



# LABORATORY USER'S GUIDE

October 2014

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# Alaska Scientific Crime Detection Laboratory

## Laboratory User's Guide

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The objective of this Guide is to make practical information concerning how the Alaska Scientific Crime Detection Laboratory can assist in criminal investigations, and procedures for the collection, preservation, and submission of physical evidence, available to law enforcement personnel.

While every effort has been made to ensure its accuracy, it is inevitable that with time some changes will occur. It is, therefore, recommended that the user of this Guide keep abreast of those changes.

The Guide is not intended to cover all situations or to supersede agency policies or procedures. The Laboratory intends to make periodic updates and changes to this Guide as new methods are developed.

Should any questions arise, individuals are encouraged to contact the Laboratory.

It is the hope of the Laboratory that this Guide will promote the maximum use of physical evidence and encourage greater use of the services of the Laboratory.

### Contact Information

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Content	Page number
<a href="#">General Submission of Evidence</a>	04
<a href="#">Controlled Substances</a>	08
<a href="#">Forensic Alcohol</a>	10
<a href="#">Breath Alcohol Program</a>	12
<a href="#">Forensic Biology</a>	13
<a href="#">Firearms/Toolmarks</a>	22
<a href="#">Latent Prints</a>	31
<a href="#">Fire Debris</a>	34
<a href="#">Crime Scene Response</a>	35
<a href="#">Services Not Currently Offered</a>	40
<a href="#">Revision History</a>	41

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### GENERAL SUBMISSION OF EVIDENCE

The "REQUEST FOR LABORATORY SERVICE" (RLS) form is designed to permit personnel in the laboratory to serve you in a more efficient and orderly fashion.

This form provides an evidence receipt for the submitter and evidence work sheets to remain with the evidence while in the laboratory.

The form should be completed by the requestor prior to being hand-carried or mailed to the laboratory with the evidence. With this procedure the person receiving the evidence will be able to process the request much more rapidly. When executing this form, use the fillable document located on the crime laboratory's website (<http://dps.alaska.gov/CrimeLab/docs/RLS.pdf>). The request form is a communication device and should be used to clearly communicate the examinations and comparisons desired.

Alaska Scientific Crime Detection Laboratory  
4805 Dr. Martin Luther King Jr. Ave. | Anchorage, AK 99507

REQUEST FOR LABORATORY SERVICES

Agency Case Number  
Agency Name  
Address  
State: AK Zip Code

Case Agent Contact & Scientific Examination Report Distribution Information  
Full Name (First M. Last) Telephone Email  
Additional Report Email

Case Related Individuals: Victim (V), Suspect (S), Elimination (E), Other (O) Add Individual  
Individual (First M. Last) DOB (mm/dd/yyyy) Sex APSIN # Type Related Evidence Items (list items #'s)

Case Information Relevant to Scientific Analysis and Sample Selection  
Offense(s) and Date of Offense  
Is this case an alleged Sexual Assault? (Check if Yes)

Evidence (Select an analysis category for each evidence item)

Evidence Item #	Description		
<input type="checkbox"/> Beverage Alcohol	<input type="checkbox"/> Blood Alcohol	<input type="checkbox"/> Controlled Substances	<input type="checkbox"/> Fire Debris
<input type="checkbox"/> Firearms/Tools	<input type="checkbox"/> Footwear Impressions	<input type="checkbox"/> Forensic Biology (DNA)	<input type="checkbox"/> Latent Prints
<input type="checkbox"/> Serial Number Restoration	<input type="checkbox"/> Toxicology (Drugs in blood, driving offenses only)		

