



Toolmarks Examination Test No. 09-529 Summary Report

This test was sent to 200 participants. Each sample pack contained two sets of pliers (Items 1 and 2) and three pieces of aluminum fence tie containing questioned toolmarks (Items 3, 4 and 5). Participants were requested to examine these items and report their findings. Data were returned from 158 participants (79% response rate) and are compiled into the following tables:

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

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

Manufacturer's Information

Each sample pack contained two diagonal cutting pliers (Items 1 and 2) and three pieces of aluminum fence tie containing questioned toolmarks (Items 3, 4 and 5). Each piece of aluminum fence tie was painted on one end; the other was to be used for the examination. Two additional aluminum fence ties were included for possible test mark purposes. The Items 4 and 5 aluminum fence ties were cut with the Item 1 diagonal cutting pliers. The Item 3 aluminum fence tie was cut with Snap-Cut pruning shears that were not provided for examination.

SAMPLE PREPARATION -

Both pliers are Do it™ 6" Diagonal Pliers catalog #303550. The aluminum fence ties were 11 gauge aluminum chain link fence ties purchased at a local home improvement store.

Each set of pliers were opened and inspected for defects. The pliers were then used to cut aluminum fence ties at least three times, along the cutting edge, to remove manufacturing residue and spurs. This process was done to break in the tools and to achieve trace materials on the cutting surfaces.

ITEM 2 (ELIMINATION TOOL): The Item 2 pliers were prepared as stated above. One handle of the pliers was labeled with an Item 2 label and the other handle wrapped with yellow electric tape. The pliers were then packaged into a pre-labeled Item 2 envelope.

ITEM 3 (PREPARATION and ELIMINATION MARK): Snap-Cut pruning shears were used to cut a 2-3" piece of aluminum fence tie from the straight end. The end that was not cut was dipped in green metal paint and the aluminum fence tie was allowed to dry for 4 days. The sample was packaged into a pre-labeled Item 3 envelope. The above process was repeated until all elimination toolmarks had been prepared.

ITEMS 1, 4 and 5 (PREPARATION and IDENTIFICATION MARKS): The Item 1 pliers were prepared as stated above. The pliers were labeled with an Item 1 label on the handle. The bent end of the remaining aluminum fence ties not used for Item 3 were dipped into blue metal paint and the straight end was dipped into red metal paint and allowed to dry for 4 days. A pair of Item 1 pliers were used to cut the aluminum fence tie in half. The cuts were made with the flat surface of the cutting edge positioned towards the red end. Once the cut was complete, the bent piece with the blue end was packaged into a pre-labeled Item 4 envelope and the straight piece with the red end was packaged into a pre-labeled Item 5 envelope. The matching pliers were packaged into a pre-labeled Item 1 envelope. The matching Item 1 pliers and Items 4 and 5 aluminum fence ties were kept together and immediately assembled in the sample pack as described below. The above process was repeated until all identification toolmarks had been prepared.

SAMPLE PACK ASSEMBLY: The corresponding Item 1 pliers and the Items 4 and 5 aluminum pieces were packaged into a pre-labeled sample pack box along with the Item 2 pliers and Item 3 aluminum piece and two additional aluminum fence ties for testing purposes. This process was repeated until the required number of sample packs were produced. Following verification, the sample packs were sealed with evidence tape and initialed with "CTS".

VERIFICATION -

In addition to the sets examined by predistribution laboratories and an AFTE representative, 10 of the completed sample sets were examined by a qualified toolmark examiner. The expected identifications and eliminations (or inconclusives) were confirmed/reported by one predistribution laboratory, the AFTE representative and for the 10 sets examined by the toolmark examiner. A third laboratory eliminated the Items 1 and 2 pliers as the tool used to cut Item 3 and identified the Item 2 pliers as the tool that cut Items 4 and 5. CTS felt that this may have been due to a sample switch of Items 1 and 2. To prevent this from happening during the normal test taking time, CTS wrapped yellow electric tape to the handle of the Item 2 pliers so that they could be differentiated if the labels fell off the handles. It was therefore determined that the test was suitable for distribution to the participants.

Summary Comments

This test was designed to allow participants to assess their proficiency at a tool mark examination involving striated type tool marks. Participants were provided with two sets of pliers (Items 1 and 2) and three pieces of aluminum fence tie containing questioned toolmarks (Items 3, 4 and 5). For each sample pack, the Item 4 and 5 aluminum fence ties were cut by the Item 1 pliers. The Item 3 aluminum fence tie was cut by another tool not submitted for examination. (Refer to Manufacturer's Information for sample preparation details.)

Of the 158 responding participants, 129 (82%) identified the Item 1 pliers as the tool used to cut the Items 4 and 5 aluminum fence ties and eliminated(122) or were inconclusive(7) as to the Item 1 or Item 2 pliers having cut the Item 3 aluminum fence tie. An additional participant identified the Item 1 pliers as the tool used to cut Items 4 and 5, eliminated the Item 1 pliers as having cut Item 3, and was inconclusive about the Item 2 pliers having cut Item 3.

Thirteen participants identified the Item 1 pliers as cutting Item 4, eliminated(4) or were inconclusive(9) as to either of the suspect pliers having cut Item 5, and eliminated(11) or were inconclusive(2) as to either of the suspect pliers having cut Item 3. A few commented that although the class characteristics were similar, a lack of corresponding individual characteristics were observed.

Eight participants did not identify either of the suspect tools to a questioned item. The majority of their responses were inconclusive with one participant eliminating the Item 1 pliers as having cut Item 5.

Seven participants reported results that included the identification of a tool to a questioned item that was inconsistent with the sample preparation. Six of these participants also eliminated Item 1 as the tool used to cut Item 4(4) or Item 5(3). These participants had varying inconclusive responses that could not be further grouped. (See Table 1)

Examination Results

Did either of the suspects' pliers (Items 1 or 2) produce the toolmarks on the aluminum fragments (Items 3, 4 or 5)?

TABLE 1

WebCode	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox		
	Item 3	Item 4	Item 5	Item 3	Item 4	Item 5
1ALBER	No	Yes	Yes	No		
1Y5Y4W	No	Yes	Yes	No	No	No
23VV6T	No	Yes	Yes	No	No	No
258NFF	No	Yes	Yes	No	No	No
2NSLST	No	Yes	Yes	No	No	No
2QVJQE	No	Yes	Yes	No	No	No
2TTA5L	No	Yes	Yes	No	No	No
317J7N	No	No	Inc*	No	Yes	Inc*
32NB3W	No	No	No	No	Yes	Yes
381J7D	No	Yes	Yes	No	No	No
3892PR	No	Yes	Inc	No	No	Inc
3B3C84	No	Inc*	Inc*	No	Inc*	Inc*
3HBMQY	No	Yes	Yes	No	No	No
3YJ77G	No	Yes	Yes	No	No	No
3ZZZ4Q	No	Yes	Yes	No	No	No
4F3N44	No	Yes	Yes	No	No	No
4J238L	Inc	Inc	Inc	Inc	Inc	Inc
4L7MGE	No	Yes	Yes	No	No	No
4Q3NNH	No	Yes	Yes	No	No	No
4WAN4K	No	Yes	Yes	No	No	No
59P2EC	No	Yes	Yes	No	No	No
5D2BEE	No	Yes	Yes	No	No	No
5FBS27	No	Yes	No*	No	No	No
5RBET4	Inc	Inc	Inc	Inc	Inc	Inc
5Y8ML3	No	Yes	Inc	No	No	Inc
671QF7	No	Yes	Yes	No	No	No
69PPMV	No	Yes	Yes	No	No	No
6AL7H5	No	Yes	Yes	No	No	No
6YUECT	No	Yes	Inc	No	No	Inc
7DFF6B	No	Yes	Yes	No	No	No
7K36S7	No	Yes	Yes	No	No	No

TABLE 1

WebCode	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox		
	Item 3	Item 4	Item 5	Item 3	Item 4	Item 5
7XS5J9	Inc*	Yes	Yes	Inc*	No	No
818UD6	No	Yes	Yes	No	No	No
82YN43	No	Yes	Yes	No	No	No
884S71	No	Yes	Yes	No	No	No
8BS476	No	Yes	Yes	No	No	No
8KVHNY	No	Yes	Yes	No	No	No
8SEGLY	No	Yes	Yes	No	No	No
8YZB83	No	Yes	Yes	No	No	No
99VMEP	No	No	Yes	No	No	No
9AFNNR	No	Yes	Yes	No	No	No
9XKHE1	No	Yes	Yes	No	No	No
AA756D	No	Yes	Yes	No	No	No
BBJ7FJ	No	Yes	Yes	No	No	No
BD8JFP	No	Yes	Yes	No	No	No
BJWC49	No	Yes	Yes	No	No	No
BQGMJT	No	No	Yes	No	Yes	No
C7XWSD	No	Yes	Yes	No	No	No
C9M8RJ	Inc	Yes	Yes	Inc	No	No
CFPTN8	*	Yes	Yes	No	No	No
CY6UGP	No	Yes	Yes	No	No	No
CYLP84	No	Yes	Yes	No	No	No
D7BUD9	No	Yes	Yes	No	No	No
DJ51H6	No	Yes	Yes	No	No	No
DPDYUD	No	Yes	Yes	No	No	No
DSH6GH	No	Yes	Yes	No	No	No
E3X7MQ	No	Yes	Yes	No	No	No
E7T35Q	Inc	Yes	Yes	Inc	No	No
EABSF9	No	Inc*	Inc*	No	No	Inc*
EESKK2	No	Yes	Yes	No	No	No
EGGQJ1	No	Yes	Yes	No	No	No
ER4SHM	No	Yes	Yes	No	No	No
F4L7W6	No	Yes	Yes	No	No	No
FLPBCA	No	Yes	Yes	No	No	No
FRZQAU	No	Yes	No	No		No
FTN29Z	No	Yes	Yes	No	No	No

TABLE 1

WebCode	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox		
	Item 3	Item 4	Item 5	Item 3	Item 4	Item 5
FXLJNE	No	Yes	Yes	No	No	No
G44GJ6	No	Yes	Inc*	No	No	Inc*
G9QXS4	No	Yes	Yes	No	No	No
GE2LQF	No	Yes	No	No	No	Yes
GFCNEZ	No	Yes	Yes	No	No	No
GT2KDC	Yes	Yes	Inc	No	No	Inc
GVQWCH	No	Yes	Yes	No	No	No
H5UY2S	No	Yes	Yes	No	No	No
H7HA1Y	No	Yes	Yes	No	No	No
HBWFRZ	No	Yes	Yes	No	No	No
HKCJ2D	No	Yes	Yes	No	No	No
HLH9PV	No	Yes	Yes	No	No	No
HN6LN1	No	Yes	Yes	No	No	No
HPGNBK	Inc	Yes	Inc	Inc	No	Inc
HRUXM6	No	Yes	Yes	No	No	No
HUTBAV	No	Yes	Yes	No	No	No
J26M3M	No	Yes	Yes	No	No	No
J59CBN	No	Yes	Yes	No	No	No
JK31K1	No	Yes	Yes	No		
JZXQDC	No	Yes	No	No	No	No
K7SYEU	No	Yes	Yes	No	No	No
KC88ZD	No	Yes	Yes	No	No	No
KPV4VY	No	Yes	Yes	No	No	No
KR3FAE	No	Yes	No	No	No	Yes
KZDHWF	No	Yes	No	No	No	Inc
L3FBGJ	Inc	Inc	Inc	Inc	Inc	Inc
L9TJHL	No	Yes	Yes	No	No	No
LA8AKX	No	Yes	Yes	No	No	No
LCGVGR	No	Yes	Yes	No	No	No
LCWMJ3	No	Yes	Yes	No	No	No
LE57FW	No	Yes	Yes	No	No	No
LQ5TR2	Inc*	Yes	Inc	Inc*	No	Inc
M6STV6	No	Yes	Yes	No	No	No
M8KYLS	No	Yes	Yes	No	No	No
MF22W6	No	Yes	Yes	No	No	No

