



# Crime Scene



Winter 2017

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## *Editor's Message*

First, I would like to acknowledge and thank Jeff Jagmin for his many years of service in this capacity. I write many years because Jeff has continued to fill this position past a normal tenure. Jeff has done a wonderful job of creating a professional newsletter with good substance. Hopefully, I can continue this trend. To give you a brief bit about me; I started off as a dispatcher while I completed a bachelor's degree in chemistry. After I graduated, I worked as a ten print examiner for about a year before moving into forensics. I have been working in forensics for approximately eleven years. My main background is latent prints and some work in footwear/tire tread. I am currently a forensic lab manager for the Ada County Sheriff's Office in Idaho. I have had the privilege of working for both the Idaho State Police and the Oregon State Police. This work has given me a firsthand look at the skilled and knowledgeable scientists that we have in the northwest. I truly believe that this organization fosters a means to share insight with each other. I am excited to step into this position (hopefully for not as long as Jeff) in an attempt to continue collaboration and communication with all of the members of the NWAFS through this newsletter.

*Cheers—Natasha*

### *About the Newsletter...*

*Crime Scene* is the official publication of the Northwest Association of Forensic Scientists. It is published 4 times a year in the months of January, April, July, and October. The Newsletter welcomes submissions from its membership such as technical tips, case studies, literature compilations, workshop or training notifications, reference citations, commentary, historical accounts, and other topics of interest to the membership. The views expressed in articles contained in this publication do not necessarily represent the views of the Northwest Association of Forensic Scientists. The Association neither guarantees, warrants, nor endorses these views or techniques but offers these articles as information to the membership.

Please submit material for publication in Microsoft Word for Windows format as an e-mail attachment or on compact disk (CD). All technical material will be subject to peer review by NWAFS members. Requests for permission of any material contained in this newsletter may be addressed to the editor. Requests, or questions, of technical submissions will be directed to the originating author. For more information regarding the Newsletter contact:

**Natasha Wheatley (editor)**  
Ada County Sheriff's Office  
[nwheatley@adaweb.net](mailto:nwheatley@adaweb.net)

**NWAFS**  
**Crime Scene**  
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## 2016 - 2017 NWAFS OFFICERS

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President	Brian Medlock Oregon State Police <a href="mailto:Brian.Medlock@state.or.us">Brian.Medlock@state.or.us</a>
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Technical	Angela Brooks Oregon State Police <a href="mailto:Angela.Brooks@state.or.us">Angela.Brooks@state.or.us</a>
Editorial	Natasha Wheatley Ada County Sheriff's Office <a href="mailto:nwheatley@adaweb.net">nwheatley@adaweb.net</a>

## *PRESIDENT'S MESSAGE*

As we move past “pumpkin spice season” into a new year, it is natural to reflect on the past twelve months. Thinking back, I feel very fortunate to work with so many great people and would like to take a moment to express my gratitude. I want to thank all the hardworking members of our organization, as well as the outgoing board members. Outgoing President, Trevor Allen, stepped into the position on short notice and did an amazing job guiding our organization forward. Long time board members, Jeff Jagmin and Heather Campbell have also passed along their torches after years of dedication and countless volunteer hours.

I would like to officially welcome and congratulate our new Editorial Secretary, Natasha Wheatley, our new Secretary Treasurer, Kerry Hogan, and our new Member at Large, Ryan Chambers. They have already proven to be outstanding board members with great ideas. Brian Robertson has transitioned to Vice-President and we are excited to see what he brings to the position. As Membership Secretary, Steve Stone has continued to improve our membership process and structure. I can't say enough good things about the work that Angie Brooks has been performing as Technical Resources Secretary. It is quite possible that she has us on track to publish a schedule this spring for our 2017 conference. I look forward to a productive year with this group of talented board members.

Our 2017 conference planning is coming along well. Angie Brooks has already lined up some vendors, presenters and is in the process of locking down a keynote speaker. The conference will be held at the Embassy Suites Hotel by Hilton in Portland, Oregon from September 17 – 22. It will continue to be structured so that there will be various disciplinary tracks that run throughout the week. If you would like to present, or if you have any ideas for workshops or vendors, please email Angie Brooks ([angela.brooks@state.or.us](mailto:angela.brooks@state.or.us)).

One of my goals this year is to try and increase the participation of current members. As such, it is important to remind everyone of the following opportunities:

- The American Board of Criminalistics provides NWAFS with one free ABC certification test every year.
- We are currently accepting nominations for our Emerging Scientist and Senior Scientist awards.
- At the Boise conference, Matthew Nodel was awarded the status of Life Member. If you know of other members deserving similar recognition, please consider nominating them.
- We will continue to support training and/or research opportunities throughout the year and are looking for new topics and interested members.

Please contact me ([brian.medlock@state.or.us](mailto:brian.medlock@state.or.us)) or any of the board members if you would like to apply for the ABC test, nominate a member for recognition or if you have any ideas that you think would improve our organization.

In closing, I'm not really one for words of wisdom, so I'll let the experts at Pixar help me out. Regardless of what challenges are ahead of us, we need to remember to “Just keep swimming...just keep swimming” and we will eventually get to where we want to be. Have a great 2017!

Until next time, enjoy!  
**Brian Medlock, NWAFS President**  
[brian.medlock@state.or.us](mailto:brian.medlock@state.or.us)

## 2016 NWAFS Board Meeting Minutes

Hotel good  
LEAN good, Management track  
Range, ACSO,  
Tracks  
College students, evid tech,

Chris  
ABC Rep  
Accredited by ISO standards, GAP analysis to  
get tests to ISO stds  
Job task analysis, Ohio State Univ (cheapest of  
3, paying for time), Psychometricians, Molecu-  
lar Bio (biggest #), 2007, outdated  
Asking for a grant for updating tests, takes time  
and money, better the science and the field  
ISO requirement, % of tests need checked an-  
nually, seed money \$2500

Is there a tax benefit for giving grants? Split it  
over several years? Does ABC need it now?  
Best interest of organization, support, \$1500/  
yr/2 yr vs lump sum \$2500  
Voted to give \$2500 this year, unanimous

Board recommends outside review of books  
Treasurer's corner on website

Date for ABC Exam Due, get paperwork in  
time  
Concern, route to correct email, member-at-  
large, route to "webmaster"  
Digital secretary  
Past president duties-advisory role

Membership drive, potential date change to  
open until meeting

Website control of layout

Membership Secretary Report  
Technical Secretary Report  
Facebook, boosted posts, good en-  
gagement, \$17, vote to continue this  
Will reimburse Angie for 2016 boost

2017 Portland  
2018 Seattle/Tacoma—Puget Sound region  
2019 Utah

Goal, November, start figuring out work-  
shops  
Survey for workshops, top 3 workshops  
were scheduled per survey

Keynote, Schneck 911  
Burns Militia

Vice President  
Constitution changes  
Creating Past President position

President  
Committee for AV equipment, on  
site at meeting, NWAFS comp room  
In person, Board meeting

Editor report  
NWAFS footwear/tire track presen-  
tation at the Plenary Session

Technical Article

## Bullet Impacts to Concrete

Authors: Matthew Noedel-Noedel Scientific (mentor);  
Dan Alessio, Jess Buttler, Travis Gover, Kathy Kittell, Leland Samuelson,  
-Oregon State Police Forensic Services Division;  
Jeff Dovci-Dovci Forensic Consulting

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**Key Words:** *Bullet Impact, Bullet Performance, Concrete, Crime Scene Reconstruction, Trajectory*

### Abstract

*The Northwest Association of Forensic Scientists offered a research based workshop that involved the examination of bullet impacts to concrete surfaces. Three different calibers were test fired into/through concrete blocks at known fixed angles. The resultant impact damage was documented at the impact site and the fired bullet was collected and evaluated.*

### Introduction

Concrete is a material that is encountered in many environments—sidewalks, driveways, parking lots, stairs, buildings, curbs and other locations. Because it is so prevalent in the environment, it can and has been impacted by fired bullets. This study served to examine and document some of the reconstruction potential surrounding bullet impacts to concrete.

### Materials

Concrete stepping stones (18 inch x 18 inch x 1.5 inch)

Spray paint (multiple colors)

Protractor

Fabric filled bullet recovery box

Ricochet shield

Eye and ear protection

### Firearms

Beretta model 92FS; 9mm Luger semiautomatic pistol

Colt 1911; 45 Auto caliber semiautomatic pistol

Ruger Ranch Rifle; 223 Remington caliber semiautomatic

*This technical article has successfully undergone the NWAFS peer review process*

## Ammunition

Remington: 9mm Luger, 115 grain Full Metal Jacket cartridges

American Eagle: 45 Auto, 230 grain Full Metal Jacket cartridges

HSM: 223 Remington, 55 grain Full Metal Jacket remanufactured cartridges

## Procedure

Concrete blocks were purchased at a local Home & Garden store and spray painted to build up multiple layers of paint. The spray painted surfaces served to mimic an urban environment as well as provide good contrast for the impacts. These blocks (approximately 18 inches square and 1.5 inch thick) were mounted onto a work bench approximately 20 feet from the shooting location. Due to the potential for concrete and/or projectiles to rebound back toward the shooter, the shooting location was protected by a wooden panel with a small access port to allow the firearm to be safely discharged while the shooter remained behind the wooden shield (Figure 1). Test shots were delivered with each firearm/ammunition combination between 90 degrees (straight on and perpendicular to the concrete) down to low angle shots delivered at 10 degrees. Where possible, the projectiles were collected in a fabric filled box and evaluated in association with the bullet path angle documented.

## Results

Figures 2-5 show a compilation of the various concrete impacts from the test fired calibers and angles. The manufacturer reported velocity and energy for each type of ammunition tested is shown in table 1.