Add Evidence

Chain of Custody for Listed Evidence

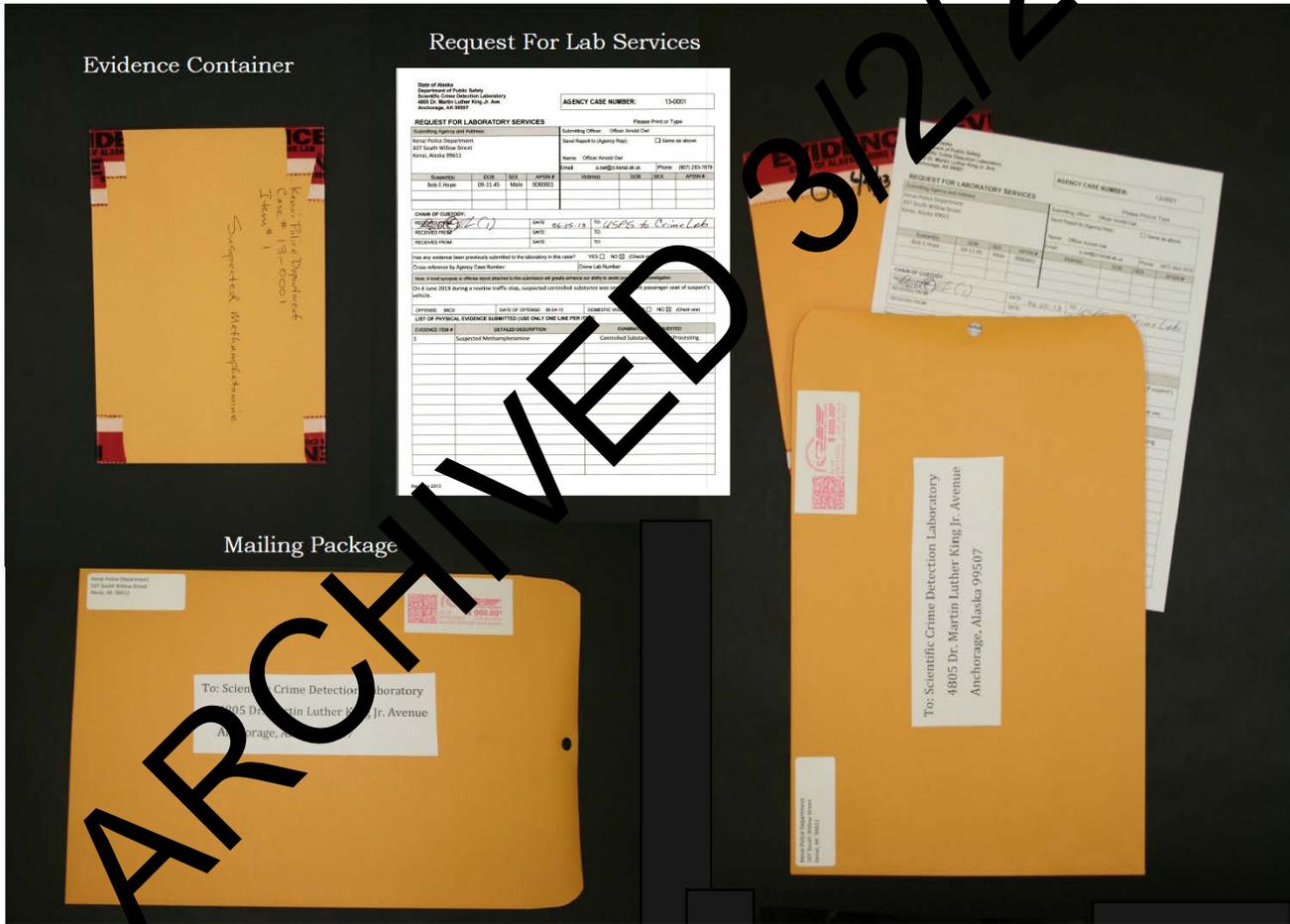
Issued: 10/24/2014  
Effective: 10/24/2014