TABLE 1

WebCode	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox		
	Item 3	Item 4	Item 5	Item 3	Item 4	Item 5
MGWLML	No	Yes	Yes	No	No	No
MJZJVT	No	Yes	Yes	No	No	No
MLRNFC	No	Yes	Yes	No	No	No
MM1P8D	Inc	Yes	Yes	Inc	No	No
MQ7W4C	No	Yes	Yes	No	No	No
NVXJL4	No	Yes	Yes	No	No	No
PFQN9A	No	Yes	Yes	No	No	No
PL4WKY	No	Yes	Yes	No	No	No
PP1C3T	No	Yes	Yes	No	No	No
PRMT38	No	No	Yes	Inc	Yes	No
QB9HC1	No	Yes	Yes	No	No	No
QCPD1Y	No	Yes	Yes	No	No	No
QPUQYK	No	Yes	Yes	No	No	No
QPYG43	No	Yes	Yes	No	No	No
QU6CWW	No	Yes	Yes	No	No	No
R2Z17S	No	Yes	Yes	No	No	No
SPTBPX	No	Yes	Yes	No	No	No
SYJVAH	No	Yes	Yes	Inc	No	No
T1KS6R	No	Yes	Inc*	No	No	Inc*
T39PLP	Inc*	Yes	Yes	Inc*	No	No
T9CRQQ	No	Inc	Inc	No	Inc	Inc
TB13PV	Inc*	Yes	Yes	Inc*	No	No
TE1HTC	No	Yes	Yes	No	No	No
TTNF3N	No	Yes	Yes	No	No	No
TVCS3T	No	Yes	Yes	No	No	No
TZLCMJ	No	Inc	No	No	No	Inc
U4KNT5	No	Yes	Yes	No	No	No
UN7G1S	No	Yes	Yes	No	No	No
UQHG4E	No	Yes	Yes	No	No	No
VEUF8J	No	Yes	Yes	No	No	No
VGHS7Q	No	Yes	Yes	No	No	No
VK5U53	No	Inc*	Inc*	No	Inc*	Inc*
VWFCR5	Inc	Yes	Yes	Inc	No	No
VX62US	No	Yes	Yes	No	No	No
W4ZT5Z	No	Yes	Yes	No	No	No

TABLE 1

WebCode	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox		
	Item 3	Item 4	Item 5	Item 3	Item 4	Item 5
W7DMNS	No	Yes	Yes	No	No	No
W92YMY	Inc	Yes	Yes	Inc	No	No
WAC1AH	No	Yes	Yes	No	No	No
WBQAL4	No	Yes	Yes	No	No	No
WEVZZY	No	Yes	Yes	No	No	No
WFPP8T	No	Yes	Yes	No	No	No
WQAUZ5	No	Yes	Inc	No	Inc	Inc
WTEL86	No	Yes	Yes	No	No	No
XE44LF	No	Yes	Yes	No	No	No
XQMHHX	No	Yes	Yes	No	No	No
XX1Z6B	No	Yes	Yes	No	No	No
Y39J1P	No	Yes	Yes	No	No	No
YNAPEG	No	Yes	Yes	No	No	No
YNK7WU	No	Yes	Inc	No	No	Inc
YRE6SR	No	Yes	Yes	No	No	No
YTMCD5	No	Yes	Yes	No	No	No
Z2CGKY	No	Yes	Yes	No	No	No
Z3L6SW	No	Yes	Yes	No	No	No
Z98KLA	No	Yes	Yes	No	No	No
ZVQUPT	No	Yes	Yes	No	No	No
ZXD6PY	No	Yes	Yes	No	No	No
ZYANJ8	No	Yes	Yes	No	No	No

Response Summary				Total Participants: 158			
<i>Did either of the suspects' pliers (Items 1 or 2) produce the toolmarks on the aluminum fragments (Items 3, 4 or 5)?</i>							
	Item 1 Pliers from Greg's toolbox			Item 2 Pliers from Matt's toolbox			
	ITEM 3	ITEM 4	ITEM 5	ITEM 3	ITEM 4	ITEM 5	
Responses	Yes	1 (1%)	145 (92%)	132 (84%)	0 (0%)	4 (3%)	3 (2%)
	No	143 (91%)	5 (3%)	8 (5%)	143 (91%)	144 (91%)	133 (84%)
	Inc	13 (8%)	8 (5%)	18 (11%)	15 (9%)	7 (4%)	20 (13%)

*See Conclusions (Table 2) and/or Additional Comments (Table 3).

Conclusions

TABLE 2

WebCode	Conclusions
1ALBER	1. The cuts located on the aluminum wire (item 3) were not produced by either pair of wire cutters (items 1 & 2). 2. The cuts located on the aluminum wires (items 4 & 5) were produced by the wire cutters (item 1).
1Y5Y4W	1. The Items 4 and 5, cut wires, were made with the Item 1, wire cutters. 2. The Item 3, cut wire, was not made with either the Item 1 or 2, wire cutters.
23V6T	The toolmarks on the aluminium fragments item 4 and item 5 was produced by pliers recovered from Greg's toolbox (item 1). Toolmarks on the aluminium fragments item 3 does not come from the pliers from Greg's toolbox (item 1) or Matt's toolbox (item 2).
258NFF	Examination and microscopic comparison showed that the Exhibit 1 pliers were used to cut the Exhibit 4 and Exhibit 5 pieces of cut aluminum fence tie. The Exhibit 2 pliers did not cut the Exhibit 4 or Exhibit 5 pieces of aluminum fence tie. Exhibit 3 was not cut by Exhibit 1 or Exhibit 2.
2NSLST	The wire cutters in item 1 cut the aluminum wire pieces in items 4 and 5. Neither of the wire cutters cut the aluminum wire piece in item 3.
2QVJQE	Disagreements of class characteristics confirmed the toolmarks on the item 3 aluminum fragment were not made by the item 1 pliers or the item 2 pliers. Sufficient agreements of class and individual characteristics confirmed the toolmarks on the item 4 aluminum fragment were made by the item 1 pliers. Sufficient agreements of class and individual characteristics confirmed the toolmarks on the item 5 aluminum fragment were made by the item 1 pliers.
2TTA5L	Test cuts were made by Items 1 & 2. These marks were consistent with marks left by a pinching tool. Items 3, 4, and 5 were microscopically examined and compared to test cuts made by Items 1 and 2. The tool marks on Item 3 appeared to have been made by a shearing type tool, therefore were eliminated as being made by Items 1 or 2. The tool marks on Item 4 were made by a pinching tool and were identified as being made by Item 1. The toolmarks on Item 4[sic] were also made by a pinching tool and were also identified as being made by Item 1.
317J7N	Item 3 was cut [sic] neither Item 1 nor Item 2, but was likely cut at a steep angle. Item 4 was cut by the inside edge of the blade of Item 2 because Item 2 produces similar scratching on the face of the cut and a similar angle of cut (rooftop). Also, the ledges formed at the base of the cut were very similar. Item 4 does not match the cut of Item 1 in the angle of the cut (rooftop), nor in the form of its ledges. Item 5 was likely cut by Item 1 (outside blade), however, the angle of the cut (rooftop) matches those produced by both Item 1 & 2 and the direction of the scratches on the face of the cut, as well as the vertical scoring underneath, suggest that it was cut by Item 1, however the similarities between cuts produced by Item 1 & 2 make it difficult to determine with certainty.
32NB3W	I microscopically compared the test-cuts made by Items 1 and 2 to the cuts in the evidence wire in Items 3, 4, and 5 with the following results: Item 3 - Based on differences in class characteristics, I determined that the wire in Item 3 was not cut by the pliers in Item 1 or 2. Items 4 and 5 - Based on consistent class characteristics, including the general shape and appearance of the evidence cuts, and sufficient matching individual striae, I determined that the wires in Items 4 and 5 were cut by the pliers submitted in Item 2.
381J7D	[No Conclusions Reported.]
3892PR	The piece of aluminium recovered from the top of the fence post (item 3) had a different cut

TABLE 2

WebCode	Conclusions
	shape to cuts made with the pliers. Therefore in my opinion, neither pair of pliers (items 1 and 2) have cut the aluminium from the fence post. There was a good correspondence of striae in the cut surfaces of the aluminium from the bottom of the fence link (item 4) and test cuts made with pliers from Greg's toolbox (item 1). In my opinion, this correspondence means that Greg's pliers have cut the aluminium (item 4). There was a correspondence of cut shape in the aluminium from the bottom of the fence post (item 5) with the test cuts made with the pliers. However, I could find no correspondence of microscopic detail. In my opinion, this evidence neither supports nor refutes the proposition that one of the pairs of pliers (items 1 and 2) have cut the aluminium (item 5). Therefore this evidence is inconclusive.
3B3C84	Aluminum Rod AR1 (Item #3) was not cut from tool surface's of wire cutter WC-1 and WC-2 due to difference's in toolmark patterns. Aluminum Rod AR-2 (Item #4) and AR-3 (Item #5) when compared against tool surface's of wire cutter WC-1 and WC-2 displayed similar however insufficient corresponding microscopic markings to permit a positive identification. [sic]
3HBMQY	Toolmarks found on the cut ends of wires from Items 4 and 5 were identified as having been produced by Item 1. Items 1 and 2 were excluded as having produced the toolmarks found on the cut end of the wire from Item 3. The painted ends of wires from Items 3 thru 5 were not examined. Lab generated evidence (test toolmarks made with Items 1 and 2) was submitted as Item 1 EAN to Firearms Non-Case Storage.
3YJ77G	On examination, I found: 1) The cut marks at the end of the aluminum fragments in Item 4 and Item 5 were similar to the cut marks on the aluminum fence tie which I made using the plier in Item 1. The cut marks on Item 3 was dissimilar to the cut marks made using by the plier in Item 1.[sic] In my opinion, the plier in Item 1 was used to cut the aluminum ties in Items 4 and 5 but the plier in Item 1 was not used to cut the aluminum ties in Item 3. 2) The cut marks at the end of the aluminum fragments in Item 3, Item 4 and Item 5 were dissimilar to the cut mark on the aluminum fence tie which I made using the plier in Item 2. In my opinion, the plier in Item 2 was not used to cut the aluminum ties in Items 3, 4 and 5.
3ZZZ4Q	The results of the examination show with certainty that the toolmarks in Item 3 have not been made by the pliers Item 1 and Item 2 (Level -4). The results of the examination strongly support that the toolmark in Item 4 have been made by the pliers Item 1 (Level +3). The results of the examination strongly support that the toolmark in Item 5 have been made by the pliers Item 1 (Level +3).
4F3N44	Items 4 and 5 are pieces of aluminum wire which were identified as having been cut with the Item 1 tool. Item 3 is a piece of aluminum wire which has been cut with a tool using a shearing action. The submitted Item 1 and Item 2 tools use a pinching action. Thus, Item 3 was not cut by either of the submitted tools.
4J238L	Item #1 and Item #2 are inconclusive as have creating the toolmarks of item #3, #4 and #5.
4L7MGE	1) The cut pieces of aluminum wire with blue and red paint (Exhibits 4 and 5) were cut by the Exhibit 1 diagonal side cutters. 2) The diagonal side cutters (Exhibits 1 and 2) were excluded from cutting the piece of aluminum wire with green paint (Exhibit 3) due to differing class characteristics.
4Q3NNH	On examination I found the fragment of aluminium 'item 4' and 'item 5' were cut by pliers 'item 1'. The fragment of aluminium 'item 3' was neither cut by pliers 'item 1' nor 'item 2'.
4WAN4K	A comparison was conducted between the toolmarks displayed on the submitted pieces of wire items 3, 4 & 5, and toolmarks displayed on test cuts created using items 1 & 2

