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Interoffice Memo

DATE: September 21, 2017

PHONE: 909-387-9925

FROM: Kirk Garrison Crime Scene Specialist
Scientific Investigations Division

TO: Kim Shapiro Acting Supervising Crime Scene Specialist
Scientific Investigations Division

SUBJECT	Lumicyano Validation
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On September 13 through September 20, 2017, I tested Lumicyano for the development of latent prints, performed a comparative analysis between Lumicyano and Ardrex and tested the suitability of Lumicyano in sequential processing. Lumicyano is a powder and solution that is mixed together in specific amounts based upon the size of the fuming chamber being used. I was provided with a sample from the manufacturer for this study, but the product can be purchased from Tritech Forensics, Sirchie, Evident and Arrowhead Forensics. Lumicyano is a one-step method to develop fluorescent prints on non-porous surfaces, but has shown results developing prints on semi-porous surfaces as well.

An initial test was run to determine the amount of Lumicyano powder and solution needed per fuming cycle. Testing materials included an aluminum weighing tray, 30-06 and .223 fired cartridge cases and used nitrile gloves. I combined .01 grams of Lumicyano powder with 1.5 grams of Lumicyano solution. Fluorescent prints were developed on all of the testing materials. Photographs were taken to document the results.

Testing materials were produced by cutting out rectangles large enough for a depletion series of three prints. These rectangles were labeled and then cut in half to produce two samples with a depletion series of three half-prints. For glass, two microscope slides were placed side by side and a print was placed so half would be on each slide. One side of the testing material was treated with Lumicyano and the other side was treated with cyanoacrylate fuming and Ardrex.

The fired cartridge case testing samples were prepared by placing prints on the cartridge prior to loading and firing them. A Glock .40 pistol, Savage 30-06 bolt action rifle and Savage .223 bolt action rifle were used to create the fired cartridge cases.

The depletion series prints were created by swiping my right thumb across my forehead and then placing my thumb on each material three times.

Photos were taken with a DCS4 system with a Nikon D700 camera body and AF-S Micro Nikkor 105mm lens. Lumicyano fluorescence was observed using an alternate

light source between 470 and 515 nanometers through various shades of yellow, orange and red filters. Ardrex fluorescence was observed using an alternate light source between 405 and 445 nanometers and a yellow filter.

Testing materials included Staples duct tape, Staples packing tape, 3M Temflex 1700 vinyl electrical tape, Cherry Pepsi aluminum can, plastic cup, Styrofoam cup, wax paper cup, Starbucks sandwich wrapper, Stater Bros white plastic bag, black plastic bag, receipt paper, magazine paper, cardboard, Fisherbrand plain microscope slides, "N CCI R 40 S&W" fired cartridge cases, "P M C 270 WIN" fired cartridge cases, "R-P 30-06 SPRG" fired cartridge cases, untreated wood and a one dollar bill.

Lumicyano showed positive results on all items tested except the untreated wood and one dollar bill. The paper samples showed poor results with only two of the six samples showing any results. Two of the twelve rifle fired cartridge cases treated showed some results, one of which had very good detail. Fourteen of the twenty-two .40 fired cartridge cases showed some ridge detail. The remaining samples I was able to visualize some detail for all six sample prints and all three sample prints on the glass. The Lumicyano produced better results on the wax cup, nitrile glove, latex glove, magazine paper, sticky side of electrical tape, sticky side of packing tape, the rifle fired cartridge cases and the .40 fired cartridge cases. The remaining items had similar results.

After the fuming cycles I swabbed Lumicyano samples A (Cherry Pepsi can) and K (plastic cup) for touch DNA using the wet-dry method with water on one set of swabs and methanol on another set of swabs. The same process was repeated with Ardrex treated samples A and K. DNA swabs will be held until testing is available.

I made several observations after the initial fuming and swabbing. The Lumicyano created much more durable prints. Swabbing did not appear to affect the quality of the Lumicyano prints. Lumicyano treated items had significantly less background staining than Ardrex treated items. Lumicyano does start losing fluorescence on some items within twenty-four hours. A second cycle of Lumicyano brings back the fluorescence without adding background staining.

I then tested the ability of Lumicyano to fit in with a sequential method of processing. Lumicyano can be used prior to dusting and magna brushing. Some of the prints developed with these methods were lifted with fingerprint tape and placed on latent print cards. Lumicyano can also be used prior to Ardrex, without interfering with the fluorescence of Ardrex. Lumicyano can be used prior to Ninhydrin. I was able to develop all six of the sample prints on the paper samples using Ninhydrin. These results were photographed. Lumicyano can be used prior to 1, 2-Indanedione. I was able to develop all six sample prints on the receipt paper using 1, 2-Indanedione. These results were photographed. Lumicyano should not be used prior to Silver Nitrate or Wet Wop. I was not able to obtain any results on the cardboard or sticky side of any of the tape samples.

