qualities of an item, may not be available for evaluation.
JAG9F9	While items 1, 5, 2 and 4 all have similar class characteristics, there were limited individual characteristics available for comparison. Identifications between (1 and 5) and (2 and 4) were due to the placement of the corresponding individual characteristics, but those areas did not share specific crossover between the groups. It's likely that a more specific conclusion could have been reached with additional exemplars and/or test fires.
JLV4XT	The reason why Items 1 and 5 were found inconclusive to Item 1 is that there was not enough detail to render an opinion of an identification or elimination. There were some differences in the firing pin impression and similarities on the breech face observed. Due to the nature of the rotating barrel of a Beretta Px4 Storm Semiautomatic Pistol, markings could vary.
JXLW7F	Items #2 and #4 had brass primers, compared to the Ni-plated primers of the test-fires. If I had a firearm in casework to compare, I'd preferably fire the same manufacturer with the same primer material as the evidence items. Having test-fires with a different primer material than my items is not ideal.
K2XBZZ	<p>Methods: Cartridge/Shotshell Case: Two cartridge cases, either two evidence items or one evidence item and one cartridge case test fired in the Laboratory, undergo two stages of comparison. First, the cartridge cases are examined to determine and compare their class characteristics. The class characteristics of fired cartridge cases include caliber, shape of firing pin impression, shape and orientation of breech face marks, and relative locations of extractor and ejector marks. If the class characteristics of the two cartridge cases are not clearly different, the examination moves to a second stage using light and/or virtual comparison microscopy. A microscopic comparison examination consists of a search of the impressed and striated toolmarks present on two cartridge cases to determine if patterns of similarity exist. At the completion of these examinations, one of the following three opinions is issued: 1) Exclusion (Elimination): If two cartridge cases have clearly different class characteristics, an Exclusion opinion is rendered. Exclusion opinions based on general differences are not required to be verified. However, an exclusion opinion based on a minor difference in a measured class characteristic cannot be reported unless a second qualified firearms/toolmarks Examiner has examined the items in question and reached the same conclusion. 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 cartridge cases known to have been fired in different firearms. b) The degree of similarity is equivalent to that normally observed in cartridge cases known to have been fired in the same firearm. When these conditions are met the likelihood another tool (firearm) 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 firearms/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, one of two types of inconclusive results can be reported. An opinion of No Conclusion is rendered if the impressed and/or striated toolmarks present in either or both of the specimens are of poor quality, have limited microscopic marks of value, lack any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for Identification.</p> <p>Limitations: Cartridge/Shotshell Cases: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to possible changes in firearm operating surfaces from wear, corrosion, and ordinary fouling and differences in ammunition design and construction, cartridge cases</p>