TABLE 2

WebCode	Conclusions
	(submitted pliers), using a comparison microscope. A comparison microscope allows 2 objects to be viewed simultaneously so that microscopic features caused [sic] the cutting action of a tool can be compared & assessed. As a result of this comparison, I formed the opinion that the pieces of wire items 4 & 5 were made by pliers item 1. The piece of wire item 3 was not cut by either item 1 or item 2.
59P2EC	Item 3 was not cut using the submitted tools, Items 1 or 2. Items 4 and 5 were cut using the pliers, Item 1.
5D2BEE	Test cuts made with Items 1 and 2 were compared microscopically with the cut marks on Items 3, 4 and 5. The cut marks on items 4 and 5 have matching striations with the test cuts of Item 1. The pliers from Greg's tool box (Item 1) made the cuts on items 4 & 5. The cut mark on Item 3 has different characteristics than the cuts made by Items 1 and 2, therefore Item 3 was cut with a different tool than Item #1 or Item #2.
5FBS27	Lab testing was carried out using both pliers (Item 1 and Item 2) as cutting tools for bent pieces similar to the ones submitted. Using a comparison microscope, the resulting toolmarks were compared to those shown on bent fragments Items 3, Item 4 and Item 5. The conclusions are as follows: Toolmarks and micromarks found on Item 4 (blue painted bent fragment of aluminium) fully match the test marks produced at the lab using Item 1 (pliers found on Greg's toolbox). From these results it can be inferred that Item 1 tool was used to cut the bent fragment of aluminium Item 4. Toolmarks[sic] and micromarks produced by Item 1 tool at the lab are NOT related to the bent fragment of aluminium Item 3. Toolmarks and micromarks produced by Item 1 have similar characteristics to those shown by Item 5. However, the analysis results were not conclusive for a positive identification. Toolmarks and micromarks produced by Item 2 are NOT related to any bent fragment submitted (Item 3, Item 4 and Item 5).
5RBET4	The cut areas of aluminum fragments (items 3, 4, & 5) bear insufficient microscopic marks to permit identification to the items 1 or 2 pliers.
5Y8ML3	Item 3 was eliminated as having been cut by Items 1 and 2. Item 4 was identified as having been cut by Item 1. Item 5 was neither identified nor eliminated as having been cut by either Items 1 or 2. While all discernable class characteristics were the same, a lack of corresponding individual characteristics was observed.
671QF7	Identification: Based on the comparison of class and individual characteristics of test cut T-1c from Item #1 with cut ends of Items #4 and #5, the tool marks on the ends of Items #4 and #5 were produced by Item #1. Elimination: Based on the comparison of class characteristics of test cuts from Items #1 and #2 with cut end of Item #3, the tool marks on the end of Item #3 were not produced by Item #1 nor Item #2. Elimination: Based on the comparison of class and with disagreement of individual characteristics of test cut T-2 from Item #2 with cut ends of Items #4 and #5, the tool marks on the ends of Items #4 and #5 were not produced by Item #2.
69PPMV	As a result of our comparative macroscopic examination it is certain that the toolmarks present on the aluminium fragments Item 4 and Item 5 have been produced by the pliers Item 1. The pliers Item 2 have been excluded to have produced the toolmarks present on the aluminium fragments Item 4 and Item 5. Both pliers Item 1 and Item 2 have been excluded to have produced the toolmarks present on the aluminium fragment Item 3.
6AL7H5	Microscopic examination & comparison between test cuts produced by Exhibits 1 & 2 and cut ends of aluminum wire fragments indicates that based on significant correspondence of class and individual characteristics both wires, Exhibits 4 and 5 were cut by pliers, Exhibit 1. Exhibit 3 was cut by a different tool.

TABLE 2

WebCode	Conclusions
6YUECT	Examination of the submitted evidence was conducted, and the findings are as follows: 1. Items #1 & 2 are wire cutters made by "Doit" manufacturing. 2. Items #3, 4, & 5 are pieces of aluminum each bearing an area that appears to have been cut by a shearing action. 3. Item #4 was cut by item #1. 4. Cannot eliminate item #1 or item #2 as having cut item #5. 5. Item #3 was eliminated as having been cut by either wire cutter submitted as items #1 & 2 based on class differences.
7DFF6B	The toolmark impressions on aluminum fragment Item #4 (blue paint) and Item #5 (red paint) were produced by questioned Item #1 ("Pliers from Greg's toolbox"). The toolmark impressions on aluminum fragment Item #3 (green paint) were not produced by questioned Item #1 ("Pliers from Greg's toolbox") or by questioned Item #2 ("Pliers from Matt's toolbox"), due to differences in class characteristics.
7K36S7	The cut areas observed on aluminum ties #4 and #5, Test #09-529, were microscopically examined and compared with test cuts made by the pliers submitted as item #1, Test #09-529. Numerous corresponding individual characteristics were observed. Therefore, it is my opinion that these aluminum ties #4 and #5, Test #09-529, were cut by the pliers submitted as item #1, Test #09-529. The cut area observed on aluminum tie #3, Test #09-529, was microscopically examined and compared with test cuts made by the pliers submitted as item #1 and #2, Test #09-529. It is my opinion that this cut was not made by either of these pliers.
7XS5J9	Examination revealed that the cut marks observed on Item #'s 4 and 5 originated from the dikes[sic] submitted in Item #1. Comparison of the cut marks observed on Item #3 could not be conclusively identified to either Item #1 or #2 due to Item #3 being poorly marked.
818UD6	Items 1 and 2 consist of two (2) pairs of diagonal cutting pliers, manufactured by Do-It Best Imports. Both items 1 and 2 produce a pinching tool action. Item 3 consists of one (1) piece of aluminum. Examination of the cut end on Item 3 determined that the cut was produced by a sheering[sic] tool action, and was not produced by Item 1 or 2. Items 4 and 5 consist of two (2) pieces of aluminum. Examination of the cut ends on Item 4 and 5 determined that the cuts were produced by a pinching tool action. A microscopic comparison of the cut ends on Items 4 and 5 to test cuts produced by Item 1, determined there was sufficient agreement of individual characteristics to conclude that Item 1 produced the cuts to Items 4 and 5.
82YN43	First, the striations and indentations on item 3 is very different from the ones of the sample aluminum ties produced by item 1 and item 2. Second, the striations and indentations on item 4 is the same as the ones of the sample aluminum ties produced by item 1. Third, the striations and indentations on item 5 is the same as the ones of the sample aluminum ties produced by item 1 and is similar to the ones of the sample aluminum ties produced by item 2. But there is a little difference between the two.
884S71	The fragments item 4 and item 5 were cut by the pliers item 1. The fragment item 3 was not cut by either pliers item 1 or item 2.
8BS476	Toolmarks present on Item 4 were made by Item 1. Toolmarks present on Item 5 were made by Item 1. Toolmarks present on Item 3 were not made by Item 1 or Item 2.
8KVHNY	Exhibits 1 and 2 are "Do it" brand combination diagonal cutting pliers that employ a pinching type cutting action and bear toolmarks of value for comparison. Exhibit 3 contains an end that was cut by a shearing type tool and bears toolmarks of value for comparison. Due to a difference in class characteristics, Exhibits 1 and 2 were excluded as having cut Exhibit 3. Exhibits 4 and 5 contain ends that were cut by a pinching type tool(s) that left toolmarks of value for comparison. The cut ends of Exhibits 4 and 5 were identified as having been cut by Exhibit 1 based on the sufficient correspondence of individual characteristics.

TABLE 2

WebCode	Conclusions
8SEGLY	Each of the three fragments of aluminum recovered from the fence had an unpainted cut end. Each of the unpainted cut ends from "Item 4" and "Item 5" were examined and found to have a roughly circular cross section with a pinched line. The unpainted cut end from "Item 3" was found to be significantly different from the cut ends of "Item 4" and "Item 5" in terms of class characteristics. These three cut ends were compared with the test cuts made using the two pairs of pliers marked "Item 1" and "Item 2" and two pieces of aluminum fence ties. (a) The cut ends on "Item 4" and "Item 5" were found to bear similar class and individual characteristics as the test cuts made using the pair of pliers marked "Item 1", indicating that "Item 4" and "Item 5" had been cut using "Item 1". They were found to be different from the test cuts made using "Item 2", indicating that these items were not cut by "Item 2". (b) The cut end on "Item 3" was found to have different class characteristics from the test cuts made using "Item 1" and "Item 2", indicating that "Item 3" was not cut by these two pairs of pliers.
8YZB83	a. The angle (69°, 128°) of toolmark on the aluminum fragment (by Items 1) is different from the angle (80°) of toolmark on the aluminum fragment (Item 3). b. The angle (69°) of toolmark on the aluminum fragment (by Items 1) is similar to the angle (66°) of toolmark on the aluminum fragment (Items 4), and each toolmark has striations, similar shape. c. The angle (128°) of toolmark on the aluminum fragment (by Items 1) is similar to the angle (124°) of toolmark on the aluminum fragment (Item 5), and each toolmark has striations, similar shape. d. The angle (46°, 126°) of toolmark on the aluminum fragment (by Items 2) is different from the angle (80°) of toolmark on the aluminum fragment (Item 3). e. The angle (46°, 126°) of toolmark on the aluminum fragment (by Items 2) is different from the angle (66°) of toolmark on the aluminum fragment (Item 4). f. The angle (126°) of toolmark on the aluminum fragment (by Items 2) is similar to the angle (124°) of toolmark on the aluminum fragment (Item 5), but each toolmark has not similar shape.[sic]
99VMEP	The marks on Item no 5 were produced by Item no 1. The marks on Items 3 and 4 were not produced by Items 1 and 2.
9AFNNR	1. Examination of Exhibits 1 and 2 (Cutters) disclosed that they are 6½ - inch long diagonal cutters. Tests were made in lead using Exhibits 1 and 2. 2. Examination of Exhibit 3 (Piece of wire) disclosed toolmark damage consistent with being made by a shearing type cutter. Microscopic comparison disclosed Exhibits 1 and 2 did not make the questioned toolmarks on Exhibit 3. 3. Examination of Exhibits 4 and 5 (Pieces of wire) disclosed toolmark damage consistent with being made by a[sic] opposed blade cutter, such as a diagonal cutter. Microscopic comparison disclosed that Exhibit 1 cut Exhibits 4 and 5.
9XKHE1	Exhibits 1 and 2 are "DOit" brand, 6½" diagonal cutters. Exhibit 3 has one end cut with a shearing type tool. Exhibits 4 and 5 have a cut and [sic] consistent with being cut with an opposing jaw tool. Based on a disagreement of class characteristics, Exhibit 3 was not cut with Exhibit 1 or 2. Three test cuts were made into soft lead wire using Exhibit 1. The test cuts were retained and labeled "1-TM". A microscopic comparison was made of the test cuts obtained from Exhibit 1 and the cut ends of Exhibits 4 and 5. Based on agreement of class characteristics and sufficient agreement of individual characteristics, Exhibits 4 and 5 were cut using Exhibit 1.
AA756D	The questioned toolmarks on Item #3 (aluminum wire with green paint) were eliminated as having been produced by Item #1 or Item #2. The questioned toolmarks on Item #4 (aluminum wire with blue paint) were positively identified as having been produced by Item #1 (diagonal cutting pliers). The questioned toolmarks on Item #5 (aluminum wire with red paint) were positively identified as having been produced by Item #1 (diagonal cutting pliers).
BBJ7FJ	A comparative microscopic examination between the exhibit sections of cut wire (Item 3, Item