Version: LUG 2014 R1  
Status: Archived

### EVIDENCE MAILING INSTRUCTIONS

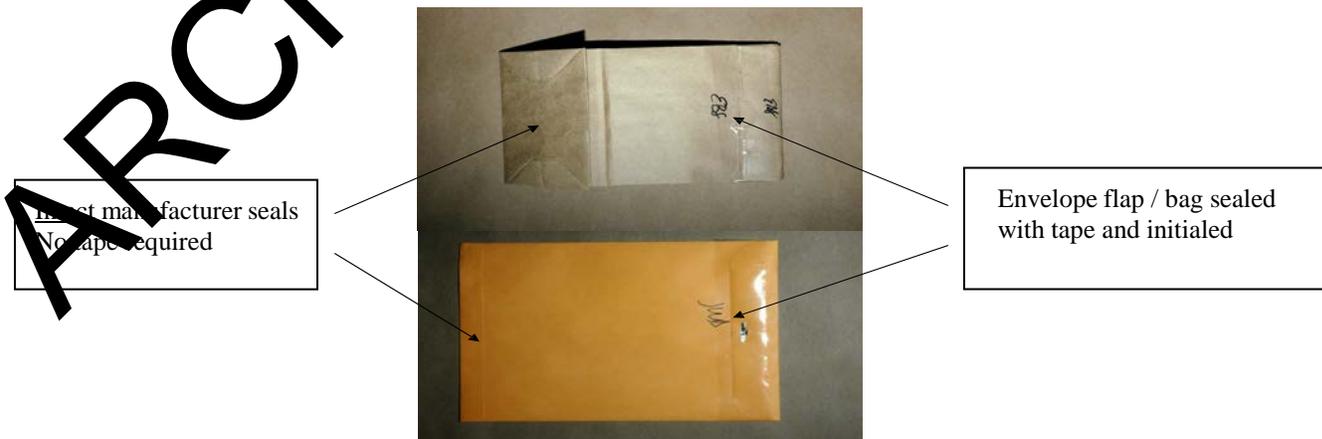
When using the U. S. Postal Service for transmittal of evidence, it is necessary to maintain the proper chain-of-custody. To maintain reasonable control over evidence transmitted in this manner, evidence should be mailed by certified or registered mail with a return receipt requested (or equivalent shipping method). This method of shipment allows the sender to maintain a written record of the various stages of transmittal. Use a street or route number in your return address so that evidence may be returned to you by USPS or other shipping agent with a signature of receipt required.

Package item(s) of evidence in a sealed, labeled and initialed evidence container(s). Complete the RLS. Place the evidence container and the RLS in a larger envelope or box for mailing.



### SUBMISSION REMINDERS

- When mailing evidence, place the RLS inside the mailing container but outside of the evidence container (see previous page for instructions.)
- Place a phone number that you can be reached at on the submission form. This will allow the analyst to contact you if there is a question. Include the email address for the primary investigator assigned to the case to ensure quick communication.
- Type or print legibly. This form is used to relay information which is rendered useless if the analyst cannot read it.
- Clearly describe the type of evidence container and the item(s) being submitted. The description and item number should match what is on the RLS.
- Use one item number for each item of evidence submitted. If resubmission of the item of evidence is required, reuse the item number originally assigned to the item of evidence. Do not duplicate item numbers that have already been assigned in a previous submission.
- Evidence containers must be at least 5x7 inches or the size of a standard business envelope.
- Each evidence container should include the following MINIMUM information: agency name, agency case number, the item number and a description of the item.
- A secure seal is necessary for chain of custody. However, do not tape excessively. This makes the evidence handling in the laboratory difficult. Additionally, it is not necessary to use more than one outer package per item.
- Evidence Seals: An acceptable seal is one that prevents the ready escape of the evidence and will be clearly damaged or altered if broken or enter to package. Intact manufacturer seals do not need to be re-sealed with additional tape. Personnel sealing the evidence must place their initials or mark across the seal.

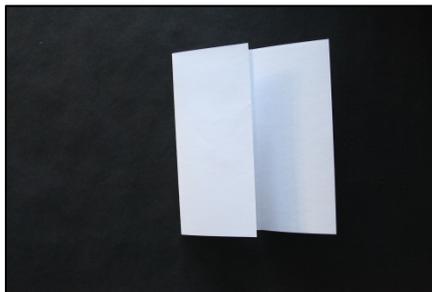


### PAPER EVIDENCE FOLD

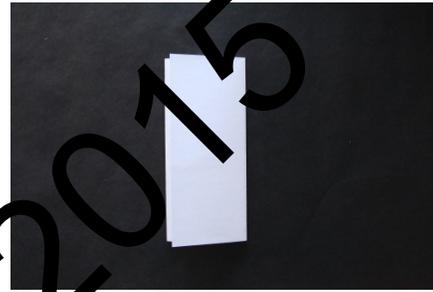
Properly folded, the paper evidence fold is a leak proof container that may be used for small quantities of any dry substance such as hairs, fibers or powders that may leak from envelopes or paper bags.