Notes, latent print cards, photographs and two DVDs containing latent print images are attached.

KG/kg

Lumicyano swab study results

Methods:

EZ1 extraction on dry swabs, quantitation

EZ1 extraction on wet swabs, combined samples with dry extracts, quantitation, DNA analysis

Results

Ardrox Can Sample A

~275pg total DNA

Full (24loci) single source male profile, no inhibition or degradation

Ardrox Methanol Can Sample A

~10pg total DNA

No DNA typing results

Lumicyano Can Sample A

~56pg total DNA

Low level, partial (15 loci) male profile, no inhibition or degradation

Lumicyano Methanol Can Sample A

~100pg total DNA

Low level, partial (18 loci) mixed profile, no inhibition or degradation

Ardrox Plastic Cup Sample K

~62pg total DNA

Low level, partial (17 loci) mixed profile, no inhibition or degradation

Ardrox Methanol Plastic Cup Sample K

~16pg total DNA

Very low level, partial (4 loci) mixed profile, too limited to assess inhibition and degradation

Lumicyano Plastic Cup Sample K

~143pg total DNA

Low level, partial (19 loci) male profile, no inhibition or degradation

Lumicyano Methanol Plastic Cup Sample K

~90pg total DNA

Low level, partial (11 loci) profile, no inhibition or degradation

Conclusions

All results are typical for touch DNA samples. The recovered quantity of DNA is as expected and all DNA results are consistent with the quantity. There does not appear to be any difference in results based on the chemicals used for processing.

Lumicyano™ Validation Proposal

Kirk Garrison

Description

Lumicyano™ is a one-step fuming and dyeing process for latent prints with a minimized risk of overdevelopment. Latent prints developed on items can be viewed immediately after fuming with an alternate light source and photographed. Traditional powders can still be used after photography to be lifted and placed on latent print cards. DNA sampling is also still possible just like it is for standard cyanoacrylate fuming.¹

Manufacturer User Instructions₁

Lumicyano is compatible with all standard fuming chambers, without modification, according the hotplate can reach 120°C / 250°F

1. Place the proper amount of Lumicyano Powder into a new foil dish then disperse the powder evenly to avoid clustering. It is possible to get chunks of Lumicyano Powder in the vial. This arises from its crystalline structure and potential traces of moisture entering the vial while using it or even during the bottling. You may just break these chunks with a clean and dry metallic spatula by scratching the powder. This phenomenon does not affect the efficiency of the product. Close immediately the vial after use to avoid any potential humidity absorption.
2. Add directly Lumicyano Solution (see further for recommended dosage) into the foil dish. Lumicyano Powder is dissolved instantly with the Lumicyano Solution. Gently move the liquid around the foil dish until you homogenize the mixture and it becomes an evenly mixed fluid.

IMPORTANT: Lumicyano Powder must be dissolved only with Lumicyano Solution

3. Place the prepared foil dish with its mixture onto the hotplate. Raise hygrometry until 70/80%. Higher hygrometry may lead to over gluing. Then raise gradually the hotplate temperature to reach 120 C/250°F. Fume completely the mixture until none remains left in the foil dish.

Recommendations:

- Windows of fuming chamber should be cleaned of old residues. Old cyanoacrylate residues will attract Lumicyano fluorescence.
- Hot plate must reach gradually 120°C/250°F. Slow heating up curve recommended (120°C in about 5-10mins)

- Humidity level range MUST be between 70% and 80% - 80% is the standard value recommended

The ideal concentration of the Lumicyano Powder into the Lumicyano Solution is about 5%. If needed, 8% concentration will give you stronger fluorescence.

If you don't have a scale that can weigh milligrams, you can dose the products as follows:

- **Lumicyano Powder: one full scoop (supplied) = 40 mg**
- **Lumicyano Solution: 33 drops = 1 gram**

Chamber capacity	Fuming Time	Quantity Lumicyano Powder	Quantity Lumicyano Solution
Small : 170 liters / 6 cub.ft (ex : F&F MVC 1000)	20 minutes	5% : 40 mg / 1 scoop 8% : 64 mg / 1.5 scoop	0.8 g 26 drops
Medium : 650 liters / 23 cub.ft (ex : F&F MVC 3000)	25 minutes	5% : 135 mg / 3.5 scoops 8% : 215 mg / 5.5 scoops	2.7 g 90 drops
Large : 2000 liters / 70 cub.ft (ex : F&F MVC 5000)	30 minutes	5% : 200 mg / 5 scoops 8% : 320 mg / 8 scoops	4 g 132 drops

In order to observe optimal brightness of the fluorescence, examination and photography are recommended to take place as soon as possible after the fuming cycle has been completed. Ideally, developed prints must be photographed within 24 hours.