TABLE 2

WebCode	Conclusions
	4 and Item 5), and the test cuts made using the exhibit side-cutters (Item 1 and Item 2), revealed the following: The exhibit sections of cut wire (Item 4 and Item 5) had been cut with the exhibit side-cutters (Item 1). The exhibit section of cut wire (Item 3) had not been cut with either exhibit side-cutters (Item 1 and Item 2).
BD8JFP	The cut on item 3 wire was microscopically compared to test cuts made using the item 1 pliers and item 2 pliers. It was determined that the cut on item 3 wire WAS NOT made by item 1 pliers or item 2 pliers. The cuts on item 4 and item 5 wires were microscopically compared to test cuts made using the item 1 pliers and item 2 pliers. It was determined that the cuts on item 4 and item 5 wires WERE made by the item 1 pliers.
BJWC49	Diagonal cutting pliers 1 produced the toolmarks on the aluminum wire 4 and the aluminum wire 5. The toolmarks on aluminum wire 3 were not produced by the diagonal cutting pliers 1 or 2.
BQGMJT	After comparison microscopic examination it is found that: (A) Pliers recovered from Greg's tool box Item No. 1 is used to cut Item No. 5 (straight fragment of aluminium recovered attached to bottom of fence post at scene (red paint)). (B) Pliers recovered from Matt's tool box Item No. 2 (yellow electrical tape on handle) is used to cut Item No. 4 bent fragment of aluminium recovered attached to bottom of fence link at scene (blue paint).
C7XWSD	The three cut pieces of aluminum fence ties submitted in Items 3, 4, and 5 were microscopically compared to test toolmarks produced with the diagonal cutting pliers submitted as Items 1 and 2 with the following results. Item 3 was not cut by Item 1 or Item 2. Item 3 was eliminated from both pairs of diagonal cutting pliers based on differences in class characteristics. Item 4 was determined to have been cut by the diagonal cutting pliers from Item 1. Item 5 was determined to have been cut by the diagonal cutting pliers from Item 1.
C9M8RJ	(1) Item #1D and #1E were cut by item #1A (pliers from Greg's toolbox). Item #1C, could not be identified or eliminated to item #1A. (2) Item #1C, could not be identified or eliminated to item #1B (pliers from Matt's toolbox). Items #1D and #1E were not cut using item #1B.
CFPTN8	On examination, I found that the toolmarks on the aluminium fragments (item 4 and 5) were produced by the suspects' pliers (item 1) while the toolmark on the aluminium fragment (item 3) was not produced by either the suspects' pliers (item 1) or suspects' pliers (item 2).
CY6UGP	The Item #4 and Item #5 fragments of aluminum were both cut by the Item #1 pliers. The Item #3 fragment of aluminum was not cut by either the Item #1 or Item #2 pliers. This is due to differences in class characteristics.
CYLP84	Test cuts were made with Items 1 and 2. The test cuts were compared microscopically with Items 3, 4, and 5. Items 4 and 5 and the test cuts from Item 1 have matching striations: Items 4 and 5 were cut with Item 1. Item 3 differs in class characteristics from Items 1 and 2, and was not cut by either tool.
D7BUD9	Items 1 and 2 are two "Do It Best Imports" brand 6 inch diagonal cutting pliers. Each was tested using the additional aluminum fence ties. Tests from Item 1 and 2 were microscopically compared to Items 3, 4 and 5 (aluminum fragments). Item 1 was identified as having been used to cut Items 4 and 5. Items 1 and 2 can be eliminated as having been used to cut Item 3.
DJ51H6	It is our opinion that the submitted aluminum fragments, Items 4 and 5 were cut by the submitted pliers Item 1. It is our opinion that the aluminum fragment Item 3 was not cut by the submitted pliers Items 1 and 2.
DPDYUD	The pliers recovered from Greg's toolbox, marked 'Item 1' was used to cut the fragments of

TABLE 2

WebCode	Conclusions
	aluminium marked 'Item 4' and 'Item 5'. The fragment of aluminium marked 'Item 3' was not cut by both pliers marked 'Item 1' and 'Item 2'.
DSH6GH	The toolmark in question observed on item 3 was not made using the suspect tools, item 1 or item 2. The toolmark in question observed on item 4 and item 5 was made with the suspect tool, item 1. The toolmark in question observed on item 4 and item 5 was not made with the suspect tool, item 2.
E3X7MQ	Item 2, the tool, is eliminated from producing the cuts on items 3, 4 and 5. Item 1, the tool, is identified as producing the cuts on items 4 and 5. Item 1, the tool, is eliminated from producing the cuts on item 3.
E7T35Q	The tool in Items 1 and 2 could not be identified or excluded a[sic] having made the toolmarks on Item 3. The tool in Item 1 was identified as having made the toolmarks on Items 4 and 5.
EABSF9	Submitted suspects' pliers (Item 1 and Item 2) could not produce the toolmarks on the aluminum fragments (Item 3, 4 or 5).
EESKK2	[No Conclusions Reported.]
EGGQJ1	Examinations showed item 3 was not cut by item 1 or item 2 due to differences in class characteristics. Examinations showed item 4 and item 5 were cut by item 1. Examinations showed item 4 and item 5 were not cut by item 2.
ER4SHM	Identification: Based on the comparison of class & individual characteristics on item 4 tool marks with test tool marks from item 1, tool marks on item 4 were made by diagonal pliers item 1. Identification: Based on the comparison of class & individual characteristics on item 5 tool marks with test tool marks from item 1, tool marks on item 5 were made by diagonal pliers item 1. Elimination: Based on the comparison of class characteristics of item 3 offset cut tool mark with both opposed blade test cut tool marks from items 1 & 2, tool mark item 3 was not made by either diagonal pliers items 1 or 2. Elimination: Based on the comparison of class & individual characteristics of items 4 & 5 tool marks with test tool marks from item 2, items 4 & 5 tool marks were not made by diagonal pliers item 2.
F4L7W6	Test cuts were made using the wire cutters marked Item 1 and Item 2 and these test cuts were microscopically compared to the submitted aluminum fragments with the following results: Item 4 and Item 5 were cut by the wire cutters marked Item 1. Item 3 was not cut by either of the submitted wire cutters.
FLPBCA	The pieces of cut wire submitted as items #4 and #5 were both identified as having been cut by "Do It" pliers submitted as item #1. The piece of cut wire submitted as item #3 exhibits different class characteristics than either set of pliers and is eliminated as having been cut by item #1 or item #2.
FRZQAU	The aluminum tie, item 4 had been cut using the pliers, item 1. The aluminum tie, item 3 was not cut by either of the submitted pliers. The aluminum tie, item 5 had been cut by a tool similar to the pliers items 1 and 2.
FTN29Z	Microscopic comparison of tool Items 1 and 2 against evidence cut aluminum wire, Items 3, 4 and 5 has revealed the following: Items 4 and 5 were cut with Item 1. Item 3 was not cut with Items 1 or 2 due to different class characteristics.
FXLJNE	Items #1D & 1E (#4 & #5) were cut by item #1A (#1). Items #1A & 1B (#1 & #2) were eliminated as having made the cut on item #1C (#3).
G44GJ6	I conducted a comparative microscopic examination between tests cuts made with the two sets of pliers (Items 1 and 2) and the cuts on the three pieces of aluminium wire (Items 3, 4

TABLE 2

WebCode	Conclusions
	and 5). This revealed the following: Item 3 can be eliminated as having been made by either set of pliers. The class characteristics of the cut are dissimilar to test cuts made using both sets of pliers in a similar medium. Item 4 was identified as having been caused by Item 1; a clear correspondence of individual characteristics was found on both sides of the cut on Item 4. The cut in Item 4 was made approximately one third of the length of the blades from the base (hinged end), by the top surfaces. The examination of Item 5 was inconclusive; it can neither be eliminated nor identified as having been caused by either set of pliers. The class characteristics of the cut are similar to test cuts made by the bottom surfaces of both sets of blades, however the poor quality and minimal quantity of striated information available for examination prevents a more definitive conclusion being achieved.
G9QXS4	I found that the characteristic marks produced by pliers Item 1 to be similar to the characteristic marks on Item 4 and Item 5, but dissimilar to the characteristics marks on Item 3. I found that the characteristic marks produced by pliers Item 2 to be dissimilar to the characteristic marks on Item 3, Item 4 and Item 5.
GE2LQF	Item 3 was not cut neither of the pliers.[sic] Item 4 was cut by item 1 (pliers from Greg's toolbox). Item 5 was cut by item 2 (pliers from Matt's toolbox).
GFCNEZ	In my opinion: 1. The tool mark evidence provides conclusive support for the proposition that Item 1, the pliers from Greg's toolbox, WERE used to cut Items 4 and 5, fragments of aluminium recovered from the scene. 2. The tool mark evidence provides conclusive support for the proposition that Items 1 and 2, the pliers from Greg's and Matt's mailboxes, WERE NOT used to cut Item 3, a fragment of aluminium recovered from the scene. In expressing the evidential significance of my findings I have used the following scale: Inconclusive, Limited, Moderate, Moderately strong, Strong, Very strong and Conclusive scientific support.
GT2KDC	The pliers Item 1 was used to cut the aluminum wires Item 3 & 4. It is unknown whether pliers Item 1 or Item 2 or non of both where used to cut the aluminum wire Item 5.[sic]
GVQWCH	I compared the individual and class characteristic markings on the pliers and aluminium fragments mentioned in Item 1 and Item 5 using a comparison microscope and found: The marks on the fragment mentioned in Item 3 were not produced by the pliers mentioned in Item 1 and Item 2. The marks on the fragments mentioned in Items 4 and 5 were produced by the pliers mentioned in Item 1.
H5UY2S	Exhibits 1 and 2 are Do it brand diagonal cut pliers. They have opposing cutting blades on the same plane. Trace metal was observed on the blades of Exhibits 1 and 2 and were collected. Test cut marks were made on lead sheets with Exhibits 1 and 2, and designated 1-F-1 and 2-F-1, respectively. Exhibit 4 and 5 were microscopically compared with 1-F-1 and 2-F-1. Based on agreement of class characteristics and significant correspondence of individual characteristics, Exhibit 4 was cut by the front side of Exhibit 1. Based on agreement of class characteristics and significant correspondence of individual characteristics, Exhibit 5 was cut by the back side of Exhibit 1. Based on differences in class characteristics, Exhibit 3 was not cut by Exhibit 1 or Exhibit 2. Exhibit 3 was cut by a tool with opposing blades on adjacent planes such as scissors or snips.
H7HA1Y	Test cuts using Items 1 and 2 were compared microscopically with the cuts on Items 3, 4 and 5. The cuts on Items 4 and 5 were found to have matching striations with the test cuts of Item 1. This means Item 1 (Pliers from Greg's toolbox) made the cuts on Items 4 and 5 (aluminum fence ties). The cut on Item 3 was found to have different characteristics than the test cuts of Items 1 and 2. This means neither Item 1 nor Item 2 made the cut on Item 3.
HBWFRZ	The Aluminum fence fragment Item 3 was not cut by cutter Item 1 nor cutter Item 2. The bent Aluminum fence fragment Item 4 and Straight fence fragment Item 5 were cut by cutter Item