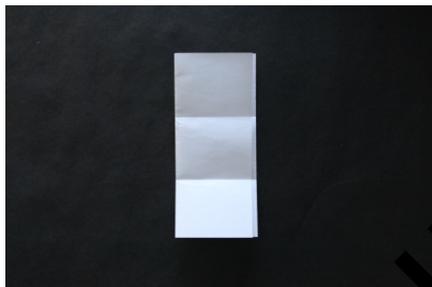
1. Fold a clean, unused sheet of paper into thirds and place evidence in middle section.



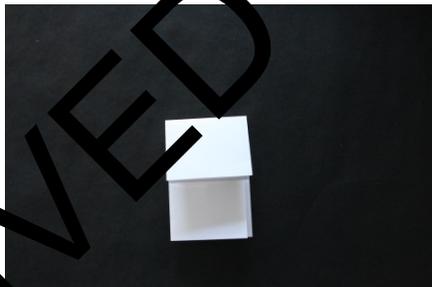
2. Fold one third over middle section.



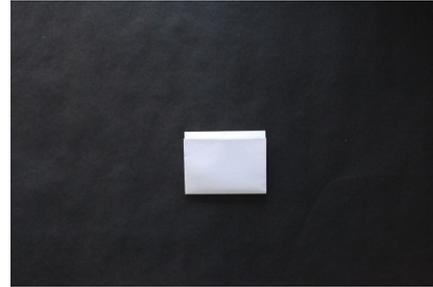
3. Fold the other third over middle section



4. Fold in thirds again  
**\*This is the critical step in making the package leak proof\***



5. Fold one end up.



5. Fold one end up.



7. Place the evidence folded paper into a 5" x 7" envelope or paper bag which is labeled and sealed as indicated on page 6 (agency case #, item #, description).

### CONTROLLED SUBSTANCES

The Controlled Substances Discipline analyzes evidence submitted by law enforcement agencies for the presence or absence of substances controlled under Alaska Statutes. The Controlled Substances Discipline does not quantitate controlled substances or have the ability to test for poisons.

If you have any questions concerning the Controlled Substances Discipline's examination capabilities or evidence handling procedures, please contact the Controlled Substances supervisor Nita Bolz at 907-269-0599 or via email at [Nita.Bolz@alaska.gov](mailto:Nita.Bolz@alaska.gov). For general questions regarding case status, reports, or discovery information please request via email at [dps.scdl.chem@alaska.gov](mailto:dps.scdl.chem@alaska.gov) including the agency case number in your request.

#### Item Selection Policy

Not all items in a case will routinely be analyzed. Selections are made based on the items with the highest schedule and weight to substantiate the highest penalties. Typically, residue items are not analyzed when accompanied by items containing a weighable quantity of drugs. Exceptions to this are cases where an item with residue is the only item connected to a particular suspect or the item with residue is the probable cause for a search. For these exceptions to be granted, this information must be specifically noted by the item in question on the RLS. If, during the pretrial process, it becomes apparent that items that were not analyzed are necessary for successful prosecution then, upon resubmission, those items will receive top priority at the laboratory. Please contact the Controlled Substances supervisor prior to resubmission.

#### Submission Guidelines

Each item must be marked with a unique item number.

- a. Each item must be packaged in an appropriately sized container suitable for the evidence. Small objects (such as a "rock" of cocaine) may become lost or crushed in a large bag. Small items should be packaged in a suitable container and then placed in a larger outer container.
- b. The minimum size of the outer container is 5" X 7". This assures security of the evidence and allows the analyst room to re-package and secure the evidence without breaking your seal.
- c. Items that contain both controlled substances and latent print evidence can be separated prior to submission to the laboratory to reduce time for completion of the case. If you have questions regarding the best way to separate the evidence, please contact the Controlled Substances supervisor. Remember to handle all evidence wearing gloves on latent print cases.
- d. The name or names of all suspects must appear on the request for laboratory services form. If there is more than one suspect, evidence items must be clearly associated with a particular suspect. List on the request for laboratory services form the location of where items were found in search warrant cases.
- e. Clearly mark probable cause exhibits on the request for laboratory services form.
- f. Note distribution cases on the request for laboratory services form.
- g. Only drugs and/or drug packaging will be accepted by the laboratory. Items with no probative value such as driver's licenses, rolling papers and lighters must be retained by the submitting agency.
- h. Hypodermic syringes with needles will not be accepted without prior approval of the Controlled Substances supervisor. The contents of a syringe can be transferred to a vial and submitted for analysis.
- i. Cases involving found property without a suspect will not be analyzed.
- j. Suspected marijuana exhibits from simple possession only investigations, with a total weight of less than one ounce of dried plant material per suspect will not be accepted with the exception of representative samples submitted from items larger than one ounce. Ensure this information is