Latent prints that have been developed must not be exposed to direct sunlight and/or high temperature environment for any long periods of time. If the developed prints are packaged in a reasonably light proof container in a fresh environment, the ridge details will still fluoresce for around 1 week following the fuming process. If required, the fluorescence can be refreshed at a later date without any loss of detail by refuming with Lumicyano.

To photograph the yellow fluorescent prints (560 nm), try the main different wavelengths and change the angle of the light source to achieve optimal results. Coloured band-pass filters are recommended to intensify the effect to obtain the best contrast.

Most of the Blue/Green (CYAN - 510nm) light sources with a good output and the appropriate clear orange goggles/camera filters are suitable with Lumicyano.

Optimal viewing sequence	Wavelength	Models/Recommended Color Options	Goggles & Filters	Notes
1	325nm	Labino SuperXenon Lumi (50W) Lumalco Superlight 400 Rofin Polilight PL400 / PL500	Deep "Yellow"	Avoid fluorescent background noise
2 Covers most casework	495nm 480nm	SPEX Crimescope F&Froeman 82/DCS4 Lumalco Superlight 400 Rofin Polilight PL400 / PL 500 Rofin Polilight Flare+2 Cyan Projectna Fagelab / SL450 « BLUE/GREEN »	Orange i.e.: Promaster YA2	Especially recommended for white/multicolour and/or highly reflective surfaces
3	515nm	SPEX Crimescope	Orange i.e.: Promaster YA2	
4	532nm	Coherent Tracer Laser « GREEN »	Deep Orange	

Manufacturer recommended storage and shelflife₁

Lumicyano Powder Shelf-Life: one year

Keep Lumicyano Powder out of the sunlight and store in a dark dry place, at ambient and constant temperature to prevent moisture building up inside of the bottle. Ideally store in a drying cabinet, it will last for about 1 year. Do not store in a fridge.

Out of date or badly stored Lumicyano Powder will turn to big **brownish** chunks. If you try to use Lumicyano Powder™ in this state, it may not mix properly with Lumicyano Solution™ by solidifying or forming small blocks. If so, it may generate residues in the foil dish and not fume properly.

Lumicyano Solution Shelf-life: one year

Keep Lumicyano Solution out of the sunlight and store in a dark dry place, at ambient and constant temperature. It is recommended to avoid moisture building up inside the bottle.

Lot number and expiration dates are indicated on each bottle.

Manufacturer health and safety issues₁

The evaporation process for Lumicyano™ is the same as for liquid super glue which is classified as an irritant product:

- Irritating to eyes, to respiratory system - Bonds skins and eyes in seconds - Keep out of reach of children - Do not breathe gas, fumes, vapor or spray
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
- Ensure good ventilation of working area - Store in a cool, dry and dark place -

When examining the evidence with a light source, we recommend that users wear protective goggles (EN 160 & EN 170) and gloves.

SDS sheets

Material Costs

Lumicyano™ requires the purchase of two components: a 5g bottle of Lumicyano™ powder and Lumicyano™ solution.

The Lumicyano™ powder comes in a 5g bottle at the cost of \$278.10. The Lumicyano™ solution comes in 10, 20g bottles at the cost of \$139.05. A kit that comes with the 5g bottle of Lumicyano™ powder and 100g of Lumicyano™ solution is priced at \$320.

Based on the purchase price of the kit, the size of our fuming chambers and the amount of Lumicyano™ powder per kit, the approximate cost of each run would be: \$4.70 for the small chambers, \$10 for the medium chamber and \$18.83 for the large chamber. The more items placed into a chamber, the lower the cost would be per item of evidence.

Validation Procedure

A depletion series of three latent prints will be placed on various substrates such as aluminum, plastic, glass (microscope slides) and papers. The series of prints will be cut in half so two sets of half latent prints will be produced. One half of the set will be processed with Lumicyano™ and the second half of the set will be processed with cyanoacrylate and Ardrex. An additional series of prints for each substrate will be created as described above to be used as a control for touch DNA purposes later. Photographs will be taken of each series after processing so the results can be compared.

After photographing the Lumicyano™ developed prints, one set for each substrate will be dusted with black latent print powder to determine if Lumicyano™ is still suitable for sequential processing. The powdered prints will be lifted and placed on white backed latent print cards. After powdering, the set of prints will be stained with Ardrex to determine Lumicyano™ suitability to additional dye staining.

Swabs will be taken of each set of developed prints to determine if any damage to DNA occurs during the processing of the prints. The sets of control prints will be swabbed and blank swabs will be obtained of all reagents used to aid in this determination.

References

1. <https://www.crimesciencetechnology.com/lumicyano-eng>

Lumicyano

Lumicyano™ is used in conjunction with a heat catalyst to produce fumes which will adhere to latent prints on evidence being processed. A cabinet or sealed chamber is used in maintaining the correct environment for developing latent prints, as well as protecting the operator from exposure to Lumicyano™ fumes.