TABLE 2

WebCode	Conclusions
HKCJ2D	<p>1, but the bent Aluminum fence fragment Item 4 and Straight fence fragment Item 5 were not cut by cutter Item 2.</p> <p>Item #1: Test exemplars were obtained from the pliers, designated as sub-exhibits 1A to 1H and will be retained as evidence. Item #2: Test exemplars were obtained from the pliers, designated as sub-exhibits 2A to 2H and will be retained as evidence. Item #3: The tool mark was compared to the test exemplars from the pliers, Items #1 and #2. Differences in the class characteristics were observed to conclude that the tool mark was not made by either of the pliers. Item #4: The tool mark was compared to the test exemplars obtained from the pliers, Items #1 and #2. Sufficient corresponding individual signatures were observed to conclude that the tool mark was made by the pair of pliers, Item #1. Item #5: The tool mark was compared to the test exemplars obtained from the pliers, Items #1 and #2. Sufficient corresponding individual signatures were observed to conclude that the tool mark was made by the pair of pliers, Item #1.</p>
HLH9PV	<p>Exhibit 1 and 2 consist of two pairs of diagonally cutting pliers manufactured by "Do it Best". Exhibits 4 and 5 consist of two (2) pieces of aluminum fence ties. These Exhibits were microscopically examined for the presence of comparable toolmarks. Toolmarks of value were found and these marks were produced by a tool employing a pinching type action. A microscopic examination was conducted and there exists sufficient agreement of individual characteristics to conclude that Exhibits 4 and 5 were cut by the Exhibit 1 diagonally cutting pliers. Exhibit 3 is a piece of aluminum fence tie. This Exhibit was microscopically examined for the presence of comparable toolmarks. Toolmarks of value were found and these marks were produced by a tool employing a shearing type action. A microscopic examination was conducted and due to a difference in class characteristics Exhibit 3 was not cut by the Exhibit 1 or Exhibit 2 diagonally cutting pliers.</p>
HN6LN1	<p>Comparative examinations of toolmarks on Item 4 (piece of aluminum fence tie) and Item 5 (piece of aluminum fence tie) against test toolmarks made using Item 1 (diagonal cutting pliers) showed the presence of matching features. This means that Item 1 cut Item 4 and Item 5. Comparative examination of toolmarks on Item 3 (piece of aluminum fence tie) against test toolmarks made using Item 1 and Item 2 (diagonal cutting pliers) showed the presence of different features. This means that Items 1 and 2 can be eliminated as having made the cut on Item 3. I hereby certify that the above report is true and accurate and represents my opinions and interpretations.</p>
HPGNBK	<p>The tool in item 1 was identified as having made the toolmarks in item 4. The tools in items 1 and 2 could not be identified as having made the toolmarks in items 3 and 5; however, similar class characteristics indicate the tools in items 1 and 2 could have made the toolmarks in items 3 and 5.</p>
HRUXM6	<p>Test standards obtained from the items 1 and 2 pliers were compared to the toolmarks on the items 3, 4, and 5 wires with the following results: Due to a difference of class characteristics, the items 1 and 2 pliers were eliminated as having cut the item 3 wire. Agreements of class and individual characteristics confirmed the item 1 pliers had cut the items 4 and 5 wires.</p>
HUTBAV	<p>Exhibits 1 and 2 are two (2) pairs of diagonal cutting pliers, manufactured by Doit. The cut end of the Exhibit 3 aluminum wire fragment was microscopically examined for the presence of comparable tool marks. Due to the difference in class characteristics, toolmarks found on the cut end were not produced by the Exhibits 1 or 2 diagonal cutting pliers. Tools which produce toolmarks like those found on the Exhibit 3 wire include, but are not limited to, a tool employing a shearing type action such as a pair of scissors, aviation snips or pruning shears. The cut ends of the Exhibits 4 and 5 aluminum wire fragments were microscopically</p>

TABLE 2

WebCode	Conclusions
	examined for the presence of comparable toolmarks. Toolmarks found were microscopically examined and compared to the test cuts from the Exhibit 1 diagonal cutting pliers. There was agreement of all discernible class characteristics and sufficient agreement of individual characteristics to identify the Exhibits 4 and 5 wire fragments as having been cut by the Exhibit 1 diagonal cutting pliers. The Exhibit 2 diagonal cutting pliers have no value in this examination.
J26M3M	Exhibit #1 and Exhibit #2 are 'Do it' brand diagonal cutting pliers which employ a pinching type action. The Exhibit #3 wire contains a cut end which has toolmarks of value for comparison. The toolmarks examined were produced by a tool with a shearing action such as scissors or snips. The difference in class characteristics between the shearing marks on Exhibit #3 and the pinching actions of Exhibits #1 and #2 eliminate the two tools as having produced the toolmarks on Exhibit #3. The Exhibits #4 and #5 wires contain cut ends which have toolmarks of value for comparison. These toolmarks were produced by a tool(s) with a pinching action. Microscopic comparisons determined that sufficient agreement of individual characteristics exist to conclude that the toolmarks on Exhibit #4 and Exhibit #5 were produced by Exhibit #1.
J59CBN	It was determined utilizing comparison microscopic examination that the toolmarks detected on item 4 and item 5 were positively made by the item 1 tool. It was determined utilizing microscopic examination that the toolmark detected on item 3 was not made by the item 1 or item 2 tool.
JK31K1	Two of the cut aluminum wires (items 4, 5) were cut by the submitted pliers known as item 1. One of the cut aluminum wires (item 3) was not cut by either of the submitted pliers (items 1, 2).
JZXQDC	2.1 The tool mark evidence in question found on Item #4 was made with the suspect tool received under Item #1. 2.2 The tool mark evidence in question found on Item #3 and Item #5 were not made with the suspect tools received under Item #2 & Item #1.
K7SYEU	Items 1 and 2 consist of two pairs of diagonal cutting pliers manufactured by "Do it Best". Item 3 is one piece of aluminum chain link that was cut by a shearing action. Items 1 and 2 were eliminated based on a difference in class characteristics as having produced the cut on the end of Item 3. Items 4 and 5 consist of two pieces of aluminum chain link that were cut by a pinching action. Item 1 was identified based on a sufficient amount of agreement of individual characteristics as having produced the cuts on the ends of Items 4 and 5.
KC88ZD	In the opinion of this examiner, the aluminum wire submitted as Item 4 & the aluminum wire submitted as Item 5 were both cut by the pliers submitted as Item 1. In the opinion of this examiner, the aluminum wire submitted as Item 3 was not cut by the pliers submitted as Item 1 or the pliers submitted as Item 2.
KPV4VY	Microscopic examination and comparison of the toolmarks on Item 4 and Item 5 with test toolmarks produced by Item 1-pliers reveals sufficient evidence to conclude that the toolmarks on Item 4 and Item 5 were produced by Item 1-pliers. Microscopic examination and comparison of the toolmarks on Item 3 with test toolmarks produced by Item-1 pliers and Item-2 pliers reveals sufficient evidence to conclude that the toolmarks on Item 3 were not produced by Item-1 pliers or Item 2-pliers.
KR3FAE	Toolmarks on item 3 (one end painted green) were not made with the suspects' pliers (item 1 and 2). Toolmarks on item 4 (one end painted blue) were made with the suspect's (Greg's) pliers item 1. Toolmarks on item 5 (one end painted red) were made with the suspect's (Matt's) pliers item 2.
KZDHWF	Tools, like the submitted side cutters, have individual surface-features, due to their

TABLE 2

WebCode	Conclusions
	manufacturing process and use. These surface-features can be transferred onto objects that are worked with the tool. If a toolmark shows sufficient details that were caused by the corresponding individual structures of the tool, the tool can be identified to have caused the toolmark. Due to the individual features in the submitted toolmarks, it is proven that: The toolmark on Item 3 was not caused by the side cutters Item 1 and Item 2. These toolmarks were caused by a different tool. The toolmark on Item 4 was caused by the side cutter Item 1. The toolmark was not caused by the side cutter Item 2. The toolmark on Item 5 was not caused by side cutter Item 1. Due to insufficient details, side cutter Item 2 could not be identified nor excluded to have caused this toolmark.
L3FBGJ	The pliers in items 1 and 2 could not be identified or excluded as having made the toolmarks in items 3, 4, and 5. Microscopic examination of the toolmarks in items 3, 4, and 5 revealed insufficient individual characteristics for identification.
L9TJHL	Items 4 and 5 were microscopically examined with test cuts from Items 1 and 2 and based on sufficient individual microscopic marks, it was determined that Items 4 and 5 were cut by the Item 1 Diagonal side-wire cutters. Due to differences in class characteristics it was determined that Item 3 could not have been cut by Items 1 or 2.
LA8AKX	The tools referred to as Item 1 and item 2 were compared with aluminium cuts referred to as items 3, 4 and 5. Item 1 was found to show agreement with respect to class and individual characteristics with item 4 such that, in our opinion, item 1 was responsible for this cut. Item 1 was found to show agreement with respect to class and individual characteristics with item 5 such that, in our opinion, item 1 was responsible for this cut. Items 1 and 2 were found to be different from item 3, such that, in our opinion, they were not responsible for this cut.
LCGVGR	Test cuts were made for purposes of comparison of Items 1 and 2 using aluminum fence ties supplied. The submitted specimens marked Items 3, 4 and 5 were examined and identified as three (3) pieces of aluminum fragments that appear to have been cut by a tool with striated marks. Items 3, 4 and 5 were microscopically compared to the test cut pieces of aluminum by Items 1 and 2. As a result of microscopic examination it was concluded that Items 4 and 5 were identified as having been cut by the Item 1 pliers. However, Item 3 aluminum fragment was not cut by either Items 1 or 2.
LCWMJ3	On examination I found:- i) The characteristic fine striations on the cut sections of the bent fragment of aluminium recovered attached to bottom of fence link at scene, 'Item 4' and the straight fragment of aluminium recovered attached to bottom of fence post at scene, 'Item 5' to correlate with the characteristic fine striations produced by the pliers recovered from Greg's toolbox 'Item 1'. Hence I am of the opinion that the cut sections of 'Item 4' and 'Item 5' were produced by 'Item 1'. ii) The cut sections of the straight fragment of aluminium recovered attached to top of fence post at scene, 'Item 3' to be different to those produced by 'Item 1' and 'Item 2' in their shape. Hence, I am of the opinion that the cut section of 'Item 3' was not produced by either 'Item 1' nor 'Item 2'.
LE57FW	One of the submitted wire fragments (Item 3) was not cut by either of the submitted wire cutters (Item 1 & 2). Two of the submitted wire fragments (Item 4 & 5) were cut by the[sic] Greg's pair of wire cutters (Item 1).
LQ5TR2	Test toolmarks produced by Items #1 and #2 were microscopically examined in conjunction with those found on Items #3, #4 and #5. Based on these comparative examinations, it was determined that: A) The toolmarks present on Item #4 had been produced by Item #1. B) Item #5 bears similar shape and contour toolmarks as tests from both Item #1 and Item #2. However, there are insufficient individual characteristics present for a more conclusive finding. C) No markings were found to link Item #3 with Item #1 or Item #2.
M6STV6	Toolmarks on the Items 4 and 5 pieces of aluminum wire tie were identified as having been