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documented on the request for laboratory services form. This policy comes from the Alaska Court of Appeals observing that in possession only cases the opinion of an expert is not required. Exceptions may be made when a prosecutor requests, in writing, for analysis to the Controlled Substances supervisor.

### Collection and Submission of Evidence

- a. Ensure that all plant material submissions are dry prior to being packaged. Use paper bags or envelopes to prevent mold. Packaging wet or damp plant material can lead to evidence deterioration that may prevent testing. Allow wet plant material to air dry prior to packaging. Dirt, growing media and plant containers should not be submitted.
- b. Package sharps (such as razor blades) in a puncture proof container.
- c. Do not submit field test kits. Most kits contain strong acids which can leak and compromise the integrity of the evidence as well as are cause burns to the skin if contacted.
- d. Please advise the laboratory if any submitted items have been recovered from a body cavity and mark the contaminated evidence with the biohazard warning label and symbol.
- e. A secure seal is necessary for chain-of-custody; HOWEVER, it is not necessary to tape excessively or "mummify" because this makes evidence handling in the laboratory more difficult.
- f. Items that need to be tested separately should be packaged separately. This will avoid cross contamination of items.
- g. LSD in liquid form can be absorbed through the skin. It is also light sensitive. Handle with caution and wrap container with paper to block light.

### DO'S and DON'TS

**DO package different substances as separate items in their own outer container. For example a white powder (item 1), green tablets (item 2), blue tablets (item 3) should be listed on the RLS on three lines and packaged in three outer containers.**

**DO ensure the minimum size of the outer container is at least 5" x 7".**

**DO package sharp objects in clearly labeled, puncture proof containers.**

**DO completely dry all wet or freshly cut plant material before packaging in paper bags or envelopes.**

**DO clearly indicate on the RLS items associated with each suspect or probable cause items.**

**DON'T submit used field test kits.**

**DON'T submit hypodermic syringes or needles.**

**DON'T submit less than one ounce of suspected marijuana in possession cases.**

### FORENSIC ALCOHOL

The Forensic Alcohol Discipline quantitates the amount of ethanol present in blood and suspected alcoholic beverage samples. Urine samples are not accepted for analysis. This Discipline does not have the ability to test for drugs in blood samples. Drug toxicology testing for traffic related offenses is provided through a grant managed by the Crime Lab. Samples are sent to a toxicology laboratory via the Crime Lab. For further information refer to Drug Toxicology.

Blood alcohol collection kits and home brew collection kits are provided to Alaska law enforcement agencies. Please request kits through the Forensic Alcohol supervisor.

If blood is collected utilizing non-gray top tubes please contact the Forensic Alcohol Discipline regarding shipping and storage instructions prior to shipping evidence to the Crime Lab.

If you have any questions concerning the Forensic Alcohol Discipline's examination capabilities or evidence handling procedures, please contact the Forensic Alcohol supervisor Nita Bolz at 907-269-0599 or via email at [Nita.Bolz@alaska.gov](mailto:Nita.Bolz@alaska.gov). For general questions regarding case status, reports, or discovery information, please request via email at [dps.scdl.toxicology@alaska.gov](mailto:dps.scdl.toxicology@alaska.gov) including the agency case number in your request.

#### Blood Alcohol Analysis

- Collect blood samples utilizing a blood alcohol collection kit provided by the Crime Lab following the instructions inside the kit. The current kit contains 4 ten milliliter tubes. Use all tubes to collect whole blood following 17 Alaska Administrative Code 63.110.
- Clearly label blood tubes with the following information: suspect's name, collection date, collection time, and the blood collector initials.
- Do not collect samples at different times to try and establish an elimination rate. The lab will only test samples from the first collection time.