This one-step fuming and dyeing process enables latent prints developed on items to be viewed immediately after fuming with an alternate light source and then photographed. Traditional powders can still be used after photography as with standard cyanoacrylate ester fuming. DNA sampling is also still possible, just like it is for standard cyanoacrylate fuming.

SAFETY

Lumicyano™ is non-toxic and is not known to be carcinogenic. Lumicyano™ fumes are an aggressive irritant, to which eyes and respiratory system are particularly sensitive. At the high vapor concentration encountered in a fuming enclosure, the vapor can also be an irritant to the skin. Lumicyano™ is a strong adhesive and will bond the skin. Care should be taken to avoid contact with the skin. Proper PPE should be worn.

The Lumicyano™ process may also be used in larger open areas and care should be taken when conducting this procedure. When a large area (i.e. Interior of a car, etc.) is processed, always ensure that the area is tightly sealed. Once fuming of these areas is complete, allow the area to air out for a period of time before further processing is conducted.

Use the proper personal protective equipment (PPE) and ultraviolet protection goggles when working with long-wavelength ultraviolet light sources. As with any chemical, it may cause some irritation when in contact with the eyes or skin and may be harmful if inhaled or ingested.

EQUIPMENT, SUPPLIES AND REAGENTS

1. Lumicyano powder
2. Lumicyano Solution
3. Water
4. Digital scale
5. Fuming chamber (commercial chamber, tank, plastic sheeting)
6. Humidifier (or beaker with hot water)
7. Disposable aluminum foil dish
8. Heating element
9. Alternate light source
10. Orange or yellow goggles
11. Digital camera and filters

WORKING SOLUTION

See table below for appropriate solution for size of fuming chamber

Chamber Capacity	Fuming Time	Quantity Lumicyano Powder	Quantity Lumicyano Solution
Small (6 cub. ft.)	20 min	5%: 40 mg / 1 scoop 8%: 64 mg / 1.5 scoops	0.8g / 26 drops
Medium (23 cub. ft.)	25 min	5%: 135 mg / 3.5 scoops 8%: 215 mg / 5.5 scoops	2.7g / 90 drops
Large (70 cub. ft.)	30 min	5%: 200 mg / 5 scoops 8%: 320 mg / 8 scoops	4g / 132 drops

**5% solution is the standard, if more fluorescence is needed, the 8% solution can be prepared*

Lumicyano Powder Shelf-Life: one year

Keep Lumicyano Powder out of the sunlight and store in a dark dry place, at ambient and constant temperature to prevent moisture building up inside of the bottle. Ideally store in a drying cabinet, it will last for about 1 year. Do not store in a fridge.

Out of date or badly stored Lumicyano Powder will turn to big brownish chunks. If you try to use Lumicyano Powder™ in this state, it may not mix properly with Lumicyano Solution™ by solidifying or forming small blocks. If so, it may generate residues in the foil dish and not fume properly.

Lumicyano Solution Shelf-life: one year

Keep Lumicyano Solution out of the sunlight and store in a dark dry place, at ambient and constant temperature. It is recommended to avoid moisture building up inside the bottle.

PROCEDURES

- 1.) Place or suspend the items to be treated into the superglue fuming chamber. Distribute items carefully so that they do not touch each other or the cabinet walls. Allow sufficient room for air to circulate all around the items. Do not obstruct the air flow around the filter unit. Always process with Lumicyano™ in a well-ventilated area, fume hood, or superglue chamber. Place a test print inside the processing chamber with the evidence.
- 2.) Place the proper amount of Lumicyano Powder into a new foil dish (see table under the working solution section) then disperse the powder evenly to avoid clustering. Add the Lumicyano Solution directly (see table under the working solution section) into the foil dish. Gently move the liquid around the foil dish until you homogenize the mixture and it becomes an evenly mixed fluid. Place the dish on the heating element. Place a beaker of hot water into the fuming chamber (or be sure the humidifier inside the fuming chamber has sufficient water in it) with the evidence and the Lumicyano™. Close the vial immediately after use to avoid any potential humidity absorption.
- 3.) Switch on the heating element (or turn on the fuming chamber). The settings for the chamber should be a humidity of 70-80%. The heating element should be set to reach a temperature of 120°C. Fume completely until none of the mixture remains left in the foil dish (see table under the working solution section for recommended times).

4.) Observe the test print development. The examiner can watch the evidence develop as well, however, since it is possible for evidence to have no prints on it, it is more reliable to watch a known (test) print develop. When the test print the examiner placed in the fuming chamber is easily observed (usually the ridges are white with superglue deposits), the processing is complete. Depending on heat and humidity in the fuming chamber this process can take anywhere from a few minutes to an hour.