TABLE 2

WebCode	Conclusions
	produced by the Item 1 wire cutter. Because of differences in the class characteristics, toolmarks on the Item 3 piece of aluminum wire tie could not have been produced by either the Item 1 or Item 2 wire cutter.
M8KYL5	The toolmarks present on the fragment of aluminum in item 3 were not made by either of the pliers in items 1 or 2. The toolmarks present on the two (2) fragments of aluminum in items 4 and 5 were determined to have been made by the pliers in item 1.
MF22W6	The cuts on Item #4 and Item #5 were made by the submitted pair of Do It® wire cutters, Item #1. Based on differences in class characteristics, the cut on Item #3 was not made by either pair of submitted wire cutters, Item #1 and Item #2.
MGWLML	Microscopic examination and comparison disclosed that the wires of Items 4 & 5 were cut by Item 1. The wire of Item 3 was not cut by Item 1 or Item 2.
MJZJVT	Microscopic comparison examinations of evidence aluminum fence ties Items 3, 4 and 5 with test cuts from evidence pliers Items 1 and 2 revealed: Item 4 and Item 5 were cut with Item 1. Item 3 was not cut with Item 1 or 2. The class characteristics of the tool used to cut Item 3 is different than those of Items 1 and 2.
MLRNFC	Items #4 & #5 were cut by Item #1. Item #3 was not cut by either Item #1 or #2.
MM1P8D	The wire cutters in item 1 could not be identified or excluded as having made the toolmark in item 3. The wire cutters in item 2 could not be identified or excluded as having made the toolmark in item 3. The wire cutters in item 1 were identified as having made the toolmark in items 4 and 5. The wire cutters in item 2 were excluded as having made the toolmark in items 4 and 5.
MQ7W4C	Wires Item 4 and 5 were both cut by pliers Item 1. Items 1 and 2 are excluded as having cut wire Item 3.
NVXJL4	The cuts on two of the pieces of aluminum (items 4 and 5) from the fence at the scene were identified as having been made by the diagonal cutters (item 1) from Greg's tool box. The cut on the piece of aluminum (item 3) from the fence post at the scene was eliminated as having been made by either of the submitted diagonal cutters (items 1 and 2).
PFQN9A	2.1 The toolmarks on Item No. 3 was not produced by Item No. 1 or Item No. 2. 2.2 The toolmarks on Items No. 4 and 5 were produced by Item No. 1.
PL4WKY	The toolmarks depicted in the aluminium fragment listed as item 3 had not been caused by the pliers listed as items 1 & 2. The toolmarks depicted in the aluminium fragments listed as items 4 & 5 had been caused by the pliers listed as item 1.
PP1C3T	Microscopic comparisons of evidence toolmark impressions Items 3, 4 and 5 with test toolmark impressions from K1 and K2 (Items 1 and 2). Diagonal cutters reveal that toolmark impressions Items 4 and 5 were created with K1 (Item 1) diagonal cutters. Toolmark impression Item 3 was not created with K1 or K2 (Items 1 or 2) due to differences in class characteristics present. Should another suspected tool be recovered for comparison to toolmark impression Item 3, submit in reference to the above #.
PRMT38	I compared the individual and class characteristic markings on the aluminum fragments and tests mentioned in Item 3 to Item 5 using a comparison microscope and found: The marks on the aluminum fragment mentioned in Item 5 were produced by the plier mentioned in Item 1. The marks on the aluminum fragment mentioned in Item 4 were produced by the plier mentioned in Item 2. It cannot be determined if the marks on the aluminum fragment mentioned in Item 3 were or were not produced by the plier mentioned in Item 2.
QB9HC1	The toolmarks present on the aluminum fragment, Item 3, were not produced by either of the

TABLE 2

WebCode	Conclusions
	suspects' pliers (Item 1 and 2). The toolmarks present on the aluminum fragments, Item 4 and 5, were produced by the pliers Item 1 (from Greg's toolbox).
QCPD1Y	My examination showed the side cutters (Item 1) caused the cut damage to the wire samples (Item 4) and (Item 5).
QPUQYK	Test marks of the two (2) "Do-it" brand side cutters (Items 1 and 2) were made to facilitate comparisons of the cutters with the three (3) pieces of aluminum wire (Items 3, 4 and 5). Based on similar class characteristics and significant correspondence of individual markings, two (2) pieces of aluminum wire (Items 4 and 5) were cut by the side cutters submitted as Exhibit 1. Based on significant differences in class characteristics, one (1) piece of aluminum wire (Item 3) was not cut by either of the two submitted side cutters (Items 1 and 2).
QPYG43	The suspect's pliers recovered from Greg's Toolbox, that is, item 1 was used to cut items 4 and 5 but not item 3. The suspect's pliers recovered from Matt's Toolbox, that is, item 2 was not used to cut any of the aluminum fragments, that is, items 3, 4 and 5.
QU6CWW	Standards were made using the "Do It" wire cutter type pliers marked #1 and compared to the striations appearing upon the the[sic] cut aluminum marked #4 and #5 with positive results. The striations appearing upon the cut aluminum marked #4 and #5 were caused by the blades of the "Do IT" wire cutter type pliers marked #1. Standards were made using the two "Do it" wire cutter type pliers marked #1 and #2 and compared to the striations appearing upon the cut aluminum marked #3 with negative results. The striations appearing upon the cut aluminum marked #3 were not caused by the baldes[sic] of the pliers marked #1 and #2.
R2Z17S	A microscopic comparison examination of test cuttings from Item 1 Gregs pliers and Item 2 Matts pliers against aluminum fragments Items 3, 4, and 5 has revealed the following: Item 3 (green) bears different class characteristics and was not cut with Item 1 or Item 2. Should a suspected tool be recovered please submit it in reference to this CC#. Item 4 (blue) was cut with Item 1 Gregs pliers. Item 5 (red) was cut with Item 1 Gregs pliers.
SPTBPX	Toolmarks present on the Item #4 fragment of Aluminum was identified as having been produced using the Item #1 pliers. Toolmarks present on the Item #5 fragment of Aluminum was identified as having been produced using the Item #1 pliers. Due to differences in class characteristics, the Item #1 pliers was eliminated as having made the toolmarks observed on the Item #3 fragment of Aluminum. Due to differences in class characteristics, the Item #2 pliers was eliminated as having made the toolmarks observed on the Item #3 fragment of Aluminum.
SYJVAH	On examination, I found i) The characteristic marks on Item 4 and 5 to match with the test cut marks made by the pliers recovered from Greg's toolbox (Item 1). ii) The characteristic marks on Item 3 could not be positively associated with the test cut marks made by the pliers recovered from Matt's toolbox (Item 2), due to a lack of sufficient corresponding individual microscopic marks. iii) The characteristic marks on Item 3 not to match with the test cut marks made by the pliers recovered from Greg's toolbox (Item 1). Therefore I am of the opinion that i) Item 4 and 5 were cut by pliers recovered from Greg's toolbox (Item 1). ii) Item 3 cannot be conclusively identified or eliminated from having been cut by pliers recovered from Matt's toolbox (Item 2).
T1KS6R	Visual and microscopic examination of the cut surfaces on Item 3 reveals that this item was not cut by either tool Item 1 or tool Item 2 based on class differences between test marks made with these tools and the cut surfaces of Item 3. Microscopic examination and comparison of the cut surfaces on Item 4 with test marks made with the tool, Item 1, reveals that Item 1 was used to cut Item 4. Microscopic examination and comparison of the cut surfaces on Item 5 with test marks made with the tools, Item 1 and Item 2, failed to reveal

TABLE 2

WebCode	Conclusions
	sufficient individual characteristics to determine if Item 5 was cut by either of these tools.
T39PLP	The Item 4 (piece of wire/rod) and Item 5 (piece of wire/rod) were identified as having been cut by the Item 1 (diagonal cutters). Nothing was found to indicate that the Item 3 (piece of wire/rod) was cut by Item 1 or Item 2 (diagonal cutters). Further examinations determined nothing was found to indicate that Item 3 (piece of wire/rod) was cut by the tool which cut the Item 4 or Item 5 (pieces of wire/rod). Item 3 (piece of wire/rod) exhibits toolmarks of value for comparison purposes. A pronounced anvil toolmark on one side of Item 3 would indicate it had been produced by a shearing type tool. However, it should be noted that a pinching type tool misused or with loose jaws can sometimes produce general class characteristics which would look like a shearing type toolmark.
T9CRQQ	Exhibit 1) A pair of Do it brand diagonal cutting pliers reportedly recovered from suspect's toolbox. Exhibit 2) A pair of Do it brand diagonal cutting pliers reportedly recovered from suspect's toolbox. Exhibit 3) A piece of aluminum wire approximately 2 inches in length reportedly recovered from the crime scene. Examination of the "cut end" of this wire revealed it to have been cut with a different class of tool unlike Exhibits 1 and 2. Exhibit 4) A piece of aluminum wire approximately 2 inches in length reportedly recovered from the crime scene. Examination, of the "cut end" of this wire, and comparison to test cuts made with Exhibits 1 and 2 were inconclusive. Exhibits 1 and 2 can not be eliminated as the source of the cut end on this exhibit. Exhibit 5) A piece of aluminum wire approximately 2 inches in length reportedly recovered from the crime scene. Examination, of the "cut end" of this wire, and comparison to test cuts made with Exhibits 1 and 2 were inconclusive. Exhibits 1 and 2 can not be eliminated as the source of the cut end on this exhibit.
TB13PV	Examination of Items 3, 4, and 5 revealed tool marks that had been produced by a double bladed cutting tool. Test cuts were produced with Item 1 ("Do it" brand, diagonal cutting pliers) and Item 2 ("Do it" brand, diagonal cutting pliers). The test cuts from Item 1 and Item 2 were microscopically examined in conjunction with the Aluminum fragments in Items 3, 4, and 5. Based on these comparative examinations, it was determined that: A. No marks could be found to link Item 3 to having been cut by Item 1 or Item 2. B. Item 4 had been cut by Item 1. C. Item 5 had been cut by Item 1.
TE1HTC	Test cuts were made with the submitted diagonal cutters (Exhibit 1) in lead wire obtained from laboratory reference materials. The tests were retained and labeled as Exhibit 1-TM. The tests were microscopically compared to each other and to the cut pieces of wire (Exhibit 4 and 5). Based on an agreement of class characteristics and sufficient agreement of individual characteristics, Exhibit 1 was used to cut Exhibit 4 and 5. Exhibit 2 was not used to cut any of the submitted wires (Exhibits 3, 4 or 5). The submitted wire (Exhibit 3) was cut with a shearing tool. Exhibit 1 and 2 are pinching tools. Based on a difference in class characteristics, Exhibit 3 was not cut by Exhibit 1 or 2.
TTNF3N	1. Examinations showed that the Item 4 and Item 5 wires had been cut by Item 1. 2. Examinations showed that the Item 4 and Item 5 wires had not been cut by Item 2. 3. Examinations showed that the Item 3 wire had not been cut by Item 1 or Item 2 due to difference in class characteristics.
TVCS3T	The cut aluminum tie in item 3 was not cut by either set of the two pliers (1,2). Elimination. The cut aluminum tie (4) was cut by the submitted pair of pliers in item 1. Match. The cut aluminum tie in item 5 was cut by the pair of pliers in item 1. Match.
TZLCMJ	Item #1 can not be eliminated - nor identified as having produced the cut/toolmark present on Item #4. However, Item #1 did not produce the toolmark present on Items #3 & 5. Item #2 can not be eliminated nor identified as having produced the cut/toolmark present on Item #5. However, Item #2 did not produce the toolmark present on Items #3 & 4.