#### Beverage Alcohol/Homebrew Analysis

- For homebrew cases collect samples utilizing a homebrew collection kit provided by the Crime Lab following the instructions inside the kit.
- Do not use hard-ice powder inside the tubes.
- The Forensic Alcohol discipline will not analyze factory sealed commercial products.

#### DO'S and DON'TS

- DO** collect blood samples as soon as possible after the offense.
- DO** label all blood tubes with the name of the subject, date and time taken, initials of person collecting the samples.
- DO** handle all blood tubes using procedures to protect the chain of custody.
- DON'T** use an ethanol-based antiseptic to cleanse the person's skin.
- DON'T** submit blood collection implements (syringes, needles, lances, swabs, gauze, etc.)
- DON'T** submit urine for any type of testing.

### DRUG TOXICOLOGY

The Alaska Scientific Crime Detection Laboratory does not have the ability to test for drugs in evidentiary samples. Drug toxicology testing for traffic related offenses is provided through a grant managed by the Crime Lab. This grant is funded through the Alaska Highway Safety Office for the analysis of blood samples at a toxicology laboratory for highway related offenses only. Samples are sent to a contracted toxicology laboratory via the Crime Lab.

Probation offenses, police involved shootings, homicide and sexual assault offenses are examples of cases not covered under this grant. Any blood or urine samples collected in non-driving related offenses that require drug toxicology analysis may be submitted to a private laboratory by the investigating agency. The investigating agency will be responsible for the cost of direct submission to the private laboratory, testing, and continued storage or return of evidence to the investigating agency.

Blood alcohol analysis is performed by the Crime Lab for all offenses. Please refer to the Forensic Alcohol portion of this manual for further information.

If you have any questions concerning drug toxicology testing, please contact the Forensic Alcohol supervisor Nita Bolz at 907-269-0599 or via email at [Nita.Bolz@alaska.gov](mailto:Nita.Bolz@alaska.gov). For general questions regarding case status, reports, or discovery please request via email at [dps.scdl.toxicology@alaska.gov](mailto:dps.scdl.toxicology@alaska.gov) including the agency case number in your request.

#### Blood Drug Analysis

- a. In cases where DUI is suspected, the best toxicology sample to collect from the subject is blood. Urine samples will not be analyzed for drug toxicology in traffic related offenses.
- b. Blood samples submitted in DUI cases are only analyzed for drugs, other than alcohol, when specifically requested by the submitting authority. Currently, in DUI cases, blood drug testing is not performed if the blood alcohol level is 0.100 g/100mL or more unless a DRE examination was performed.
- c. Collect blood samples utilizing a blood alcohol collection kit provided by the Crime Lab following the instructions inside the kit. The current kit contains 4 ten milliliter tubes. Use all tubes to collect whole blood following 13 Alaska Administrative Code 63.110.
- d. Drug toxicology testing will only be performed on traffic related cases based on the conditions of the grant. Agencies must submit samples for drug toxicology testing in all other types of cases (sexual assaults, homicides, etc.) to a private laboratory and pay for the testing.

#### DO'S and DON'TS

- DO collect blood samples as soon as possible after the offense.**
- DO label all blood tubes with the name of the subject, date and time taken, initials of person collecting the samples.**
- DO handle all blood tubes using procedures to protect the chain of custody.**
- DON'T use an ethanol-based antiseptic to cleanse the person's skin.**
- DON'T submit blood collection implements (syringes, needles, lances, swabs, gauze, etc.)**
- DON'T submit blood samples for blood drug testing in non-traffic related cases.**
- DON'T submit urine samples to the crime lab.**

### BREATH ALCOHOL PROGRAM

The Breath Alcohol Program, as outlined in 13 Alaska Administrative Code Chapter 63, is responsible for the:

- certification, calibration and maintenance of the evidential breath testing instruments
- training and certification of breath test supervisors
- development of the breath test operator training program
- certification of breath test operators
- instrument and training records.

If you have any questions concerning the Breath Alcohol Program, please contact the Scientific Director Nita Bolz at 907-269-0599 or via email at [Nita.Bolz@alaska.gov](mailto:Nita.Bolz@alaska.gov). For general questions regarding training, operator status, or discovery information, please request via email at [dps.scdl.toxicology@alaska.gov](mailto:dps.scdl.toxicology@alaska.gov). Breath Test Supervisors can request an external gas cylinder via email at [dps.scdl.toxicology@alaska.gov](mailto:dps.scdl.toxicology@alaska.gov) or by contacting the Breath Alcohol Program directly.