5.) Vent the fuming chamber. Open the tank lid and close the fume hood, or wait for the ventilation cycle of the fuming chamber to be complete.

6.) At this point the latent prints are “fixed” on the article. The article can now be photographed then powdered with minimal damage to the original print.

7.) Visualize latent prints using the appropriate wavelength and goggles or filters by referencing the following table:

Wavelength	Goggle/Filter
325nm	Deep yellow
480nm	Orange
495nm	Orange
515nm	Orange
532nm	Deep Orange

NOTE: Lumicyano™ is an easy way to obtain quality, durable prints. However, the process requires turning Lumicyano™ into invasive fumes that can ruin electrical components. If an item of evidence is to be returned in working condition to the owner, it might be best to use an alternative method for processing.

Lumicyano™ will work in any size chamber. PVC pipe and plastic sheeting can often be combined to create any size chamber required for odd sized objects such as bicycles, large tarps and cars.

Superglue can work inside a closed vehicle and inside sealed rooms of houses. The examiner needs to adjust the amount of Lumicyano™ and humidity for the size of the fuming chamber.

NOTE: When using the Lumicyano™ processing method it is necessary to make, and develop, a test print using a known fingerprint to ensure the quality of the Lumicyano™ that you are using. The test print should be placed on a similar or like surface as the item being processed. This same test print should be used with any further processing techniques such as dye stains, etc. The results of this test print should be recorded in the technical processing notes.

NOTE: Windows of fuming chamber should be cleaned of old residues. Old cyanoacrylate residues will attract Lumicyano fluorescence.

NOTE: Humidity level range MUST be between 70% and 80% - 80% is the standard value recommended

NOTE: The ideal concentration of the Lumicyano Powder into the Lumicyano Solution is about 5%. If needed, 8% concentration will give you stronger fluorescence.

NOTE: In order to observe optimal brightness of the fluorescence, examination and photography are recommended to take place as soon as possible after the fuming cycle has been completed. Ideally, developed prints must be photographed within 24 hours.

NOTE: Latent prints that have been developed must not be exposed to direct sunlight and/or high temperature environment for any long periods of time. If the developed prints are packaged in a reasonably light proof container in a fresh environment, the ridge details will still fluoresce for around 1 week following the fuming process. If required, the fluorescence can be refreshed at a later date without any loss of detail by refuming with Lumicyano.

INTERPRETATION/REPORTING

- 1) **POSITIVE:** A positive result is indicated if prints are visualized
- 2) **NEGATIVE:** A negative result is indicated if prints are not visualized

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

*LC-LUMICYANO

ADDITIONAL NOTES

DR # LUMICYANO VALIDATION

LIMS #

	MATERIALS USED FOR TEST PRINTS INCLUDED:
	STAPLES DUCT TAPE
	STAPLES PACKING TAPE
	3M TEMFLEX 1700 VINYL ELECTRICAL TAPE
	CHERRY PEPSI CAN ALUMINUM CUP MARK
	PLASTIC CUP
	STYROFOAM CUP
	THE HABIT BURGER GRILL WAX PAPER CUP
	STARBUCKS SANDWICH WRAPPER
	STATER BROS WHITE PLASTIC BAG
	BLACK PLASTIC BAG
	RECEIPT PAPER
	MAGAZINE PAPER
	CARDBOARD
	FISHER BRAND PLAIN MICROSCOPE SLIDES
	"NCCI R 40 SBW" FIRED CARTRIDGE CASES
	"PMC 270 WIN" FCCS
	"R-P 30-06 SPRG" FCCS
	UNTREATED WOOD
	\$1 US CURRENCY
	CHEMICAL PROCESSES
	LC* - POWDER LOT # F010617 / WHITE WW - ID# P-0108
	SOLUTION LOT # 70029E / SN - ID# 16-0079
	ARD - ID# 17-0013
	METHANOL - ID# 16-0050
	N - ID# 16-0065
	IND - ID# 16-0078
	BLACK WW - ID# P-01051

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS: K. GARRISON F7709

Date 09/13/17 - 09/20/17

Page 1 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR # LUMICYANO VALIDATION