TABLE 3

WebCode	Additional Comments
	fired in the same firearm are sometimes not identifiable as such. Additionally, some firearm manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value on fired cartridge cases. Virtual comparison microscopy (VCM) is restricted to the surface that the three-dimensional toolmark topographical instrument is capable of measuring to produce a digital reproduction. Additionally, individual characteristics may be present on the evidentiary item(s) and may not be reproduced during a scan. This may be due to interference from lacquer/sealant, environmental damage, debris, or measuring limits for an instrument. Furthermore, physical characteristics that are not measurable, such as the metallic qualities of an item, may not be available for evaluation.
K4LPMN	I made my conclusions (identifications and eliminations) under the following assumptions: (1) the cartridge cases recovered from the scene were left at or near the same time during the same incident and (2) prior to the evidence being submitted, subclass influence was considered and eliminated for all items of evidence.
KMH2PW	Item 3 eliminated from Item 1, 2, 4 and 5 based on class - firing pin shape (oval shape vs circular hemispherical) and individual - significant disagreement of individual characteristics (breechface marks - sufficient disagreement).
KMWNZJ	Items 2 and 4 were identified as having been fired from the same firearm based on the agreement of class and individual characteristics seen in the breech face marks; however, they were not fired by item 1 based on the differences seen in the extractor marks Item 3 was eliminated as having been fired by item 1 and the firearm that fired items 2 and 4 based on the differences seen in the breech face marks
KXWAWW	The quality of the samples was good. The difficulty of the test set was appropriate.
M9PF3Z	Strength of Associations Made in the Identification of Firearm-Produced Toolmarks: The identification of the cartridge cases or bullets is made to the practical, not absolute, exclusion of all other firearms. This is because it is not possible to examine all firearms in the world, a prerequisite for absolute certainty. The conclusion that sufficient agreement for identification exists between two firearm-produced toolmarks means that the likelihood another firearm could have made the questioned mark is so remote as to be considered a practical impossibility.
MA7KMJ	The below listed spent cartridge cases were macroscopically and microscopically examined and compared with test cartridge cases fired by the Beretta 40 caliber pistol, Property# [Participant Code], Lab Evidence# 001-A1. These items could neither be identified nor eliminated as having been fired from this firearm due to a lack of corresponding individual characteristics. Property# Lab Evidence# Item# Item Description [Participant Code] 001-A2 2 Spent Federal 40 S&W cartridge case [Participant Code] 001-A4 4 Spent Federal 40 S&W cartridge case. [Participant submitted data in a format that could not be reproduced in this report].
MNJVDR	There were no extractor and ejector marks. There were very limited chamber marks for comparison. That's not normal for a Beretta or most 40 caliber semi-automatic pistols to not leave extractor or ejector marks.
MRPA6Q	The cartridge cases in Items 1 and 5 bear similar class characteristics as the cartridge cases in Items 2 and 4 and cannot be eliminated as having been fired from the same firearm. The cartridge cases in Items 1 and 5 and the cartridge cases in Items 2 and 4 lack sufficient

TABLE 3

WebCode	Additional Comments
	agreement of individual characteristics to identify them as having been fired from the same firearm.
MX9TTY	Additionally, a microscopical comparison of firing marks has shown there is sufficient agreement of class and individual characteristic markings (breech face & firing pin) to conclusively determine that the cartridge case ITEM 2 was fired from same firearm as ITEM 4.
N68J7M	Three guns used.
NMPMHG	the hypothesis that expended cartridge cases item 2 and item 4 were discharged from the same firearme is very strongly supported.
PYE24V	Items 2 & 4 were inconclusive to Items 1A-1C because the primer areas could not be put together between the two groups but yet there were corresponding striae on the headstamp area between the 2 groups. Items 2 & 4 exhibited repetition marks inside the firing pin impression but they were not visible on Items 1A-1C + 5 - however different primer materials existed between the 2 groups. There was too much similar + too much different to conclusively go to either an ID or an elimination.
Q9J7TQ	Due to matching class characteristics, but lack of matching pattern areas of individual characteristics Items 2 and 4 could neither be identified nor eliminated as having been fired in the same firearm as the submitted known cartridge cases, Items 1.1, 1.2, and 1.3.
QREU78	The exhibit item listed as item 2 and exhibit item 4 were identified within the limits of practical certainty as having been fired in the same firearm.
R2DWZ4	All items - 1 (3 known test fire DCCs) and 2 - 5 (evidence DCCs) all exhibited evidence of same/similar matching marks from manufacture on their head stamp areas. These marks could be confused with marks created from the discharge of a firearm however upon examination and comparison, they are not. The manufacturing mark locations relative to the directionality of firing marks on the primers, are not consistent with marks created from discharge, as evident from the known test fires to each other and to eliminated DCCs as well. All evidence DCCs Federal American Eagle .40 S&W ammunition.
R4FYJD	Item 2 was fired by the same weapon than item 4. (Item 2 = Item 4 = Weapon B); Item 3 was fired by an other weapon than items 1 and 5, or than items 2 and 4. (Item 3 = weapon C).
RDNDJT	Items 2 and 4 have similar class characteristics as Items 1 and 5; however, there are insufficient corresponding individual characteristics.
TBVU4D	Item 2 has a slightly pierced primer and casings submitted as Item 1 did not mark very consistently. For these reasons, I feel that without the firearm available for further tests, I can not form a more conclusive finding.
TFTCKE	The weapon which fired the Item #3 is equipped with a tilting barrel.
TLVG6H	It's recommended to perform the firing tests a second time with the suspect's weapon using the same ammunition as that of the cartridge cases of items 2, 3 and 4. This step will insure that each pair of cartridges cases meant for comparison have of the same nature allowing as to obtain more efficient results at the end of such examination.