The only evidential breath testing instrument approved for use in Alaska is the DataMaster DMT. Instruments are provided to local law enforcement agencies that have a dedicated analog modem line, a certified breath test supervisor, and upon approval by the Scientific Director.

Breath Test Operators must successfully complete a four hour course of instruction approved by the Scientific Director. This course is taught by certified Breath Test Supervisors. Breath Test Supervisors must successfully complete a twenty-two hour course taught by the Breath Alcohol Program staff. Breath Test Operator and Breath Test Supervisor certifications expire on December 31 of the third year after the year issued.

The Crime Lab website has additional information on the Breath Alcohol Program at [www.dps.alaska.gov/Crimelab/datamaster.aspx](http://www.dps.alaska.gov/Crimelab/datamaster.aspx). Information found there includes the verifications of calibration for the DataMaster DMT instrument, a list of current breath test operators, the current Breath Alcohol Testing Program Manual, and communications from the Scientific Director. These communications are memos posted regarding important events or information about the Breath Alcohol Program.

The Breath Alcohol Program provides expert testimony in the interpretation of blood and breath alcohol results. The Interpretation of Alcohol Results manual, which is available on Crime Lab website on the Quality Assurance Documents page, outlines the information that would be given in this testimony.

### FORENSIC BIOLOGY

#### OVERVIEW

A biological substance, such as, blood, semen, saliva, or tissue that leaves the human body and is left at the scene of a crime, may provide valuable information as to who was present at a scene and what events might have occurred. The value of this evidence can be greatly diminished if not properly collected, packaged, and preserved. In addition, due to the sensitivity of the DNA technology used by the Forensic Biology discipline, if proper precautions are not taken while collecting evidentiary samples, there is an increased likelihood of introducing contamination from a foreign DNA source unrelated to the crime. It is also possible to transfer unrelated sources of DNA between crime scene samples if the evidence is not packaged correctly.

#### PROCESSING OF EVIDENCE BY THE FORENSIC BIOLOGY SECTION

The initial examination performed by the Forensic Biology discipline is screening the evidence to identify the possible presence of a biological substance (i.e., blood or semen). Probative biological evidence can then be analyzed using a DNA technology specifically designed to test minute amounts of biological material at 16 different areas of the DNA. The DNA profile obtained from the "questioned" evidence is compared to the DNA profile from evidentiary known samples (victim, suspect, or elimination buccal samples) to determine if an individual is included or excluded as a possible source of the biological substance. If no suspect has been identified, the foreign DNA profile may be searched against the DNA profiles in the DNA database, CODIS, which is comprised mainly of DNA profiles from convicted offenders and individuals arrested for specific crimes (as per AS 44.41.035), to aid law enforcement in identifying a possible perpetrator.

#### DEFINITIONS

##### Biological Material

Body fluids such as blood, seminal fluid or saliva, or a biological substance such as hair and tissue (muscle, fetal material, etc.)

##### Combined DNA Index System (CODIS)

A collection of DNA profiles primarily from persons arrested or convicted of certain misdemeanors and felonies as specified in AS 44.41.035. The CODIS database also contains DNA profiles obtained from crime scene samples, unidentified human remains, missing persons, and relatives of missing persons.

##### Contact or Touch DNA Evidence

Evidence resulting from casual contact by an individual with a surface or material. This would include primarily objects touched by an individual's hand(s), such as gun grips, triggers, knife handles, steering wheels, etc.

##### Deoxyribonucleic Acid (DNA)

The genetic material found in various body tissues (muscle, fetal tissue, skin, etc.) and body fluids (semen, vaginal fluid, blood, saliva, etc.). Because an individual's DNA is the same from cell-to-cell within the body and is different from individual-to-individual, DNA can be used to determine whether a biological substance may have been deposited by a specific individual.

### **Offender Kit**

A kit used for the collection and preservation of statutorily mandated DNA samples (from convicted offender and arrestees) for entry in the DNA database.