The high velocity and energy associated with the 223 Remington rifle cartridge created large craters and secondary cracks through the target such that by the fourth shot to the concrete, the block shattered (see Figure 2). No additional test shots were delivered from the 223 rifle for this experiment. Future testing of this caliber into concrete blocks may benefit by better supporting the test block (perhaps against the ground) or using a thicker block of concrete.

The impact sites for the 9mm Luger and 45 Auto projectiles did not disintegrate the blocks thus multiple shots were delivered to each block. The qualitative angle of origin for the impact damage was very difficult to differentiate as the spalling (the ejection of adjacent material from the impact site) concrete created large round to ovoid craters at nearly every angle. At the lowest angle (10 degree) the shallow contact did create a situation where one could recognize it as relatively low angle (see Figure 4). In very general terms, for the 9mm Luger and 45 Auto tests, impacts at the high angles (50-90 degree) created larger craters than impacts at low angles (10-40 degree). However, estimating a specific angle based on the appearance of the craters left by these impacts is tenuous at best.

The nearly straight on (orthogonal) shots typically resulted in the projectile (or fragments thereof) to rebound essentially straight back toward the shot origin. While these rebounding projectiles did not carry much velocity or energy, they often came back 20 feet or greater. In an enclosed environment, it is anticipated that these projectiles could be found near the area of origin as they can ricochet straight back for limited distances.

Table 1: Manufacturer reported muzzle velocity and energy for the ammunition used in these tests.

Brand	Muzzle Velocity	Muzzle Energy
Remington 9mm Luger, 115 grain Full Metal Jacket	1145 fps	335 ft-lbs
American Eagle 45 Auto, 230 grain Full Metal Jacket	890 fps	404 ft-lbs
HSM 223 Remington 55 grain Full Metal Jacket	3050 fps	1136 ft-lbs

### Bullets

The most successful recovery of the fired bullets after concrete impact was with the 45 Auto caliber bullets. The rifle bullets fragmented into numerous small pieces and very few pieces of original bullet were recovered. The 9mm Luger bullets, while more intact than the 223 Remington rifle bullets did exhibit significant fragmentation after impact. The 45 Auto bullets were the easiest to capture and recover after impact. This is likely due to the combination of their large size and slower velocity as compared to the 9mm Luger and 223 Remington caliber projectiles. Figure 6 demonstrates the appearance of the 45 Auto bullets after ricochet from concrete and recovery.

The bullets themselves show a progression from rounded to flattened as the angle changed from 90 degree (orthogonal) through 10 degree impact angles. For high angles (70, 80 and 90 degree) the bullet damage was very symmetrical as the nose of the bullet simply smashed flat. One would have to take care to not mis-identify this full metal jacket impact symmetry with hollow-point bullet expansion. The low angle bullet impacts exhibit flat linear damage across the portion of the projectile that scoured across the concrete surface.

Only the impact side of the bullet was damaged (with the land and groove information essentially obliterated) leaving the “back side” of the bullet (that did not impact concrete) essentially pristine. Finally, as there was no intermediate object struck between the firearm and the concrete target, the bullets were travelling stable and nose forward. This stability upon impact could be seen translated on the direction of the scrapes on the bullet surface. The impact side of the bullets demonstrated scrapes and damage along the long axis of the bullet (that is from nose to base-not side to side). This characteristic, if observed on an evidence ricocheted bullet, can assist an examiner to assess if the bullet struck concrete before or after

an intervening target. An intervening target will likely cause the bullet to tumble and thus not present the long axis of the projectile “in-line” for ricochet purposes.

### *Other*

The opposite side of some of the high energy perforations (from the 223 Remington caliber rifle) exhibited the “cone fracture” appearance on the exit side of the concrete block. This effect has been documented through glass, bone, plastic [1] and was seen here through concrete (see Figure 7).

Some of the painted blocks demonstrated an overhanging tab of paint toward the bullet entry side. In honor of our testing site location in Clackamas, Oregon, we dubbed this observation as the “Clak-Flap”. While this does not occur every time, when it did occur, it was consistently present on the entry side of the impact (see Figure 8). This feature may be useful to determine direction of projectile travel if encountered on a scene where painted concrete has been struck by a fired bullet.

### **Conclusions**

It is very difficult to estimate specific angles associated with bullet impacts to concrete. The amount of material that is ejected from the impact location is typically much larger than the size and profile of the bullet that caused the damage. Spalling, or the ejection of adjacent material from the impact site, creates large impact craters that may not follow typical length to width ratio relationships sometimes seen in other surfaces.

The fired projectiles can offer some idea as to the angle of impact (provided they are stable and not tumbling prior to impacting concrete) [2]. Low angle impacts (10-40 degrees) exhibit a nearly pristine side and a rough flattened striated side. High angle impacts (70-90 degrees) demonstrate nearly symmetric crushing of the nose and include a nearly circular, undamaged base. High angle impacts to concrete gave an appearance similar to an expanded hollow point bullet. Projectiles from the mid-range impact angles (40-60 degrees) exhibited bullet/jacket tearing, fragmentation and bullet/core separations.

One must further understand that these tests were conducted with only one type of concrete. Concrete can be made with many different formulations and different formulations may react different than the type of concrete tested here. When reconstructing based on concrete impact sites, test shots should be developed with the same formulation of concrete and under the same type of support (lying flat on the ground versus standing upright and unsupported). In addition, one must always consider the implications of trace evidence generated from such high energy impacts to concrete (see Figure 9).

The images and findings presented in this experiment should be considered as a starting point for consideration of impacts to concrete and are not meant to be a substitute for testing in a specific examination or reconstruction.

## References

- [1] Caunt, Robert “A Review of How the Physical Properties of Glass Explain the Shapes of Bullet Holes” Presented at the Association of Firearm and Tool Mark Examiners annual conference; May 2014, Seattle, WA
- [2] Komar, Susan M. “Identification of Bullet With Concrete - A Depressing Identification” AFTE Journal Volume 23, Number 4 (Fall), Page 977 thru 979 (1991)
- [3] Haag, Michael G.; Haag, Lucien C. “Shooting Incident Reconstruction 2<sup>nd</sup> Edition” Academic Press 2011 Elsevier Inc. page 158

## Acknowledgement

The authors wish to thank the Oregon State Police Forensic Service Division (Clackamas, OR) for their assistance with this project and provision of the range in which to conduct this testing. The authors also thank the Northwest Association of Forensic Scientists for providing the opportunity, financial support and forum for this research.



Figure 1: Experimental set-up. Shots were delivered through a port in the wooden shield (to protect the shooter from rebounding concrete and projectiles) to impact the yellow painted concrete block down range. After each test shot, the concrete block was repositioned.

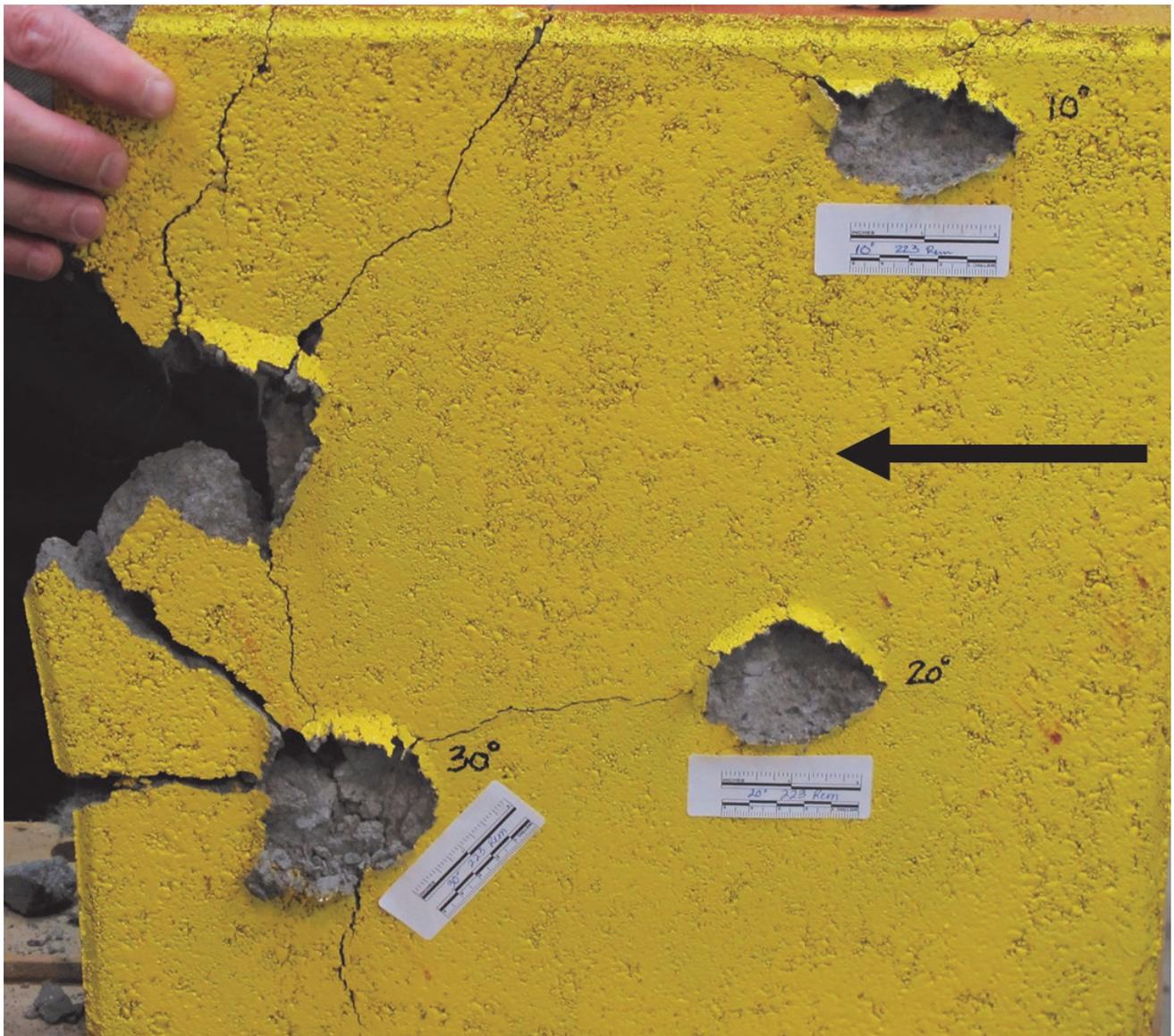


Figure 2: Four of the impacts from the 223 Remington caliber test shots. The increased velocity and energy from these rifle impacts quickly disintegrated the blocks. The fourth shot (delivered at 40 degrees) impacted toward the left side of the surface causing the block to disintegrate at that location with larger pieces being able to be piece matched back along