TABLE 3

WebCode	Additional Comments
TM93ZD	Based on the agreement of class characteristics and sufficient agreement of individual characteristics, the questioned cartridge case marked "Item 2" was fired from the same firearm as the questioned cartridge case marked "Item 4".
U7YKKY	The exercise was practical for the application to the comparative studies of cartridge cases that realizes the ballistic group of [City] in [Country]; activity that is very frequent in this laboratory by material evidence submitted for analysis of criminal cases which use one or more firearms.
UU6A3J	The firearm is needed for more testing in order to form a more conclusive determination of results dealing with Items 2 and 4. This firearm can be fired in single and double action modes and could produce different type characteristics given its action design.
UVKFHA	SHOULD ANY ADDITIONAL FIREARMS BE RECOVERED, SUBMIT, AND REFER TO THE ABOVE CC#. "Sufficient agreement" exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility. Sufficient agreement is related to the significant duplication of random toolmarks as evidence by a pattern or combination of patterns of surface contours.
VKF2Y9	The 0001-AB (Item 2) and 0001-AD (Item 4) expended cartridge cases were inconclusive to the 0001-AA (Item 1) three expended cartridge cases due to insufficient agreement or disagreement of individual characteristics. All class characteristics were in agreement.
WYCETB	The firearm which discharged the item 4 and 2 is probably an other PX4 Storm type Handgun.
X2EMP8	The characteristic marks on the questioned cartridge cases Item 2 and Item 4 are similar and they were fire from the same firearm.
X849DL	Two guns of the same caliber but different from one another and different suspect's weapon, were used in the commission of the facts.
X84CV4	Similarities have been observed between the marks in the Items 2 and 4. This observation lead to an additional examination between the marks in Item 2 and 4. The findings of this examination were viewed under the following two hypotheses: H3: The questioned cartridge cases are fired by one firearm; H4: The questioned cartridge cases are fired by two firearms of the same calibre and with the same class characteristics. The findings of the additional examination are extremely more probable when H3 is true than when H4 is true.
XN697L	Items 2 and 4 were discharged in the same firearm. Item 3 was discharged in a third firearm.
Y693CL	Item 1 and 2, Item 1 and 3, Item 1 and 4 had agreement of all discernible class characteristics and disagreement of individual characteristics, but insufficient for an elimination.
YHE2GL	Methods: Cartridge Cases: Two cartridge cases, either two evidence items or one evidence item and one cartridge case test fired in the Laboratory, undergo two stages of comparison. First, the cartridge cases are examined to determine and compare their class characteristics. The class characteristics of fired cartridge cases include caliber, shape of firing pin impression, shape and orientation of breech face marks, and relative locations of extractor and ejector marks. If the class characteristics of the two cartridge cases are not clearly