TABLE 2

WebCode	Conclusions
U4KNT5	Item #3 demonstrates physical characteristics of a tool different than the suspect side cut pliers. One possible tool is a wire plier or other such tool with one flat jaw.
UN7G1S	The toolmarks present on items 4 and 5 were made with the submitted wire cutters labeled item 1. The toolmark present on item 3 was not made by either cutter based on differences in class characteristics.
UQHG4E	I visually and microscopically examined the two pair of pliers. I noted shiny metal deposits on Item 1 about ½ way up the blade. Item two had some apparent damage/use to the blade but no areas of shiny metal deposits were noted. I visually and microscopically examined the 3 pieces of cut wire. I made test marks with both pair of the pliers using the submitted wire and lead sheets. I microscopically compared the cut wires (Items 3, 4 and 5) to the test cuts using the pliers (Items 1 and 2). The wire submitted as Item 3 had a cut that differed from that made by the pliers submitted in Item 1 and Item 2. Neither pair of submitted pliers cut Item 3. I observed sufficient matching individual stria on both Items 4 and 5 with test cuts from Item 1 to identify Item 1 as the tool that cut both wires. The pliers, Item 1, cut the submitted pieces of wire, Items 4 and 5. Neither pair of submitted pliers cut the piece of wire submitted as Item 3.
VEUF8J	The toolmarks present on the cut edge of the wire, designated item 3, were NOT made by either of the tools listed as items 1 & 2. The toolmarks present on the cut edges of the wires, designated items 4 & 5, have been identified as having been made by the wire-cutting pliers listed as item 1.
VGHS7Q	The cut sections of wire, Items 4 and 5, were cut with the tool, Item 1. The cut section of wire, Item 3, was not cut with either of the submitted tools, Items 1 or 2.
VK5U53	The characteristic marks on the fragments of aluminium in Item 4 and Item 5 to correlate with those of the marks produced using the pliers recovered from Greg's toolbox (Item 1), but not with those using the pliers recovered from Matt's toolbox (Item 2). Whereas, the characteristics marks on the fragment of aluminium in Item 3 did not correlate with those of the test marks produced using both the pliers recovered from Greg's (Item 1) and Matt's toolbox (Item 2) respectively. I am of the opinion that the questioned fragments of aluminium in Item 4 and Item 5 were cut by using pliers recovered from Greg's toolbox (Item 1). I am also of the opinion that the questioned fragment of aluminium in Item 3 was not cut by using the pliers recovered from Greg's toolbox (Item 1) and Matt's toolbox (Item 2).
VWFCR5	The fragment in the item 3 (green) hasn't been cut with the pliers in the items 1 and 2. It can't be established if the fragments in the items 4 (blue) and 5 (red) has been cut with the pliers in the items 1 and 2. Obs. The fragment in the item 4 (blue) has striations which match with the side striations of the pliers in the item 1. Normally our laboratory won't give positive conclusions based only on side striations. The quality of the marks in the item 5 is worse than in the item 4.
VX62US	The bent fragment of aluminum in Item 4 was identified as having been cut by the diagonal pliers in Item 1. The straight fragment of aluminum in Item 5 was identified as having been cut by the diagonal pliers in Item 1. The straight fragment of aluminum in Item 3 could not be identified or excluded as having been cut by either the diagonal pliers in Item 1 or the diagonal pliers in Item 2.
VX62US	The markings produced on the test samples by the pliers, Item 1, were compared to the markings on the questioned samples Items 3, 4 and 5 using a comparison microscope[sic]. There is sufficient agreement of class and individual characteristic markings to conclude that the pliers, Item 1, had been used to cut the questioned samples, Items 4 and 5. There is sufficient disagreement of class characteristics to conclude that the pliers, Item 1 had not been used to cut the questioned sample, Item 3. The markings produced on the test samples

TABLE 2

WebCode	Conclusions
	by the pliers, Item 2, were compared to the markings on the questioned samples Items 3, 4 and 5 using a comparison microscope[sic]. There is agreement of class characteristic markings but sufficient disagreement of individual characteristic markings to conclude that the pliers, Item 2, had not been used to cut the questioned samples, Items 4 and 5. There is sufficient disagreement of class characteristics to conclude that the pliers, Item 2 had not been used to cut the questioned sample, Item 3.
W4ZT5Z	Item #3: The unpainted cut end of the wire was compared to test exemplars obtained from the pliers, Items #1 and #2. Differences in class characteristics were observed to eliminate both pliers as having made the cut in the wire. Item #4: The unpainted cut end of the bent wire was compared to test exemplars obtained from the pliers, Items #1 and #2. Sufficient corresponding individual signatures were observed to conclude that the cut in the wire was made with the pliers, Item #1. Item #5: The unpainted cut end of the wire was compared to test exemplars obtained from the pliers, Items #1 and #2. Sufficient corresponding individual signatures were observed to conclude that the cut in the wire was made with the pliers, Item #1.
W7DMNS	The tool marks observed on item 3 were produced with a tool of different class characteristics than the items 1 and 2 submitted pliers. The item 3 fragment was thus not cut with either item 1 or item 2. The tool marks observed on items 4 and 5 were compared to test markings produced with the item 1 pair of pliers, and were found to be consistent in class characteristics, with sufficient agreement of individual markings for identification. Items 4 and 5 were also found to be consistent in class characteristics with the item 2 pair of pliers, with no further consistencies observed. The item 4 and item 5 aluminum fragments were thus cut with the item 1 pliers.
W92YMY	The toolmarks on the aluminum fragments in Items 4 and 5 were produced by the pliers in Item 1. There was insufficient agreement of individual characteristics between the test toolmarks prepared with the pliers in Items 1 and 2 to those observed on the aluminum fragment in Item 3. Therefore, the pliers in Items 1 and 2 could not be positively included or excluded as having produced the toolmarks observed on the aluminum fragment in Item 3.
WAC1AH	Examinations showed that Items 4 and 5 were cut by Item 1. Examinations showed that Items 4 and 5 were not cut by Item 2. Examinations determined that, due to gross class differences, Item 3 was not cut by Items 1 or 2.
WBQAL4	A microscopic examination and comparison of the three (3) submitted pieces of cut aluminum fence ties to test cut pieces produced by the two (2) submitted tools, item #1 and item #2, revealed the following results: The submitted cutting pliers #1 did cut the submitted pieces of fence ties marked #4 and #5 (Two (2) different areas of the cutting surface). The submitted cutting pliers marked #2 did not cut any of the submitted fence ties. Item #3, the green tip fence tie was cut by another tool, not submitted.
WEVZZY	The pliers recovered from Greg's toolbox (Item 1) were used to cut the aluminum fragment from the bottom fence link at the scene (Item 4) and the aluminum fragment from the bottom of the fence post at the scene (Item 5). The aluminum fragment from top of the fence post at the scene (Item 3) was not cut by the pliers recovered from Greg's toolbox (Item 1) or the pliers recovered from Matt's toolbox (Item 2).
WFPP8T	The Item #4 and #5 Aluminum ties were identified as having been cut by the Item #1 pliers. Due to a difference in class characteristic, the Item #3 Aluminum Tie could not have been cut by either the Item #1 or #2 pliers.
WQAUZ5	Due to a difference in class characteristics, Item 3 was eliminated as having been cut by Item 1 and 2. Sufficient corresponding striated toolmarks were observed on Item 4 to determine that it was cut by Item 1. Insufficient toolmarks were exhibited on Item 5 and could neither

TABLE 2

WebCode	Conclusions
	be identified nor eliminated as having been cut by Items 1 or 2.
WTEL86	A. I have found a match between the toolmarks on two of the aluminum fragments (Items 4, 5) and the marks produced by the pliers from Greg's toolbox (Item 1). In my opinion, these pliers (Item 1) were used to make the toolmarks on these aluminum fragments (Items 4, 5). B. No match was found between the toolmarks on the third aluminum fragment (Item 3) and the marks produced by those pliers (Item 1). In my opinion, the pliers from Greg's toolbox (Item 1) did not leave the toolmarks on the third aluminum fragments (Item 3). C. No match was found between the toolmarks on all three aluminum fragments (Items 3, 4 and 5) and the marks made by the pliers from Matt's toolbox (Item 2). In my opinion, these pliers (Item 2) did not leave the toolmarks on the aluminum fragments (Items 3, 4 and 5).
XE44LF	The toolmarks present on the aluminum fragment in item 3 were determined not to have been made by either of the suspect's pliers in items 1 and 2. The toolmarks present on the aluminum fragments in items 4 and 5 were determined to have been made by the suspect's pliers in item 1.
XQMhMX	Item 3 wasn't cut off with Item 1 and Item 2. Item 3 was cut off with cable (wire) cutter or other similar tool. Item 4 and Item 5 were cut off with Item 1.
XX1Z6B	The fence ties in items 4 and 5 were determined to have been cut by the Do It brand diagonal wire cutters in item 1. The fence tie in item 3 was determined to have been cut by an offset blade cutting tool such as snips or scissors, but was eliminated as having been cut by the Do It brand diagonal wire cutters in items 1 and 2.
Y39J1P	An examination of item 3 revealed class characteristics typical of a single blade cutter which differs from the opposing blade cutters of items 1 and 2; therefore Items 1 and 2 are eliminated as possible sources. Item 4 was positively identified as a match to test cuts produced by item 1 (top sides of blades). Item 5 was positively identified as a match to test cuts produced by item 1 also (bottom side of blades).
YNAPEG	Examinations showed Items 4 and 5 were cut by Item 1. Examinations showed Items 4 and 5 were not cut by Item 2. Examinations showed Item 3 was not cut by Items 1 or 2 due to gross differences in class characteristics.
YNK7WU	Items #1 and #2 were used to make test cuts in flat and round laboratory stock lead for comparisons to Items #3, #4 and #5. Item #3 was not cut by Items #1 or #2. Item #4 was cut by Item #1. Item #5 could neither be identified nor eliminated as having been cut by Items #1 or #2.
YRE6SR	The Item 1 and 2 pliers, along with their respective test tool marks, were microscopically compared to the Item 3, 4, and 5 evidence tool marks. Comparison between the Item 3 tool mark and the Item 1 and 2 pliers revealed a difference of class characteristics. The Item 3 tool mark was not made by either of the Item 1 or 2 pliers. Items 4 and 5 were compared to the Item 1 pliers and its test tool marks, revealing class and individual characteristic correspondence. The Item 4 and 5 tool marks were made by the Item 1 pliers. Items 4 and 5 were compared to the Item 2 pliers and its test tool marks, revealing limited class characteristic similarity and a lack of individual characteristic correspondence. The Item 4 and 5 tool marks were not made by the Item 2 pliers.
YTMCDs	The DOIT wire cutters, Item #1 and #2, were examined. Test cuts were made into the supplied wire and microscopically compared to the submitted cut ends of the aluminum wire, Items #3-5. The cut on Item #3 exhibited different class characteristics to the tests cuts from the wire cutters and can be eliminated as having been cut by either of the DOIT wire cutters, Items #1 or #2. The cuts on Items #4 and #5 were both identified as having been cut by the DOIT wire cutters, Item #1.