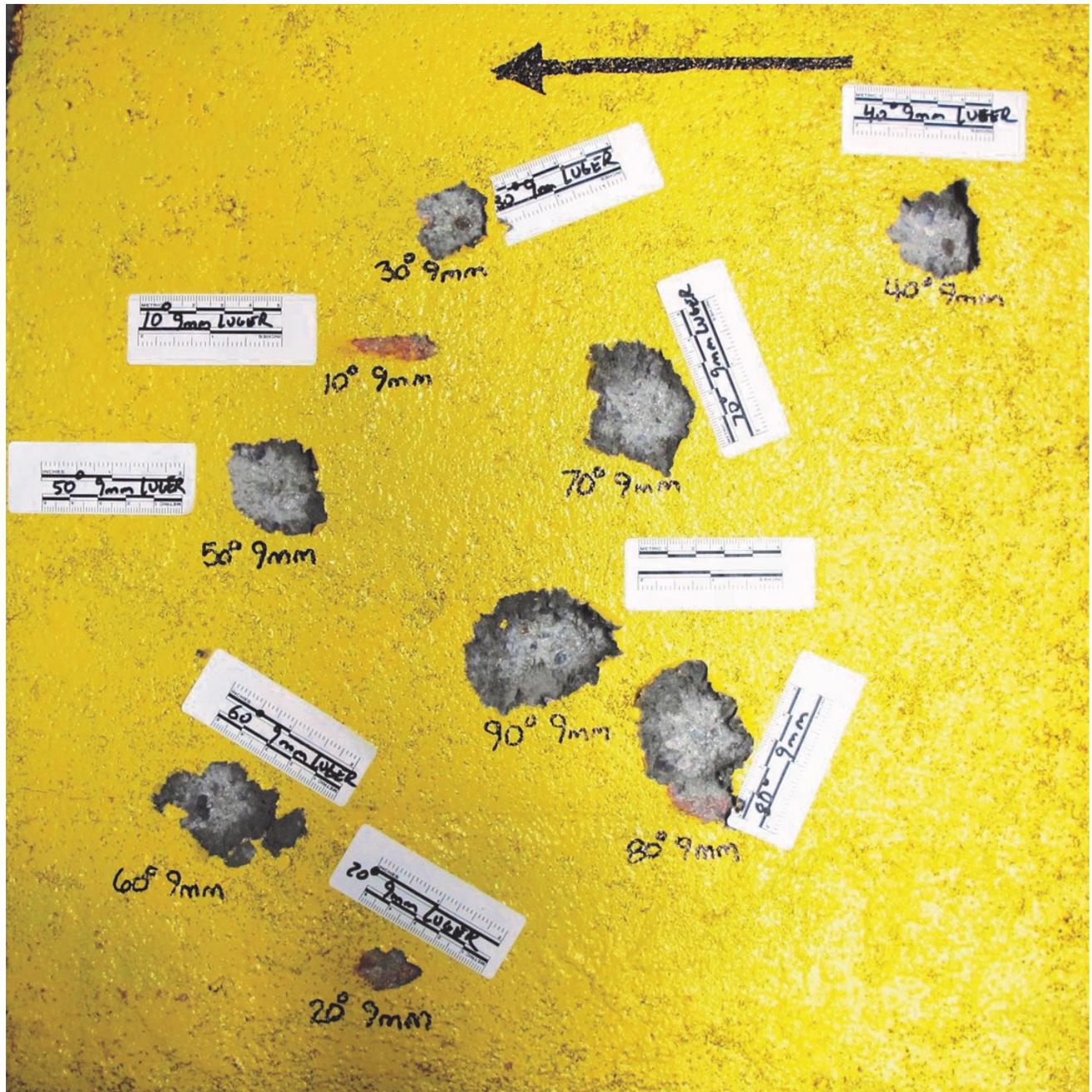


Figure 3: The 9mm Luger painted concrete impact results for 10-90 degrees. Direction of travel for each shot was from right to left. Of interest is the shallow 10 degree impact where the top layer of yellow paint was removed to reveal the under-lying layer of red paint. Remnants of the underlying red painted surface can also be seen in the 20 degree

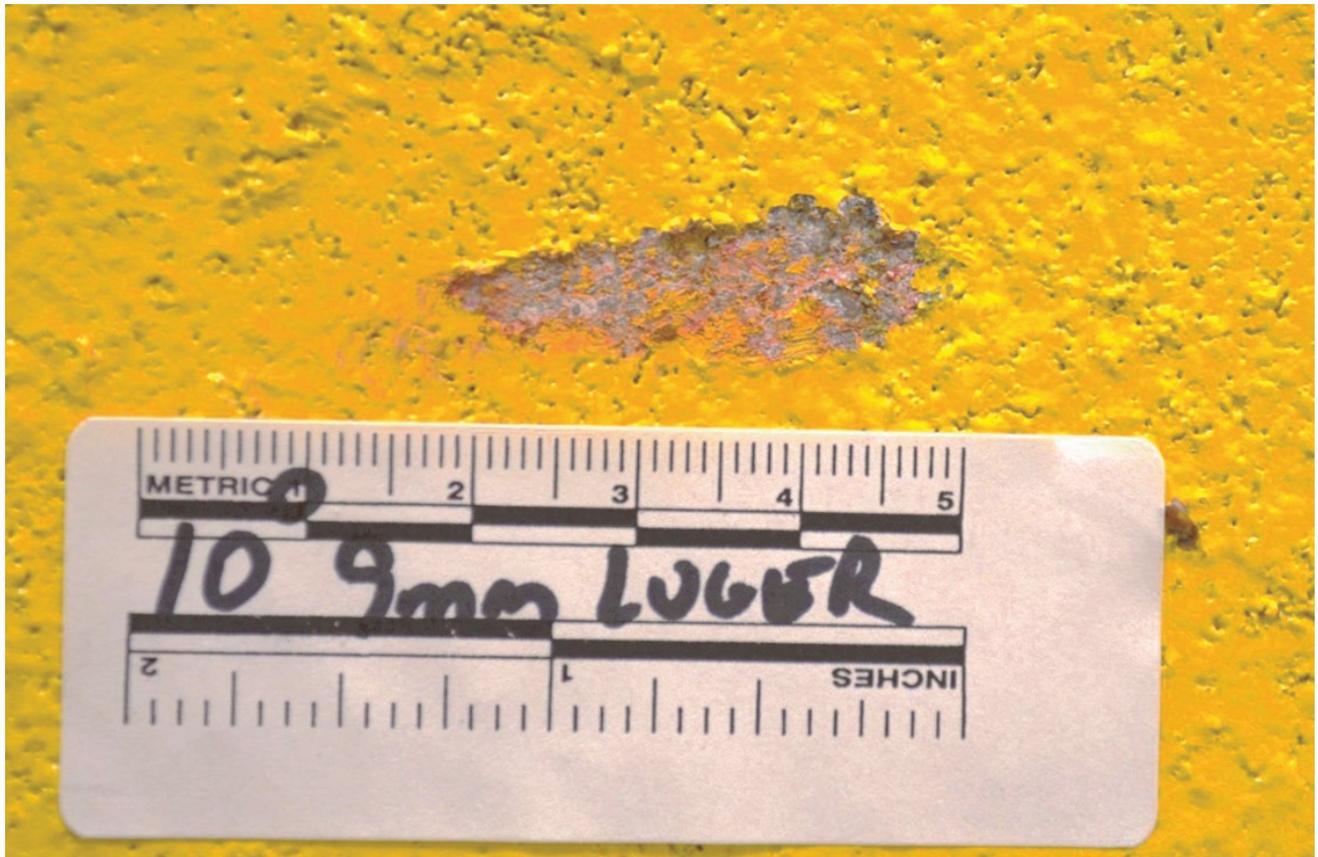


Figure 4: The 10 degree impact from a 115 grain, 9mm Luger full metal jacket bullet. Direction of travel is from right to left.