TABLE 3

WebCode	Additional Comments
	<p>different, the examination moves to a second stage using light and/or virtual comparison microscopy. A microscopic comparison examination consists of a search of the impressed and striated toolmarks present on two cartridge cases to determine if patterns of similarity exist. At the completion of these examinations, one of the following three opinions is issued: 1) Exclusion (Elimination): If two cartridge cases have clearly different class characteristics, an Exclusion opinion is rendered. Exclusion opinions based on general differences are not required to be verified. However, an exclusion opinion based on a minor difference in a measured class characteristic cannot be reported unless a second qualified firearms/toolmarks Examiner has examined the items in question and reached the same conclusion. 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 cartridge cases known to have been fired in different firearms. b) The degree of similarity is equivalent to that normally observed in cartridge cases known to have been fired in the same firearm. When these conditions are met the likelihood another tool (firearm) 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 firearms/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, one of two types of inconclusive results can be reported. An opinion of No Conclusion is rendered if the impressed and/or striated toolmarks present in either or both of the specimens are of poor quality, have limited microscopic marks of value, lack any observed microscopic similarity, or microscopic similarity that is present but too limited to meet the criteria for Identification. Limitations: Cartridge Cases: Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to possible changes in firearm operating surfaces from wear, corrosion, and ordinary fouling and differences in ammunition design and construction, cartridge cases fired in the same firearm are sometimes not identifiable as such. Additionally, some firearm manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value on fired cartridge cases.</p>
YWD87B	<p>Items 2 and 4 exhibit identical class characteristics as the cartridge cases from the suspect's gun, but no correspondance in individual detail. I observed considerable variation in individual detail between test fired cases, and the effect of the unusual rotary locking system on the reproducibility of individual detail is unknown. As a result, I conclude that Items 2 and 4 were most likely not fired in the suspect's firearm.</p>
Z6K7HX	<p>Three firearms were involved in firing the exhibits and tests mentioned above.</p>
ZB8UBH	<p>Since the examiner was not present when test fires were generated, no conclusion was rendered linking the cartridge cases in Item 1 to the firearm stated in the synopsis.</p>
ZKZ6PJ	<p>Two guns of the same caliber but different from one another and different suspect's weapon, were used in the comission of the facts.</p>

-End of Report-
(Appendix may follow)

Appendix: Data Sheet

Collaborative Testing Services - Forensic Testing Program Test No. 18-527: Firearms Examination

DATA MUST BE RECEIVED BY December 17, 2018 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

Accreditation Release Statement

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, and/or A2LA.

Scenario:

Police are investigating a shooting outside of a residence. Investigators recovered four expended cartridge cases at the scene - three from the driveway and one from the yard. A suspect was apprehended later that day and police seized a Beretta Px4 Storm .40 caliber handgun from his possession. Three rounds of Federal American Eagle® .40 S&W 180 grain FMJ ammunition (which were consistent with the cartridge cases found at the scene) were fired with the suspect firearm and the cartridge cases collected. Investigators are asking you to compare the recovered cartridge cases from the scene with those test fired from the suspect's weapon and report your findings.

Please note the following:

- Each item is in a small labeled box, it is suggested that when the items are removed from their labeled boxes, they be marked according to your laboratory procedure. However, in case the items are separated from their boxes before labeling has occurred, each item has been inscribed with its item number.

Items Submitted (Sample Pack F2):

Item 1: Three expended cartridge cases discharged from the suspect's weapon (known).

Item 2: First expended cartridge case recovered from the driveway (questioned).

Item 3: Second expended cartridge case recovered from the driveway (questioned).

Item 4: Third expended cartridge case recovered from the driveway (questioned).

Item 5: One expended cartridge case recovered from the yard (questioned).

1.) Were any of the questioned expended cartridge cases (Items 2-5) discharged from the same firearm as the known expended cartridge cases (Item 1)?

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"/>
Item 4	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inconclusive*	<input type="checkbox"/>
Item 5	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Inconclusive*	<input type="checkbox"/>

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

Please return all pages of this data sheet.

Page 1 of 3

Participant Code:

WebCode:

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

3.) Additional Comments

<p>Return Instructions: Data must be received via online data entry, fax (please include a cover sheet), or mail by December 17, 2018 to be included in the report. Emailed data sheets are not accepted.</p>	<p>Participant Code:</p>
<p>QUESTIONS? TEL: +1-571-434-1925 (8 am - 4:30 pm EST) EMAIL: forensics@cts-interlab.com www.ctsforensics.com</p>	<p>ONLINE DATA ENTRY: www.cts-portal.com FAX: +1-571-434-1937 MAIL: Collaborative Testing Services, Inc. P.O. Box 650820 Sterling, VA 20165-0820 USA</p>

Please return all pages of this data sheet.

Collaborative Testing Services ~ Forensic Testing Program

RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **18-527: Firearms Examination**

This release page must be completed and received by **December 17, 2018** 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

ANAB Certificate No. _____

(Include ASCLD/LAB Certificate here)

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.

Page 3 of 3