LIMS #

	MATERIALS WERE PRODUCED BY CUTTING
	OUT SQUARE ^{831417 RG} RECTANGLES LARGE ENOUGH
	FOR A SET OF THREE DEPLETION PRINTS.
	NON-POROUS ITEMS WERE WIPE DOWN WITH
	SANITARY WIPES TO ELIMINATE POTENTIAL FOR
	OTHER PRINTS CONTAMINATING THE SAMPLE PRINTS.
	ITEMS THAT WERE ABLE TO BE CUT IN HALF
	WERE, AND EACH SIDE LABELED.
	TWO MICROSCOPE SLIDES PLACED TOGETHER WERE
	USED FOR THE SAMPLE PRINTS ON GLASS, PULLING
	THEM ^{091417 RL} APART APART CUT THE PRINTS IN HALF.
	THE FCCs WERE PREPARED BY PLACING PRINTS
	ON THE CARTRIDGE PRIOR TO LOADING AND
	FIRING THEM. A SEMI-AUTOMATIC PISTOL AND
	TWO BOLT ACTION RIFLES WERE USED TO
	CREATE THE FCCs.
	PRINTS WERE CREATED BY "LOADING" UP MY
	RIGHT THUMB BY SWIPING IT ACROSS MY
	FOREHEAD AND THEN PLACING IT ON EACH
	SUBSTRATE THREE TIMES.
	PHOTOS WERE TAKEN W/ A DCS 4 SYSTEM W/ A
	NIKON D700 CAMERA BODY AND AF-S MICRO
	NIKKOR 105mm LENS.

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS K. GARRISON F7709

Date 09/13/17

Page 2 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR# LUMICYANO VALIDATION

LIMS #

AN INITIAL RUN WAS PERFORMED PRIOR TO SAMPLES
BEING TESTED TO CHECK IF MY CALCULATED AMOUNTS
OF MATERIALS AND FUME TIME WOULD BE APPROPRIATE
INITIAL AMOUNT OF MATERIALS USED FOR LUMICYANO
0.01g OF POWDER
1.5g OF SOLUTION
INITIAL ITEMS TESTED
30-06 AND .223 RIFLE FCCS
ALUMINUM TRAY
USED NITRILE GLOVES
15 MINUTE FUMING CYCLE

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS R. GARRISON F7709

Date 09/13/17

Page 3 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR # **LU MICYANO VALIDATION**

LIMS #

FILTER, WAVELENGTH, RESULTS

	LU MICYANO PHOTO (DCS 4, NIKON D700, AF-S MICRO NIKKOR)
	ALUMINUM - YELLOW AT 470nm, 6/6 VISIBLE ^{105mm LENS}
	PLASTIC ^{CUP} ORANGE AT 500nm, 6/6 VISIBLE _{NO DETAIL}
	WOOD - SLIGHT OUTLINE, NO DETAIL
	CARDBOARD - ORANGE AT 500nm, 6/6 VISIBLE
	ALUMINUM B ONLY - ORANGE/RED AT 470nm, PHOTO _{BT B1}
	WAX CUP - ORANGE/RED AT 500nm, 6/6 VISIBLE
	PAPER - ORANGE/RED AT 500nm, ONLY VISIBLE
	UNDER LONG EXPOSURE, ^{2/6} HAVE SOME DETAIL
	GLASS - ORANGE AT 470nm, 3/3 VISIBLE
	BLACK PLASTIC - CAN VISUALIZE W/ NO ALS 6/6
	NO FLUORESCENCE
	SANDWICH PAPER - ORANGE AT 500nm, 6/6 VISIBLE
	RECEIPT PAPER - ORANGE/RED AT 500nm, 6/6 VISIBLE
	STYROFOAM - 6/6 VISIBLE, BUT LITTLE DETAIL _{NO DETAIL}
	WHITE PLASTIC ^{PLG} ORANGE AT 500nm, 6/6 VISIBLE _{NO DETAIL}
	MAGAZINE PAPER - CAN SEE W/ LOW ANGLE LIGHT 6/6
	NO FLUORESCENCE
	LATEX GLOVE - NEGATIVE, CAN VISUALLY SEE
	SLIGHT DEPOSITION, NO DETAIL
	NITRILE GLOVE - NEGATIVE
	PACKING TAPE - ORANGE/RED AT 500nm, 6/6 VISIBLE _{NO DETAIL}
	STICKY SIDE NO FLUORESCENCE _{NO DETAIL}
	DUCT TAPE - STICKY SIDE NO FLUORESCENCE
	CAN SEE 6/6 UNDER WHITE LIGHT
	DEPOSITION
	NON-STICKY ORANGE @ 470nm, 6/6
	ELECTRICAL TAPE - STICKY NO FLUORESCENCE, 6/6 VISUAL DEPOSITION
	RIFLE FCC - ^{ONE GOOD DETAIL} ONE SLIGHT POSITIVE, LITTLE DETAIL 2/12 _{NO DETAIL}

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS **R. GARRISON F7709**

Date **09/13/17 - 09/14/17**

Page **4** of **9**

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR# *LUMICYANO VALIDATION*

FILTER, WAVELENGTHS, RESULTS

LIMS#

	RIFLE FCCS - CAN VISUALLY SEE DEPOSITION
	.40 FCCS - OBSERVE W/ ^{ORANGE} GOGGLES BETWEEN
	495nm AND 515nm, 14/22 W/ SOME DETAIL
	\$1 US CURRENCY - NEGATIVE
	FUMED SAMPLES A AND K WERE SWABBED
	USING THE WET DRY METHOD W/ WATER
	AND THEN W/ METHANOL FOR ITEMS PROCESSED
	W/ LUMICYANO AND ARDROX