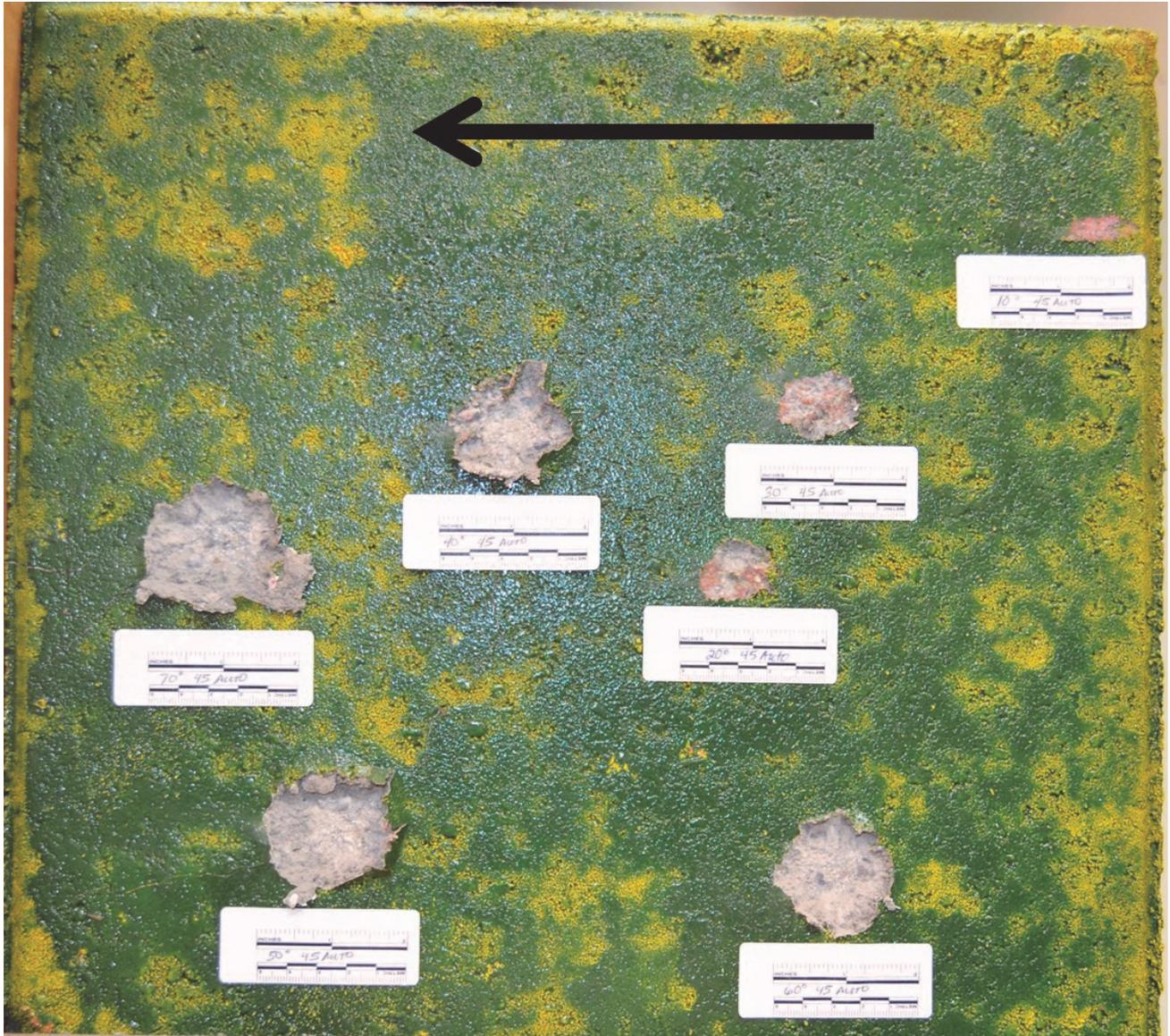


Figure 5: The 45 Auto painted concrete impact results for 10-70 degrees. The 80 degree test shot shattered the block creating the cone fracture seen in Figure 7. Direction of travel



Figure 6: A progression of the recovered 45 Auto bullets after impact with concrete. From left to right, the images depict low angle (10 degree impact angle) to high angle (orthogonal 90 degree from the surface) in 10 degree increments. The upper image demonstrates the “non-impact” side while the lower images demonstrate the “impact” side of the



Figure 7: View of the back side of the 1 ½ inch thick concrete block after perforation by a 45 Auto caliber fired bullet from an angle of approximately 80 degrees. A large “cone fracture” was created from the bullet impact similar to what is seen on other hard surface perforations. The inset is the bullet that caused this impact damage. Note the nearly symmetrical deformation as the nose of this full metal jacket bullet crushed outward in all directions.



Figure 8: This view of a 223 Remington bullet impact site delivered at an angle of 30 degrees (measured out from the right side of the image) shows the “Clak-flap”. The direction of bullet travel in this example was from right to left and the overhanging ridge of painted surface concrete occurred on the entry (right) side of the impact site. The absence of the “flap” *may* indicate the exit side as the projectile and associated debris obliterates the overhang as it passes.



Figure 9: Before and after images of the fourth 223 Remington caliber rifle shot to the block. The disintegration of the block created a massive cloud of concrete dust and debris

## Why do we need an SDO if we have the OSAC?

Brad Wing  
Secretariat, Academy Standards Board

SDO is a term meaning *Standards Developing Organization*. OSAC stands for the Organization of Scientific Area Committees. The AAFS has established an SDO (called the AAFS Standards Board, abbreviated ASB) that works closely with OSAC to develop voluntary consensus standards, technical reports and best practice recommendations.

OSAC is administered by the National Institute of Standards and Technology (NIST). OSAC publishes the *Registry of Approved Standards* and the *Registry of Approved Guidelines* for the forensics community. Each document listed in the registries is required to be based upon sound scientific principles and to have been developed in a *consensus-based* processes. OSAC has 23 subcommittees, each focused upon a specific area of forensics. These subcommittees are responsible for determining which documents to submit to the Registries, but also to identify gaps and needs in standards and related documents. Another function of the subcommittees is to identify research needs and publicize these needs to Federal agencies.

The term *voluntary consensus standards* is the key as to why the ASB was created, and why OSAC needs the cooperation and participation of the ASB and other SDOs. In 1995, Congress passed a law called the National Technology Transfer and Advancement Act (NTTAA). This law states “All federal agencies must use voluntary consensus standards in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law or otherwise impractical.” This also has a trickle-down effect, since Federal grants involving standards are also subject to NTTAA. The important point for this discussion is that OSAC was not created to generate voluntary consensus standards. The NTTAA and the policy document explaining it (*available at <http://www.nist.gov/standardsgov/ombal19.cfm#3>*) define the processes required to develop a voluntary consensus standard:

- i) *“Openness*
- ii) *Balance of interest*
- iii) *Due process*
- iv) *An appeals process*
- v) *Consensus, which is defined as general agreement, but not necessarily unanimity and includes a process for attempting to resolve objections by interested parties...”*

The AAFS Academy Standards Board (ASB) meets these criteria. In fact, it has been accredited by the American National Standards Institute (ANSI), which requires adherence to the principles defined above. OSAC is not an SDO and will not become an SDO. While an subcommittee may identify a gap in existing standards for a field, and even develop a draft document for submittal to an SDO, it is the role of the SDO to ensure that the procedures are properly followed so that the requirements of the NTTAA for *voluntary consensus standards* are met.

The ASB accomplishes this by forming consensus bodies (CBs). Currently there are 13 such CBs (Anthropology, Bloodstain Pattern Analysis, Disaster Victim Identification, DNA, Dogs and Sensors, Firearms and Toolmarks, Footwear and Tiretracks, Forensic Document Examination, Friction Ridge, Medicolegal Death Investigation, Patterned Injury, Toxicology, and Wildlife Forensics). With the exception of Patterned Injury, these exactly correspond to OSAC subcommittees. The CBs are made up of individuals from different backgrounds, which are characterized by ‘interest categories,’ of which we have eight: academia, consumer groups, general interest (typically lawyers and judges), laboratories and testing facilities, producers, subject matter experts, user/government and user/industry. This helps to ensure balance of interest – one of the key requirements for an SDO.

Consensus bodies (which develop the standards) hold meetings open to all interested parties and are comprised of experts from the eight interest categories listed above. There is a defined process to develop the documents – ensuring due process, including an appeals procedure. Each document is put out for public review, so that any interested party—even if they do not participate on the consensus body—may comment on the document. The consensus body is responsible for adjudicating any issues that may arise during the review. Consensus must be reached among the members of the consensus body for a document to be adopted. In addition, the Board of the ASB must approve the document prior to submission to ANSI (which allows a standard to become an American National Standard).

This is all well and good, but it still doesn’t answer the question of why the AAFS now has an SDO.

When OSAC was established, it became apparent that some fields in forensic science had existing relationships with SDOs – such as in fire science and gunshot residue. Others may have had professional organizations (such as the American Board of Forensic Odontology) which had issued guidance documents. In some fields there were Scientific Working Groups (SWG), such as in DNA. However, the standards and best practice guidelines produced by professional organizations and SWGs do not meet the requirements of the NTTAA for being voluntary consensus standards. OSAC approached several professional groups, including AAFS to see if any were interested and capable of establishing an SDO to generate voluntary consensus standards.

The AAFS accepted the challenge and created the ASB. The ASB CBs have close relationships with their corresponding OSAC subcommittees but the CBs may also generate documents on their own. Some documents may be proposed directly by professional organizations, or even by individuals not associated with OSAC.

The CBs need assistance in determining the scientific underpinnings that must be included in ASB standards and best practice recommendations. CBs will typically reach out to OSAC subcommittees to provide the necessary scientific and operational foundation for the requirements in a standard or best practice recommendation.

Once a standard or best practice recommendation is finalized by the ASB, the corresponding OSAC subcommittee may refer it for inclusion in the appropriate Registry – thus completing the loop of interrelationship of OSAC subcommittees and ASB CBs.