TABLE 2

WebCode	Conclusions
Z2CGKY	The cut aluminum ties, Items 3, 4 and 5, were microscopically examined and compared with test toolmarks made with the pliers[sic] Items 1 and 2. Based on these comparisons, in my opinion, toolmark damage on the ties Items 4 and 5 was made with the pliers Item 1. Toolmark damage on the tie Item 3 is excluded as having been made by the pliers[sic] Item 1 or Item 2.
Z3L6SW	An examination of the pliers, Items 1 and 2, revealed each to have a small visible piece of silver colored material resembling metal stuck to one of the cutting edges. This material was photographed in place and then collected and retained. This trace evidence could be examined further, if needed. Test toolmarks were made in sheet lead with each pair of pliers. A microscopic comparison of the test toolmarks made with plier #1 and the questioned cut ends of wire lengths #4 and 5, both reported to have been recovered from the bottom of fence at scene, revealed a sufficient amount of agreement of individual toolmark detail to establish that these two questioned cut ends were cut with plier #1. The positive identification of this pair of standard diagonal cutting pliers (Item 1) is made to the practical, not absolute exclusion of all other tools. The reason why the identification is not absolute is because it will never be possible to examine all firearms or tools in the world, a prerequisite to making an absolute determination. But, the conclusion that "sufficient agreement" exists between two toolmarks (test and questioned) for an identification means that the likelihood another tool could have made the questioned toolmarks in this case is so remote as to be considered a practical impossibility. This conclusion of "practical impossibility" is based on extensive empirical research and validation studies by the Firearm and Toolmark Examination and Identification Community, as well as the cumulative results of casework examinations. Item 3, the wire tie reported to have been recovered from the top of fence post at scene, was determined not to have been cut by either of the submitted pliers. This cut wire end was cut by a tool having a shearing action. Both pairs of submitted pliers cut through a pinching action. The shape of the toolmarks resulting from these two types of actions is different, and can readily be distinguished from one another.
Z98KLA	K-1 (Item 1) cut Q-2 (Item 4) and Q-3 (Item 5). K-1 (Item 1) did not cut Q-1 (Item 3). K-2 (Item 2) did not cut Q-1 (Item 3), Q-2 (Item 4) or Q-3 (Item 5).
ZVQUPT	The Item 4 and Item 5 toolmarks were identified as having been produced by the Item 1 pair of diagonal cutters. Because of a difference in class characteristics, the questioned toolmarks noted on Item 3 could not have been produced by either the Item 1 or Item 2 pair of diagonal cutters. The toolmarks noted on the Item 3 aluminum wire were produced with a tool that produces a shearing type action. Test toolmarks produced by the Item 1 and Item 2 diagonal cutters are being returned with the evidence and should be maintained.
ZXD6PY	The Item 1.4 and 1.5 pieces of aluminum were identified as having been cut with the Item 1.1 pliers. Because of a difference in class characteristics, the Item 1.3 piece of aluminum could not have been cut with either set of pliers (Item 1.1 or 1.2).
ZYANJ8	Item 3 was not cut by either Item 1 or Item 2. Items 4 and 5 were cut by Item 1.

Additional Comments

TABLE 3

WebCode	Additional Comments
2NSLST	Items 1 and 2 are Doit brand double-bladed wire cutters, each with one upper and one lower blade. Both appeared to have been used. Duplicate test cuts were made with each tool using 1/8 inch diameter lead free solid wire. All of the test cuts showed beveling typical of double blade cutting tools. Microscopic comparison of the test cuts showed excellent reproducibility of striae within the respective sets. Item 3 is a piece of cut wire. The cut has a single bevel with a flat surface on the side of the wire at the cut tip. Such a cut suggests a single-blade cutting tool was used rather than a double-blade tool like items 1 and 2. Item 3 was compared microscopically to the test cuts from both tools. Different class characteristics (the beveling of the cuts) and no similar striae were found. Item 3 was not cut by either of the submitted wire cutters. Items 4 and 5 are pieces of cut wire. They both have beveled cuts similar to the test cuts from both wire cutters. Items 4 and 5 were compared microscopically to the test cuts from item 1. Excellent correspondence of striae on the cut surfaces was observed. The wire cutters in item 1 cut the wire pieces in items 4 and 5. The wire cutters in item 2, therefore, are excluded as having cut items 4 and 5.
3HBMQY	Toolmarks found on the cut ends of wires from Items 4 and 5 were identified as having been produced by Item #1 based on sufficient agreement of individual characteristics on striated/impressed toolmarks. Item 2 was only used to make one test due to Items 4 and 5 being identified as having been cut by Item 1. (Exclusion based on ID of Item 1 to Items 4 and 5.) Items #1 and #2 were excluded as having produced the toolmarks found on the wire from Item #3 based on disagreement of class characteristics.
3ZZZ4Q	We can send you our scale of conclusions on request.
4WAN4K	The toolmarks seen on item 3 displayed marks indicating that it was cut by a tool with a different cutting action to the action of the supplied pliers, items 1 and 2.
69PPMV	For[sic] comparison toolmarks have been produced in the lab using the pliers and a lead alloy. The questioned toolmarks have not been cast. The toolmarks produced in the lab and the questioned toolmarks (Item 4 and 5) have been examined using a comparative microscope.[sic] Both tools (pliers) have been excluded to have produced the toolmarks on Item 3 already during a pre-examination using stereo magnifying glasses.
8SEGLY	1. "Item 4" and "Item 5" were very likely to have been two fragments which were originally one single fragment. 2. The cutting edges of the two pairs of pliers marked "Item 1" and "Item 2" were examined and found to be approximately 2 cm in length. The surfaces of the cutting edges of "Item 1" and "Item 2" were found to be stained with aluminum over a distance of approximately 9 millimeters (mm) and 13 mm respectively. The cutting edges of "Item 1" were significantly stained with aluminum, compared to those in "Item 2".
C9M8RJ	Item #1A = #1 (Pliers from Greg's toolbox); Item #1B = #2 (Pliers from Matt's toolbox); Item #1C = #3 (Al wire); Item #1D = #4 (Al wire); Item #1E = #5 (Al wire)
DPDYUD	Class and individual characteristics on 'Item 3' indicated an elimination against[sic] 'Item 1' and 'Item 2'.
G44GJ6	This test was challenging due to the fact that the cut wire was only 2.6mm in diameter, whilst the cutting blades were 20mm in length. The small surface area of the wire therefore reduces the amount of striated information that can fit on the cut portion. Eliminating Item 3 was easy - the cut is very different in class. Identifying Item 4 was possible but it did take some time to find the matching area. Item 5 was close in class characteristics to the cuts made by the bottom surfaces of the blades in both sets of pliers. I tried numerous mediums to make test cuts but could find no correspondence of individual features in any of my tests. Item 5 was also difficult

TABLE 3

WebCode	Additional Comments
	to work with due to the fact that only a very small part of the cut surface had good quality striae of sufficient quantity and quality to compare (a fraction of one mm in width). Even if I was told that Item 1 or 2 was responsible, it is doubtful an identification could be achieved by anyone with certainty as there simply isn't sufficient quality striae available for consideration.
GT2KDC	One of the pliers you sent us had a wrong label. Both pliers where[sic] marked with the label Item 1. We hope that at least the yellow tape was wrapped around the right pliers.
KR3FAE	We have noticed that on the both pliers cut area was covered (when new) with black paint.[sic] At the end of cut area on both pliers was the paint off/damaged. And we have found small metal pieces on the end of cut area on both pliers.
M6STV6	Items 4 and 5 were cut from one wire tie.
MJZJVT	Item 3 has teeth type cutting marks. Items 1 and 2 have no teeth and cut from both sides.
MLRNFC	The identification of Item #4 to Item #1 was made using impressed and striated detail from the jaws labeled "C" and "D". The identification of Item #5 to Item #1 was made using impressed and striated detail from the jaws labeled "A" and "B". Differences in class characteristics eliminate Items #1 & #2 from being the tool that cut Item #3.
NVXL4	The tools are diagonal cutters, not pliers.
PFQN9A	3.1 Item No. 1 was used at this crime scene. 3.2 Item No. 2 cannot be linked at this crime scene.
QCPD1Y	The wire sample (Item 3) has cut damage of the type caused by a shear cutting tool.
QU6CWW	Plier #1 vs #4 and #5 Positive, Plier #1 vs #3 negative. Plier #2 vs #3, #4, #5 - negative.
R2Z17S	This test was way too time consuming especially for a busy lab.
VEUF8J	This report contains interpretations and opinions based on scientific data. Some samples may have been altered or consumed during testing or may deteriorate with time. To obtain information about sample availability for re-testing or additional testing please contact the writer of this report.
XX1Z6B	The "Scenario" and "Items Submitted" sections incorrectly indicated that items 1 and 2 contained pliers.
Y39J1P	Need the skills of a micro surgeon.
YNK7WU	Photographs taken during examination are being retained on a compact disc in the case file.
YRE6SR	Sub-class characteristics noted on the Item 1 pliers were useful in focusing the examination, as the Item 2 pliers did not display the same gross characteristics. The Item 3 exclusion was possible due to the very different tool mark noted. Item 3 appears to have been made by a cutting tool employing a shearing blade and an anvil component.
Z3L6SW	The working surfaces of cutting pliers, such as Items 1 and 2, often have toolmarks with high sub-class potential, because of how they are machined during manufacture. When potential sub-class features such as this are present, it is necessary to make toolmark identifications through the use of accidental features, such as breaks or gaps and metal tearing, that occur as machining produces prominent toolmarks. This is especially true when comparing impressions of striated toolmarks made by relatively new tools that have not acquired individuality through use, corrosion, etc. The toolmark identifications made in this case were made through the association of non-subclass toolmark features, as determined by the examiner. The basis of the toolmark identifications was recorded through a series of quality photomicrographs.
ZVQUPT	The correct terminology to identify Item 1 and Item 2 is "Diagonal Cutters".

Appendix: Data Sheet

Collaborative Testing Services - Forensic Testing Program

Test No. 09-529: Toolmarks Examination

DATA MUST BE RECEIVED BY January 11, 2010 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

Please Note: The Accreditation Release Section Has Moved

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

This participant's data is intended for submission to ASCLD/LAB and/or FQS-International. (Accreditation Release section on the last page must be completed and submitted.)

This participant's data is **NOT** intended for submission to ASCLD/LAB or FQS-International.

Scenario:

Police are investigating repeated thefts at a construction site. The site is surrounded by a chain link fence that is closed and locked at the end of the day. It was discovered that the aluminum ties used to connect the fencing to a post were cut off allowing the fencing to be moved aside to gain entry, but would hang in place unnoticed during the day. Two construction workers are suspected of the multiple break-ins; when they were arrested they were found to have matching toolkits provided to them by the company. The pliers from the toolkits were seized for examination. The investigating officer has recovered the remaining aluminum ties and has cut the questioned end off for submission. He painted the end he cut with metal paint. The investigator is requesting that you examine the cut sections and determine if any were cut by the submitted pliers.

Please note the following:

-Each Item is in a labeled envelope, it is suggested that when the Items are removed from their labeled envelopes, they be marked sufficiently using laboratory procedure.

- The end of the aluminum fence tie not for use in the examination has been dipped in paint, the colors are indicated next to their item description.

-Additional aluminum fence ties have been included in the sample pack for testing purposes.

Items Submitted:

Item 1: Pliers recovered from Greg's toolbox.

Item 2: Pliers recovered from Matt's toolbox.(yellow electrical tape on handle)

Item 3: Straight fragment of aluminum recovered attached to top of fence post at scene.(green paint)

Item 4: Bent fragment of aluminum recovered attached to bottom of fence link at scene.(blue paint)

Item 5: Straight fragment of aluminum recovered attached to bottom of fence post at scene.(red paint)

1.) Did either of the suspects' pliers (Items 1 or 2) produce the toolmarks on the aluminum fragments (Items 3, 4 or 5)?

	Item 1 (Pliers from Greg's toolbox)		
Item 3:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>
Item 4:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>
Item 5:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>

	Item 2 (Pliers from Matt's toolbox)		
Item 3:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>
Item 4:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>
Item 5:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Inc <input type="checkbox"/>

Please return all pages of this data sheet.

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RELEASE OF DATA TO ACCREDITATION BODIES

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **09-529: Toolmarks Examination**

This release page must be completed and received by **January 11, 2010** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

ASCLD/LAB RELEASE

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

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

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

Signature _____ Date _____

Laboratory Name _____

Location (City/State) _____

FQS-INTERNATIONAL RELEASE

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

FQS-International Certificate No. _____

Signature and Title: _____ Date _____

Laboratory Name _____

Location (City/State) _____

Accreditation Release

Return Instructions

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

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

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

Please return all pages of this data sheet.

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