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS *R. GARRISON F7709* Date *09/13/17 - 09/14/17* Page 5 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR # *LUMICYANO VALIDATION*

LIMS #

<i>09/19/17</i>	<i>— WAVELENGTH, FILTER, RESULTS</i>	<i>09/21/17</i>	<i>ALL</i>
<i>FUMING ITEMS THAT LACKED FLOURESCENCE</i>	<i>A SECOND</i>	<i>FUMED</i>	
<i>TIME TO SEE IF FLOURESCENCE CAN BE</i>			
<i>REGENERATED WITHOUT OVER-STAINING</i>			
<i>BLACK PLASTIC, 470nm + 500nm w/ ORANGE</i>		<i>6/6</i>	
<i>MAGAZINE PAPER, 470nm + 500nm w/ ORANGE/RED</i>		<i>6/6</i>	<i>LITTLE</i>
<i>LATEX GLOVE, 500nm w/ ORANGE/RED</i>		<i>6/6</i>	<i>GOOD DETAIL</i>
<i>NITRILE GLOVE, 470nm + 500nm w/ ORANGE</i>		<i>6/6</i>	
<i>TAPES</i>			
<i>RIFLE FCCS, 500nm w/ ORANGE, FLOURESCENCE RETURNED</i>			
<i>40 FCCS, 500nm w/ ORANGE, SAA, PHOTO OF 4 FCCS</i>			
<i>ELECTRICAL TAPE STICKY SIDE, 470nm + 500nm w/ ORANGE/RED</i>		<i>6/6</i>	
<i>ELECTRICAL TAPE NON-STICKY SIDE, SAA</i>			
<i>DUCT TAPE STICKY SIDE, SAA</i>			
<i>DUCT TAPE NON-STICKY SIDE, 470nm + 500nm w/ ORANGE</i>		<i>6/6</i>	
<i>PACKING TAPE STICKY SIDE, SAA</i>			
<i>PACKING TAPE NON-STICKY SIDE, SAA</i>			

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS *K. GARRISON F7709*

Date *09/19/17*

Page *6* of *9*

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

ADDITIONAL NOTES

DR # LUMICYANO VALIDATION

LIMS #

	ARDROX + CA TREATED - WAVELENGTH, FILTER, RESULTS
	ALUMINUM - 445nm w/ YELLOW, 6/6
	PLASTIC CUP - 445nm w/ YELLOW, 6/6
	GLASS - 445nm w/ YELLOW, 3/3
	WHITE PLASTIC BAG - 445nm w/ YELLOW, 6/6
	WAX CUP - 445nm w/ YELLOW, 4/6
	STYROFOAM - 445nm w/ YELLOW, 6/6
	NITRILE GLOVE - SAA, 3/6 LOW QUALITY
	LATEX GLOVE - NEGATIVE
	MAGAZINE PAPER - 445nm w/ YELLOW, 2/6 1 LOW QUALITY
	BLACK PLASTIC - 405nm w/ YELLOW, 6/6
	DUCT TAPE STICKY SIDE - 445nm w/ YELLOW, 6/6
	DUCT TAPE NON-STICKY SIDE - SAA 405nm w/ YELLOW, 6/6
	ELECTRICAL TAPE STICKY SIDE - SAA, 5/6
	1 LOW QUALITY
	ELECTRICAL TAPE NON-STICKY SIDE - 445nm w/ YELLOW, 6/6
	1 LOW QUALITY
	PACKING TAPE STICKY SIDE - NEGATIVE
	PACKING TAPE NON-STICKY SIDE - 445nm w/ YELLOW, 6/6
OBSERVE UNDER 365nm	RIFLE FCCs - NEGATIVE, LO BACKGROUND STAINING
	.40 FCCs - 7/22, 1 PHOTO ⁰⁹¹⁴¹⁷⁶ 445nm w/ YELLOW
	FUMED SAMPLES A AND R WERE SWABBED
	USING THE WET DRY METHOD W/ WATER
	AND THEN W/ METHANOL FOR ITEMS PROCESSED
	W/ LUMICYANO AND ARDROX