The ASB Consensus Bodies are open to anyone with an interest in forensic science. Updates as well as applications for a Consensus Body membership can be found at <http://asb.aafs.org/>



**Technical Article****Subjecting Vehicle Paints with Known Lead Pigment Content to Testing with 3M LeadCheck™ Swabs**

Authors: Kris Gates, Matt Eggert, Senior Forensic Scientists - Oregon State Police (OSP)  
Portland Metro Forensic Laboratory  
Victoria Dickerson, Senior Forensic Scientist - OSP Bend Forensic Laboratory

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**Introduction**

The Oregon State Police currently uses consumer-level chemical swabs to test for bullet strikes on various surfaces in the context of a crime scene. A substrate control is tested if a positive result is obtained, and a positive control is performed as needed to ensure the test is functioning as expected. The substrate in question may be a painted architectural or automotive surface. Questions arose among OSP Crime Scene and Trace Paint examiners regarding whether these swabs could detect lead in vehicle paints in which lead was present. Although leaded paints are no longer in use for new application, leaded paints can still be found on older vehicles as well as both interior and exterior paint applications on buildings and other structural surfaces. Although a substrate control would still be required to rule out environmental deposition of lead onto a vehicle, this experiment tested the hypothesis, based on the paint examiner's understanding of leaded vehicle paint formulation, that lead pigments in vehicle paints would not react to this type of lead-testing swab.

Prior to 1990, lead pigments in vehicle paints were commonly used to achieve colors in shades of yellow, orange, red, and brown. Among others, lead chromate (a yellow pigment), lead molybdate (orange coloration), and lead oxides (including a red pigment) were widely applied as part of the top-most color coat of a paint system, or they were covered with a clear coat after their widespread usage began in the 1980s. Although these lead pigments pose health risks to the factory workers where the paints were applied and add to environmental lead levels as paint degrades and falls to the ground, leaded vehicle paint was not associated with high levels of human health risk since exposure to the lead, especially among children, was much less than with residential leaded paint. In addition, the water-insoluble lead pigments in vehicle paint may be encapsulated in a silica framework to increase their abrasion-resistance and improve dispersion throughout the paint matrix. [1,2] Lead carbonate, the white pigment formerly used in house paints, was not so encapsulated, is water soluble [2], and was therefore more prone to the creation of toxic lead dust or other routes of exposure.

*This technical article has successfully undergone the NWAFS peer review process*

## Materials and Methods

3M LeadCheck™ swabs [3], Lot # AA9BA4D, were purchased at a local home improvement store as part of a kit containing instructions, multiple testing swabs, and paper circles impregnated with a chemical that functions as a positive control. These swabs contain two ampoules of chemical testing agents inside a protective tube. The ampoules are broken to mix and release the reagent through a fibrous brush tip that is rubbed against the sample to be tested. The active ingredient is purported to be sodium rhodizonate, but 3M would not confirm this [4], nor is it listed in the MSDS-type documents currently available. The color of the reagent itself is yellow-brown; the negative reaction is “no color change”, and the positive reaction when lead is detected is a bright reddish-pink. According to the manufacturer’s safety sheet, the reagent contains an aqueous buffer solution of tartaric acid and hydrated disodium tartrate, pH 2.8. The scope of this project did not include investigation into the mechanism or specificity of this testing method.

From the instruction sheet at the product website: “3M™ LeadCheck™ Swabs reliably (sic) detect lead in paints at 0.5% (5,000 ppm). 3M™ LeadCheck™ Swabs may indicate lead in some paint films as low as 0.06% (600ppm)... Marine and industrial paints as well as other materials may contain lead chromate (CR+6). Lead chromate paints are typically red, yellow, green, or orange in color. 3M™ LeadCheck™ Swabs will indicate the presence of lead in these paints. However, since lead chromate is virtually insoluble in water, it can take up to 18 hours (overnight) for the pink color to appear on the swab tip and/or the surface tested.” For the purposes of forensic crime scene use, such a long reaction time can be considered a negative response, since it would be compared to an immediately-visible reaction with lead originating from ammunition to rule out a false positive from the substrate.

## Samples

Using the lab’s vehicle paint reference collection, nine samples were selected for testing in shades of yellow, orange, red, and brown. The sample set was chosen via screening by an EDAX Orbis micro-Xray Fluorescence Spectrophotometer (XRF) to select samples that contained various levels of lead, including no lead at all. The sample set also included paint layer systems with and without clear coats and those that had indications of aftermarket paint repair. Refer to Table 1 for sample set details.

Chips of each paint type were sampled via XRF as intact paint structures. Since lead is a known component in some vehicle primer layers, each chip was sampled both from the top and bottom surface. In those paints where significant differences in lead levels were seen in one orientation versus the other, the higher lead level was detected from the topcoat side.

Paint Ref. #	topcoat color	clear coat?	re-paint?	lead levels detected via XRF	layer structure	vehicle info		
						year	make	model
34	red	yes	yes	low	clear/red/clear/red/light grey/dark grey	1986	Toyota	Supra
55	brown	no	no	med-low	brown/white/grey	1977	Volkswagen	Rabbit
60	red	no	no	low	red/light grey/brown/dark grey	1973	Volkswagen	Beetle
265	yellow	no	no	none	yellow/light grey/dark grey	1979	Toyota	Tercel
796	orange	no	maybe	med-high	orange/white/orange	1973	Toyota	Corolla
812	orange	no	no	med-high	orange/white/grey	1971	Volkswagen	Beetle
954	yellow	no	yes	med-low	yellow/grey/clear/yellow/grey	1986	Chevrolet	Camaro
1072	orange	no	no	high	orange/grey	1972	Volkswagen	Beetle
1794	yellow	yes	yes	none	clear/yellow/clear/yellow/tan/grey	2002	Ford	Ranger

Table 1: Sample set

## Experimental

Testing was conducted on clean exam paper in the Trace Lab at the Oregon State Police Portland Metro Forensic Laboratory. Two chips of each paint type were mounted on a plastic slide: one with top coat color facing up and the other flipped. A scrapbooking adhesive known to contain no metals was used to mount the chips as shown in Figure 1. A substrate control of slide/adhesive was also tested with the LeadCheck™ swab and found to produce no color change.

Immediately prior to testing, the swab was activated by breaking the interior ampoules, the chemicals were mixed, and the reagent mixture was squeezed out to the brush. The brush top was then rubbed vigorously against a chip and checked for a color change. Note: lead deposits from bullet strikes are known to give an immediate reaction; therefore, a significantly longer development time in the reagent color would be readily differentiated.

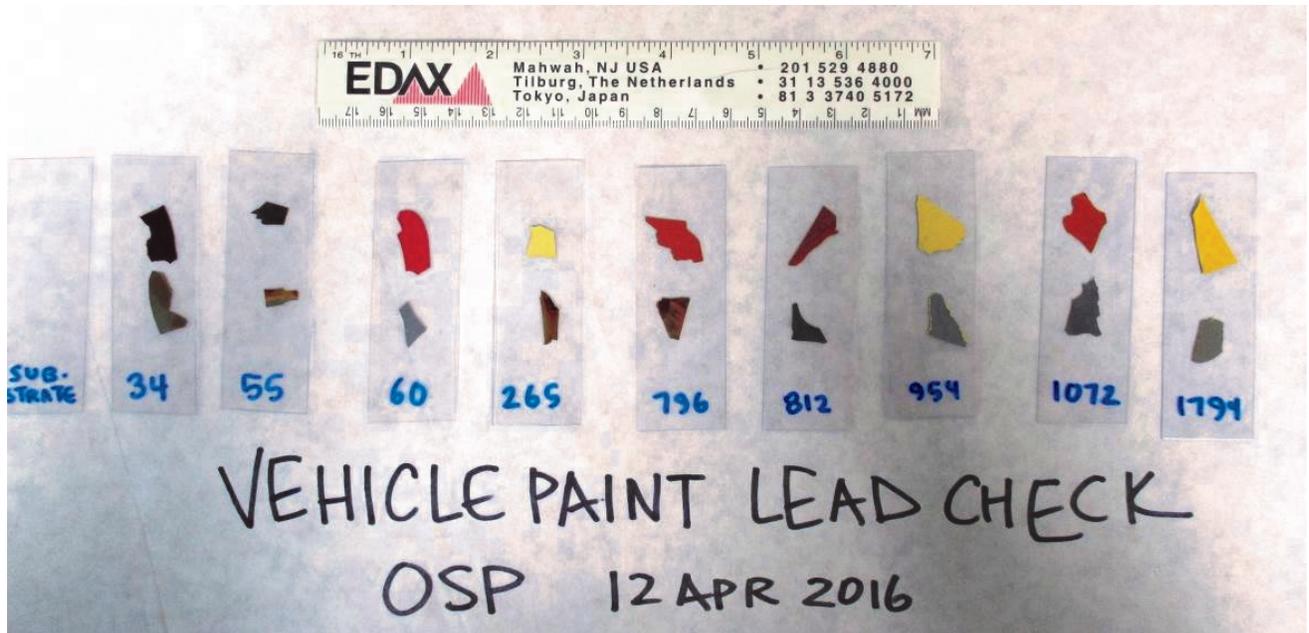


Figure 1: Sample set; each slide has two chips of the same paint, showing opposite surfaces

Although the LeadCheck™ swabs are intended for single use, in order to minimize consumables use, a single swab was used on approximately four to five surfaces before switching to a fresh swab if the results were negative. At the end of testing with each swab, it was rubbed against a positive control paper circle (impregnated with lead) included with the testing kit. In each instance, the positive control produced the expected red-pink color on both the swab tip and the circle. This testing was performed within the active time period of the reagents. The application, post-swabbing appearance of the chips, and the reacted swab are shown in Figures 2, 3 and 4.