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CSS K. GARRISON F7709

Date 09/13/17 - 09/14/17

Page 7 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

*LC = LUMICYANO

ADDITIONAL NOTES

DR # LUMICYANO VALIDATION

LIMS #

SEQUENTIAL PROCESSING 09/19/17
ALUMINIUM - *LC, D, ARD PHOTO AT 405nm w/ YELLOW AND 445nm w/ ORANGE
LIFTED PRINTS
GLASS - SAA PHOTO AT ^{09/19/17} 405nm w/ YELLOW
LIFTED PRINTS
PLASTIC CUP - SAA
LIFTED PRINTS
PAPER - LC, N
PHOTOS 9/6
WAX CUP - LC, MB, ARD
LIFTED PRINTS
WHITE PLASTIC BAG - LC, MB
LIFTED PRINTS
SANDWICH PAPER - LC, N
LOW DETAIL
RECEIPT - LC, W/D
PHOTOS 6/6, 3 HAVE LOW DETAIL
CARDBOARD - LC, SN NO DETAIL, NEGATIVE
ELECTRICAL TAPE - LC, LC ^{09/19/17} WW, NEGATIVE
DUCT TAPE - LC, LC, WW, NEGATIVE
PACKING TAPE - LC, LC, WW, NEGATIVE

Note: The use of the word "blood" to describe stains/fluids is based upon visual examination and/or the results of preliminary screening tests. The actual presence of blood has not been confirmed by laboratory testing.

CSS R. GARRISON F7709

Date 09/19/17 - 09/20/17 Page 8 of 9

**SAN BERNARDINO COUNTY SHERIFF'S DEPARTMENT
SCIENTIFIC INVESTIGATIONS DIVISION**

**ADDITIONAL NOTES
OBSERVATIONS**

DR# LUMICYANO VALIDATION

LIMS #

- CAN STILL OBSERVE ~~FED~~ ^{9/11/17} FLUORESCENCE AFTER SWABBING SAMPLE A+K
 - K STILL HIGH QUALITY PRINT
 - ARDROX + CA TREATED SAW MORE DEGRADATION
- ARDROX + CA TREATED FCCs HAD SIGNIFICANT BACKGROUND STAINING
- OBSERVE A PINK DYING ON LIGHT COLORED ITEMS
- SECOND ROUND OF FUMING BROUGHT BACK FLOURESCENCE WITHOUT BACKGROUND STAINING
- DID LOSE FLOURESCENCE ON SOME ITEMS IN LESS THAN 24 HOURS
- DOES NOT APPEAR TO WORK W/ SN
- DOES NOT APPEAR TO WORK W/ ~~SN~~ ^{ORANGE} WW
- SOME TAN COLORED RESIDUE LEFT IN ALUMINUM TRAY AFTER FUMING CYCLE
 - SLIGHTLY MORE SOLUTION COULD BE NEEDED
- A 10 MINUTE FUMING CYCLE COULD BE LONG ENOUGH TO EVAPORATE ALL THE LC
- LUMICYANO PRODUCED BETTER RESULTS ON THE FOLLOWING:
 - WAX CUP, NITRILE GLOVE, LATEX GLOVE, MAGAZINE PAPER, STICKY SIDE OF ELECTRICAL TAPE, STICKY SIDE OF PACKING TAPE, ~~WAX~~ RIFLE FIRED CARTRIDGE CASES, .40 FIRED CARTRIDGE CASES
- LC APPEARS TO MAKE MORE DURABLE PRINTS

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CSS K. GARRISON F7709

Date 09/13/17 - 09/20/17

Page 9 of 9

<u>Material</u>	<u>Lumicyano Results First Cycle</u> <i>(visualized prints) of (total prints)</i>	<u>Lumicyano Second Cycle</u> <i>visualized prints / total prints</i>	<u>Ardrox Results</u> <i>visualized prints / total prints</i>
Aluminum can	6 of 6	N/A	6 of 6
Plastic cup	6 of 6	N/A	6 of 6
Wood	0 of 3	N/A	N/A
Cardboard	6 of 6	N/A	N/A
Wax cup	6 of 6	N/A	4 of 6
Paper	2 of 6	N/A	N/A
Glass	3 of 3	N/A	3 of 3
Black Plastic	6 of 6	6 of 6	6 of 6
Sandwich Paper	6 of 6	N/A	N/A
Receipt Paper	6 of 6	N/A	N/A
Styrofoam	6 of 6	N/A	6 of 6
White plastic	6 of 6	N/A	6 of 6
Magazine paper	6 of 6	6 of 6	2 of 6
Latex glove	0 of 6	6 of 6	0 of 6
Nitrile glove	0 of 6	6 of 6	3 of 6
Packing tape sticky side	0 of 6	6 of 6	0 of 6
Packing tape non-sticky side	6 of 6	6 of 6	6 of 6
Duct tape sticky side	6 of 6	6 of 6	6 of 6
Duct tape non-sticky side	6 of 6	6 of 6	6 of 6
Electrical tape sticky side	6 of 6	6 of 6	5 of 6
Electrical tape non-sticky side	6 of 6	6 of 6	6 of 6
Rifle fired cartridge cases	2 of 12	2 of 12	0 of 12
.40 fired cartridge cases	14 of 22	14 of 22	7 of 22
One dollar bill	0 of 6	N/A	N/A