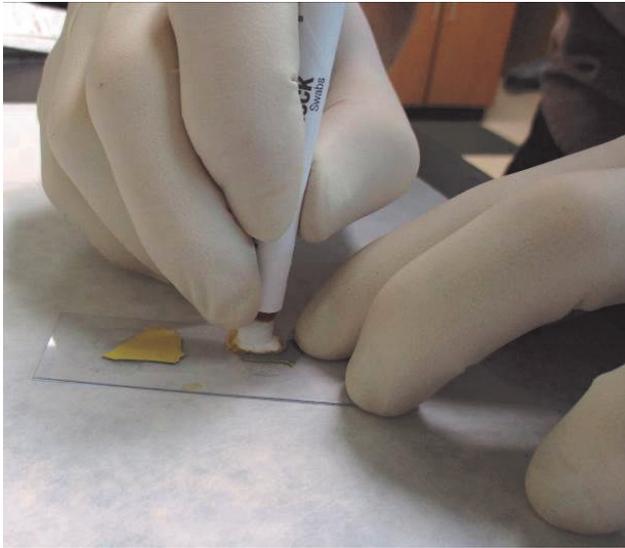


Figure 2: Application of testing swab to a chip

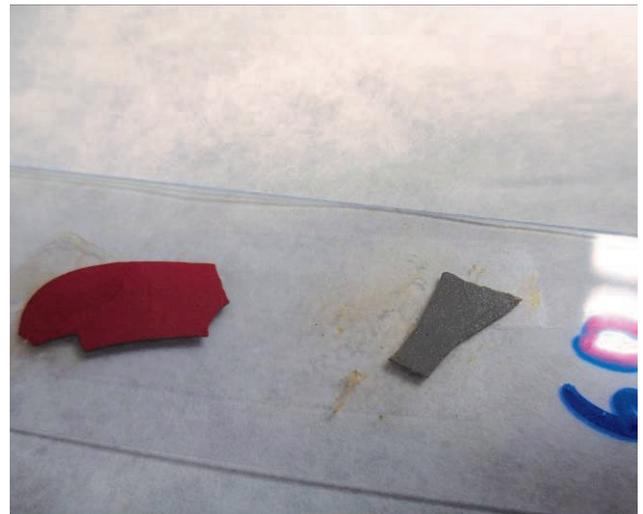


Figure 3: Post-swabbing appearance of a typical paint sample. No solubility observed.



Figure 4: A positive reaction after the swab was tested with the kit's lead-impregnated circle

**Results and Discussion**

All nine paint samples resulted in negative LeadCheck™ reactions with both tested surfaces. This was as expected with the chips containing no lead (samples 265 and 1794). It is conceivable that low-level lead content such as in samples 34, 55, 60, and 954 could be below the detection limit of the LeadCheck™ swabs which is purported to be 5000ppm. However, in samples 796, 812, and 1072 (all orange topcoats), lead was the most- or second-most-detected metal. In all three orange samples, chromium and molybdenum were also detected, supporting the case that the lead is in the form of insoluble lead salts. Chromium was also detected in samples 55 and 954, brown and yellow samples with lead, but not in either red paint where lead was found via XRF. Examples of XRF data from different paint years are shown in Figures 5 and 6.

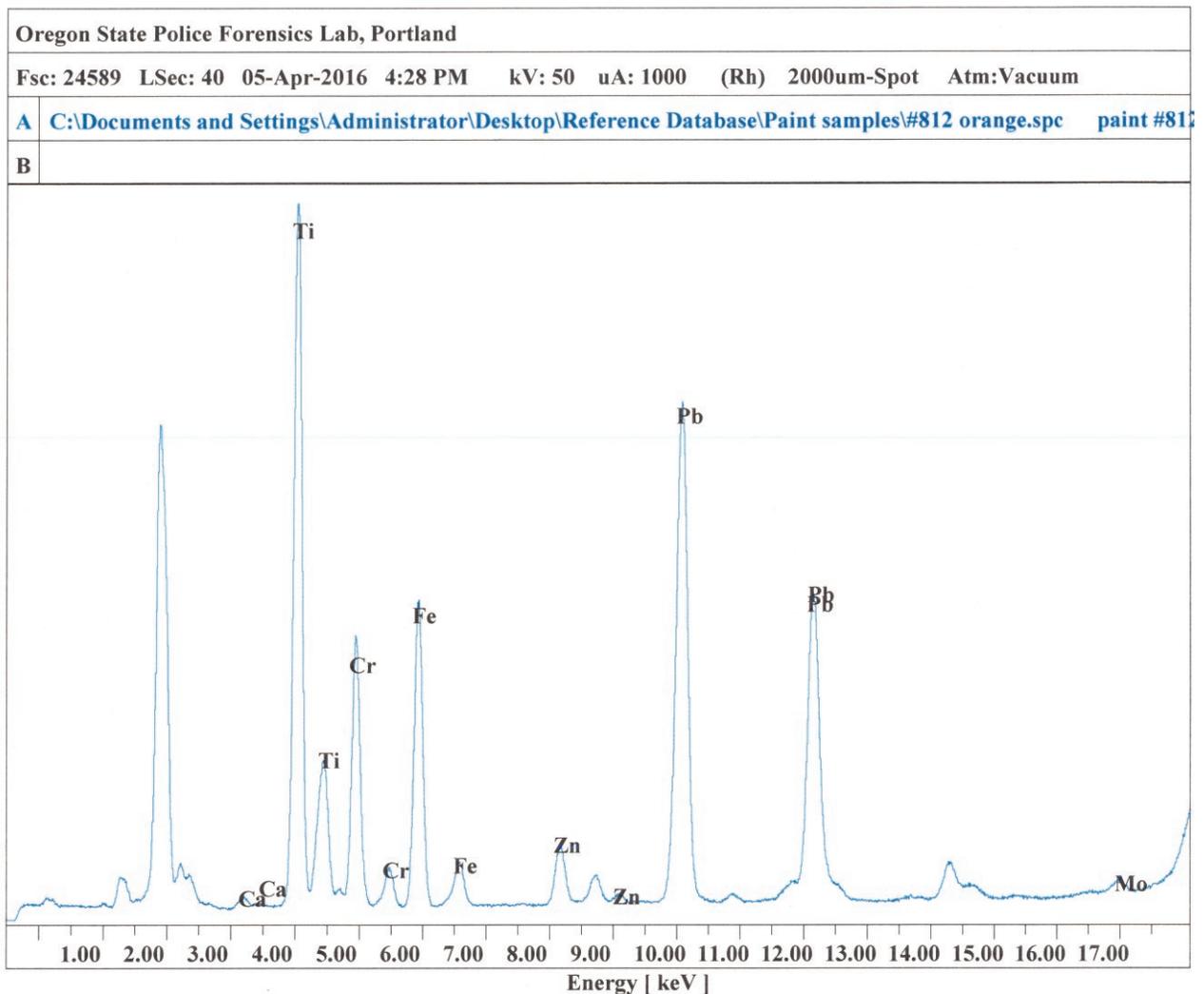


Figure 5: Orange paint from 1971 showing peaks for lead, chromium, molybdenum and others

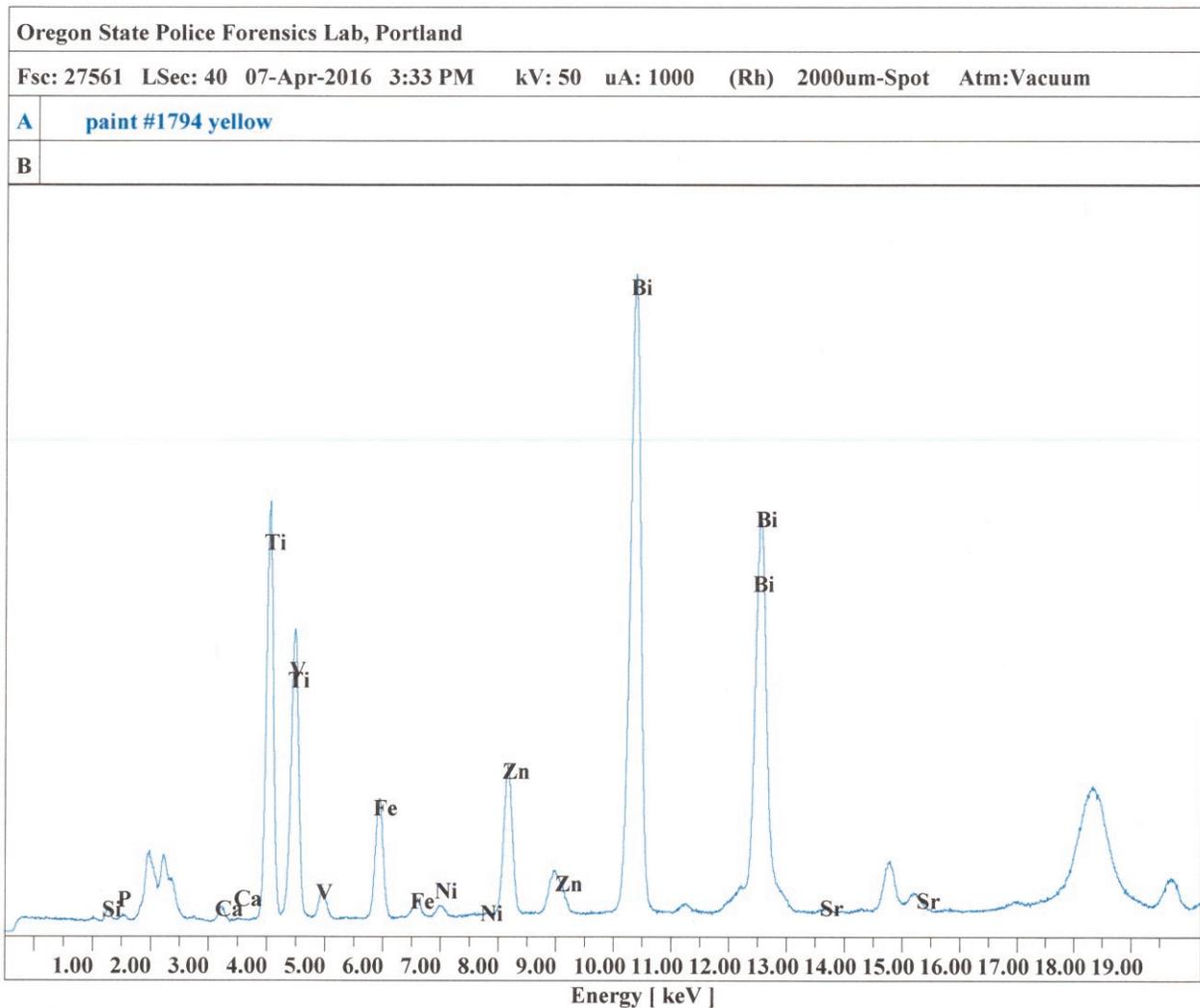


Figure 6: Yellow paint from 2002; lead pigments have been replaced by bismuth

**Conclusions**

Under normal testing conditions at a crime scene, there would be little danger of receiving a positive LeadCheck™ result with a vehicle paint substrate that could be confused with a positive result from a bullet strike. This is due to the low solubility of lead-containing vehicle pigments into the aqueous test reagent. However, a substrate control is still recommended to rule out the possibility of surface deposition of lead that does not originate from the bullet strike or the paint system.

## References

- [1] Process for making silica-coated lead chromate pigments and product thereof (US 3639133 A) <http://www.google.com/patents/US3639133>
- [2] Personal correspondence, March 17, 2016, with Dr. Ed. Suzuki, Seattle Laboratory, Washington State Crime Laboratory, Washington State Patrol
- [3] Product website <http://leadcheck.com/products/leadcheck-products/leadcheck-swabs>
- [4] Multiple phone conversations, April 12 and 13, 2016, with 3M customer service at 1-800-494-3552

## Acknowledgements

The authors would like to thank the Oregon State Police Forensic Services Division for allowing the use of examiner time and supplies to work on this project, Dr. Ed Suzuki of the Washington State Patrol for sharing his expertise on leaded pigments, and Brian Medlock and Chrystal Bell for providing technical review of this summary.

## Ryan Chambers Forensic Scientist Oregon State Police Portland Forensic Laboratory

I graduated from Texas Tech University in 2005 with a B.S. in Biology with a minor in chemistry. Not sure what to do with that degree, and because those 4 years went by in a flash (or a blur?), I decided to stay in school and was fortunate to have the opportunity to receive my M.S. from Texas Tech in Zoology. My research was focused on the molecular techniques used to study the DNA sequences of small mammals for genetic relationship purposes. Those three years also flew by! But, again, I was fortunate to have someone ahead of me in the program take a position in a DNA lab in Colorado. I looked into the profession and quickly decided this is what I wanted to do. Before I knew it, I was here as a DNA analyst in Portland for the Oregon State Police. And, as is a recurring theme here, the past 8 years have gone by in a hurry, but have been some of the best years of my life. I'm lucky to work with and have become friends with some amazing people. I started the application process to become a member of the NWAFS shortly after I started here and am very excited to become more involved. The people and the meetings have been excellent and I plan to help that continue to be the case. Cheers!



# Kerry Hogan

Forensic Scientist  
Idaho State Police

My higher education journey started in Spokane, Washington where I studied journalism at Gonzaga University. I quickly realized this was not meant for me and transferred to the University of Montana in Missoula, Montana. I graduated in 2008 with my Bachelor of Science degree in microbiology and a minor in chemistry. The summer before I graduated I was able to intern at the Idaho State Police Forensic Services Lab and get my feet wet, so they say, in forensics. I enjoyed it so much that I volunteered at the Montana Crime Lab the year before I graduated. I was hired at ISP right after my graduation and started in the biology/DNA section. In 2011, I decided to take a different path in forensics and laterally transferred into the chemistry section where I have been ever since.

I have been a member of NWAFS since 2010 and some of my most memorable moments were the Portland meeting when our rooms had no air conditioning (well known fact: I sweat. A lot.); and the 10+ hour drive to California for the joint CAC/NWAFS meeting with none other than Corinna Owsley and Heather Campbell. Years of wisdom were passed onto me...

Outside of work I love spending time with my dog Lucy hiking, or...let's be honest, just laying around. I also enjoy working out and have been known to run every now and then. I enjoy challenging myself and have been pondering running my first Spartan race sometime next year because I want to be one of those crazy people. If I'm in a particularly creative mood, you can find me painting or coloring (love the adult coloring books). It's the simple things that let me relax and relieve some stress.

(To put Corinna in a better mood, I often see if I would be able to fit in items of evidence, this happens to be a bag of approximately 15lbs of marijuana)



# 44th NWAFS Business Meeting—Riverside Hotel—Boise, ID September 28, 2016 Minutes by Secretary-Treasurer Campbell

Meeting called to order at 1507

BOD Members in Attendance: President Trevor Allen, Vice President Brian Medlock, Editorial Secretary Jeff Jagmin, Secretary-Treasurer Heather Campbell, Membership Secretary Steve Stone, Technical Resource Secretary Angie Brooks

Not in attendance: Member-At-Large Brian Robertson

Quorum met, confirmed by Campbell, 17 voting members in attendance

### Report by President Trevor Allen

For past 5 years was NWAFS Tech Sec, ran for President last year due to a vacancy

Meeting focused on SRT workshops

Spring-SRT Footwear/TT workshop-positive reviews

Took perspective from original members

Expenses:

AV bill-purchased 4 projectors, screens, cases, slide advancers--\$3200

Board voted to award ABC Grant money to update certification testing--\$2500

Thanked the Board and past board members for efforts

### Report by Membership Secretary Steven Stone

#### Open Board Positions:

Open for 2016:

President

Vice President

Member-At-Large

Editorial/Publications Secretary

Secretary-Treasurer

*The following has been approved by the 2016 Membership Committee:*

#### Elevation from Provisional Associate Member to Associate Member:

First Name	Last Name	Organization
David	Tkac	Illinois State Police

**Elevation from Provisional Regular Member to Regular Member:**

First Name	Last Name	Organization	Reason
Christine	Cannon	Nampa Police Department	Membership Committee '14
Melissa	Simons	OSP Crime Lab, Central Point	Committee Membership in '16
Joshua	Spatola	CA Dept. of Justice	Previous Board Member
Jon T.	Stimac	OSP Crime Lab, Bend	Taught Workshop in '10
Sara	Trejo	OSP Crime Lab, Clackamas	Committee Membership in '16
Elizabeth	Uhrich	WSP Crime Lab, Marysville	Membership Committee '15
Natasha	Wheatley	Ada County Sheriff's Office	Committee Membership in '16

**Applicants for Provisional Regular Membership:**

First Name	Last Name	Organization
Janeice	Amick	Anchorage Police Department Crime Lab
Jessica	Buttler	Oregon State Police
Tina Wu	Chang	San Mateo County Sheriff's Office
Tanna	Gendreau	Montana Forensic Science Division
David	Kanaris	Alaska Scientific Crime Detection Laboratory
Kaitlin	Moe	Montana Forensic Science Division
Darren	Wright	Idaho State Police

The following members have not met the requirements within 3 years for the promotion out of Provisional status and are eligible for demotion to Associate Status:

First Name	Last Name	Organization
Scott	Bauer	CA Dept. of Justice
Donald W.	Brannan	WSP Crime Lab Division-Olympia
Christina	Buettner	Wyoming State Crime Lab
Cori	Dahlby	MN Bureau of Criminal Apprehension
Adam J.	Fleischer	OSP Crime Lab, Springfield
Gene	Lawrence	WSP Crime Lab, Marysville
James W.	Luthy	WSP Crime Lab, Olympia
Barry	Miller	Solano County Bureau of Forensic Services

**A question has arisen as to the status of the following members whom are employed by ASCLD/LAB and not actively practicing forensics. Are they to be demoted to Associate Member or kept at Regular?**

First Name	Last Name	Organization
Rhonda	Banks	ASCLD/LAB
Brad	Putnam	ASCLD/LAB

**Nomination for Life Membership:**

**The following members have voluntarily resigned:**

First Name	Last Name	Organization
Kelsey	Brand	OSP Crime Lab, Portland
Kirsten	Gleim	Emerald City Forensics
Shawn	Malikowski	OSP Crime Lab, Springfield WSP Crime Lab, Vancouver
Sharon	Herbelin	
Josh	Williams	Wyoming State Crime Lab

**The following members have not paid dues for at least two years and are eligible for removal from the organization:**

First Name	Last Name	Organization
Darren	Bowles	Utah State Crime Lab
Keith	Chan	DEA
Chandra Erin	Christenson	Utah State Crime Lab
Terry	Coons	Retired
	Hutchison	Montana Forensic Science Division
James	Jr.	
Megan	Inslee	WSP Crime Lab, Seattle
Kevin	Jones	WSP Crime Lab, Seattle
Kristen	Pilar	Metropolitan State University of Denver
Robert	Krivickas	Bode
Nika	Larsen	OSP Crime Lab, Bend
William	Marshall	WSP Crime Lab, Marysville
Ken	McDermott	WSP Crime Lab, Vancouver
Stan	McGee	WSP Crime Lab, Spokane
Steven	Norris	Wyoming State Crime Lab
Denise	Olson	WSP Crime Lab, Spokane
Andrea	Ricci	WSP Crime Lab, Kennewick
Edward	Robinson	WSP Crime Lab, Spokane
Chris	Sewell	WSP Crime Lab, Tacoma
Robert	Shem	Alaska DPS Crime Lab
Lisa	Turpin	WSP Crime Lab, Spkane
Mandi	VanBuren	Utah State Crime Lab

This year has been one of catching up on delinquencies and lapsed memberships. Most of it was spent working with Heather Campbell to figure out the best paths forward for the members. The following was completed over the past year:

- Wild Apricot was adjusted and new levels were developed to better track and notify members on when dues are to be sent in. Members who were delinquent on payments were tracked and now notified of that status more effectively.
- The list of Provisional members was culled through to see who has slipped through the cracks over the years. Members who had not met the requirements for promotion were notified.
- Forms and templates within Wild Apricot were adjusted to better suit the purposes of the organization.
- The member database is actively published on the NWAFS website.
- Written communications are now handled through email.

To do for 2016: Continue to improve Wild Apricot. Add a Charter Member level.

Mem-	Membership Level	Total	Membership totals:
	Provisional Associate	1	
	Associate	28	
	Provisional Regular	42	
	Regular*	19	
	Life*	1	
		10	*Amount needed for Quorum is (191+10) * 0.07 = 14

2016

**Membership Committee:**

- Melissa Simons – OSP
- Sara Trejo – OSP
- Kelly Whittle – Utah Bureau of For. Sci.
- Natasha Wheatley – Ada Co. S.O.

Jeff Jagmin moved to make a motion to:

- promote the 1 provisional associate to associate member,
- elevate the 7 provisional regular to regular members,
- accept the 7 provisional regular members,
- demote the 8 to associate members,
- let the 2 ASCLD/LAB remain as regular members (allowed per the Constitution),
- accept Matthew Noedel as a Life Member,
- accept the 5 resignations,
- remove the 21 members who are out of compliance.

Motion was seconded by Kathy Kittell

All in favor, unanimous vote, Motion carries

**Report by Vice President Brian Medlock**

Read through the proposed changes to the Constitution that was provided via the website, this included a new Past President position that will serve as an advisory role without voting privileges

Jeff Borngasser moved to make a motion to accept the Constitution changes

Motion was seconded by Chris Hamburg

All in favor, unanimous vote, Motion carries

Read the proposal to increase dues that was provided on the website

Jason Stenzel made a move to increase dues to \$50

Motion was seconded by Jeff Borngasser

All in favor, unanimous vote, Motion carries

**Report by Technical Resource Secretary Angie Brooks**

Meeting had 36 attendees, down from past years

Attempting to get other local agencies involved

Utilized Facebook and social media

Sent out a survey re: workshop topics

Actively looking for Conference Planning Committee members

Please provide any feedback, comments, ideas, and workshops

Future meetings

2017 Portland, OR

2018 Seattle/Tacoma

2019 Smaller area

Discussions

Stenzel asked the question about co-hosting conference?

Trevor responded with, NWAFS is always the smaller agency, would like to see us build our organization up before reaching out

Medlock attended a regional workshop, mentioned there is talk of doing more joint meetings

Joint meetings allow for good networking

NWAFS is needing management buy in

Timeliness of meeting, overlapping dates, affected attendance and vendors

Femreite asked the possibility of moving meeting to better time of year? Hard to find a week that doesn't overlap with some other organization, but try to factor it in when picking date

**Report by Editorial Secretary Jeff Jagmin**

Past his term

Organized and hosted a SRT Footwear/Tire Track Spring workshop with Chris Hamburg

1 newsletter to publish, waiting on technical reviewer

**Report by Secretary/Treasurer Heather Campbell**

**Old Business**

Accept meeting minutes.

**New Business**

Website

Contents

Past presidents

Life members

Thank Webmaster Borngasser

Keeping up to date with job postings

Inundated with emails

Dreyfus

Wild Apricot

Annual fee due March 2017

ABC

Ed Rhodes Scholarships-how to go about submitting them

Paid member dues of \$500.00

ABC Board of Directors, Chris Hamburg attended Summer 2016 meeting, Indianapolis, IN

Insurance

Meeting registration/dues-accept Paypal, check or Square

Senior Scientist and Emerging Scientist Awards-will add description to website

Taxes

Filed e-postcard 990-N

Annual Report due to Idaho Secretary of State filed August 15, 2016

**Account balances**

Account Balances	September 2016	September 2015	Difference
Chase Savings	\$27,125.33	\$49,110.32	\$(21,984.99)
Chase Checking	\$28,132.75	\$28,616.15	\$(483.40)
Dreyfus	\$26,122.65	\$25,939.75	\$182.90
PayPal	<u>\$8,358.41</u>	<u>\$4,184.83</u>	<u>\$4,173.58</u>
Total	\$89,739.14	\$107,851.05	\$(18,111.91)

2015	Spokane Meeting	\$16,122.24 loss	Dues \$4,590.00
2014	Rohnert Park Meeting	\$1,573.00 loss	Dues \$6,815.00
2013	Vancouver Meeting	\$8,885.81 loss	Dues \$6,985.00
2012	Missoula Meeting	\$3,571.28 loss	Dues \$7,025.00

2016 Purchases

AV equipment	\$3200+
ABC dues and Board meeting	\$116.35
NWAFS Footwear/Tire Track Spring workshop	\$4311.65

Steve Stone made a Motion to accept 2015 meeting minutes

Motion seconded by Brian Medlock

All in favor, unanimous vote, Motion carries

Campbell discussed the two awards that NWAFS has, Emerging Scientist and Senior Scientist. These awards have only been giving out once. We will be putting information on the website if anyone would like to nominate someone. Winners are awarded with a free meeting registration that can be used within 3 years of receipt.

**2016 ABC Report by Chris Hamburg**

In 2016, the ABC Board of Directors has met twice (once in Las Vegas at the AAFS Meeting and once in Indianapolis). We have also regularly conducted meetings via online meeting services to reduce costs.

**ABC Overview**

The ABC is composed of regional and national organizations that represent forensic scientists. Each organization is entitled to one member on the ABC Board of Directors and one member on the ABC Examination Committee. Additionally, there are three At-Large Director positions and one public representative. Currently one of the At-Large Directors and the one public representative position are open. I represent the NWAFFS as its Member Director and am the Secretary of the Board; Erica Graham recently resigned as one of the At-Large Directors. After advertising through all of the member organizations, she was replaced by a member of the Southern Association of Forensic Scientist. Additionally, Judy Hoffman represents the NWAFFS on the Exam Committee.

The ABC currently offers certification in the following areas: Drug Analysis, Fire Debris Analysis, Molecular Biology, Comprehensive Criminalistics, Hairs and Fibers, and Paints and Polymers. There are currently over 1050 certified individuals.

**ABC Updates**

The ABC is continuing to move forward toward ISO 17024 accreditation. This process is labor and financial intensive. As such, we have asked our member organizations for grants to help us forward in our process. I'm very happy to report that the NWAFFS Board of Directors is providing a grant of \$2,500. This grant will be used for the Job Task Analysis process for the Molecular Biology examination.

I would like to hear any comments or questions anyone might have about our streamlined recertification process. You can either contact me directly, or head to the new website [www.criminalistics.com](http://www.criminalistics.com) for our FAQ page. There you will also find a link to email our registrar, Mr. Mike Healy.

**Scholarship**

The ABC provides one paid testing fee per member organization. The NWAFFS has selected a scholarship recipient for the last two years. If you're considering taking the test in 2017, please contact me or an NWAFFS board member for information.

**Next Meeting**

We will be meeting again at the AAFS meeting in New Orleans in February, 2017.

Respectfully submitted,

Christopher Hamburg, D-ABC

Opened the floor for Nominations for President

Brian Medlock was recommended by Jeff Borngasser

Opened to other nominations, none

Trevor Allen entertained a motion to accept Brian Medlock as President

Motion made by Jeff Jagmin

Seconded by Natasha Wheatley

Unanimous decision, Motion carries

Brian Medlock nominated Brian Robertson for Vice President

No other nominations presented

Trevor Allen entertained a motion to accept Brian Robertson as Vice President

Motion made by Kathy Kittell

Seconded by Heather Campbell

Unanimous decision, Motion carries

Kerry Hogan nominated Ryan Chambers as Member-At-Large

No other nominations presented

Trevor Allen entertained a motion to vote Ryan Chambers as Member-At-Large

Motion made by Brian Medlock

Corinna Owsley nominated Kerry Hogan as Secretary-Treasurer

No other nominations presented

Trevor Allen entertained a motion to vote Kerry Hogan as Secretary-Treasurer

Motion made by Natasha Wheatley

Seconded by Heather Campbell

Unanimous decision, Motion carries

Jeff Borngasser nominated Natasha Wheatley to serve as Editorial Secretary

Tanna Gendreau is interested in position but is ineligible due to her provisional regular membership status

Trevor Allen entertained a motion to vote Natasha Wheatley as Editorial Secretary

Motion made by Heather Campbell

Seconded by Brian Medlock

Unanimous decision, Motion carries

Kathy Kittell asked if anyone was opposed to sharing work emails with vendors. No one was opposed.

Trevor Allen entertained a motion to close the meeting

Motion to close the meeting made by Steve Stone

Seconded by Angie Brooks

Unanimous decision, Motion carries

Meeting closed at 1637

# ***CAPTION THIS!***



The best caption submitted for this photo will win a \$25 gift card of your choice!

[nwheatley@adaweb.net](mailto:nwheatley@adaweb.net)

# ***CAPTION THIS WINNER!***

**Congratulations to:  
Odessa Siegel**

**Winner goes to:**

“... and that’s when she knew the fall from the diaper change table so many years ago had indeed caused permanent damage.”



**Runner up goes to:**

**Traci Rose**

“To infinity and beyond!” A young Buzz Lightyear coins the phrase that will become his life-long mantra.

# **FREE REGISTRATION!**

**Got an interesting technical note, informative article  
or research project?**

**Make a submission to the NWAFS newsletter, and you could win FREE  
REGISTRATION to an upcoming NWAFS meeting!**

**The officers vote for the “Best Independent Newsletter Submission” once  
per year and award a FREE REGISTRATION to the winner.**



**Help keep the NWAFS newsletter interesting and informative by  
sending your submissions to:**

**Natasha Wheatley, NWAFS Editor**  
[nwheatley@adaweb.net](mailto:nwheatley@adaweb.net)