### **DNA Profile**

The combined results that are obtained when testing DNA at several locations on various chromosomes; from the nucleus of the cell. The DNA comprising an STR profile is inherited from both biological parents.

### **Y-Chromosome DNA**

Male specific DNA found in the nucleus of most cells of the body. This type of DNA is inherited paternally. All males within a family (e.g., father, grandfather, brother, uncle, and cousin) will have the same Y-chromosome DNA profile, except where mutations occur.

### **Semen**

A biological substance secreted by males that consists of a combination of seminal fluid and spermatozoa

### **Seminal Fluid**

A biological fluid produced by males for the transport of spermatozoa. May be absent of spermatozoa in vasectomized males or males with certain medical conditions.

### **Spermatozoa**

The male cell involved in reproduction; carries one-half of the genetic information for a new individual

### **Wearer DNA**

DNA recovered from an article of clothing in an effort to identify the wearer of the garment

### **CAPABILITIES AND SERVICES**

The primary function of the Forensic Biology discipline is the identification of biological material and the use of DNA analysis to determine whether the biological material could have originated from a specific individual.

The Forensic Biology discipline provides three types of service: biological screening of forensic casework, DNA analysis of forensic casework, and DNA analysis of offender samples. Separate scientific reports are issued for biological screening and DNA testing of forensic casework.

The laboratory also issues CODIS hit letters to notify law enforcement when there is a DNA match between samples in the DNA database. CODIS hits are investigative leads, typically identifying a potential source of biological material from crime scene evidence.

### **Biological Screening**

- 1) **Blood evidence** – Blood evidence may be encountered in homicides, assaults, sexual assaults and property crimes. Biological screening for blood answers three questions:
  - a) Are there stains present on an item which are visually consistent with blood?
    - This is typically accomplished by examining items using stereomicroscopy.
  - b) Is the stain blood?

- The laboratory uses a presumptive chemical test to evaluate potential blood stains. A positive presumptive test result is indicative of, but not confirmatory for, the presence of blood.
- c) If the stain is blood, is it human?
- Typically, presumptive positive stains will proceed directly to DNA analysis. Occasionally, it is necessary to identify a stain as human or animal. The laboratory uses an immunoassay test card to identify stains that are human (or higher primate) in origin.
- 2) **Semen evidence** – Evidence in sexual assault cases is often screened for the presence of semen. Biological screening for semen answers two main questions.
- a) Are there stains present on an item which are visually consistent with semen?
- This is typically accomplished by examining items with an alternate light source.
- b) Is the stain semen?
- The laboratory uses a presumptive chemical test to evaluate potential semen stains or swabs that may contain semen. A positive presumptive test result is indicative of, but not confirmatory for, the presence of semen.
  - Stains that are presumptive positive for semen are examined for the presence of spermatozoa. The presence of spermatozoa is a confirmatory microscopic analysis.
  - Stains/swabs that do not contain spermatozoa may be tested for the presence of PSA (prostate specific antigen), a protein that is strongly indicative of semen, although not confirmatory.
- 3) **Hair evidence** – Hair evidence can be relevant in many types of cases. Microscopy is used to examine hair evidence.
- a) Is the evidence a hair?
- i) If the evidence is hair the following questions are answered.
- b) Are the hairs human or animal?
- i) Once identified, animal hairs must be sent to a private lab, if further analysis is required.
- c) Are the human hairs suitable for STR DNA analysis?
- Hairs not suitable for analysis at the laboratory may be suitable for Mitochondrial DNA analysis by a private laboratory.
- 4) **Saliva evidence** – Saliva evidence is often relevant in sexual assaults and property crimes. The laboratory does not screen specifically for saliva. Samples that potentially contain saliva are forwarded on for DNA analysis.
- 5) **Skin cell evidence** – Skin (epithelial) cells are potentially relevant in most types of crimes. The laboratory does not screen for epithelial DNA. Samples are typically collected by swabbing an item and sending the swab on for DNA analysis. Items sampled vary from swabs from an individual's body where forceful skin to skin contact between individuals may have occurred, to swabs of items thought to be handled extensively by an individual.
- 6) **Vomit/Urine/Fecal Samples** – The laboratory does not perform biological screening for these sample types owing to a lack of reliable tests available for this purpose. DNA testing on these types of samples is often unsuccessful with current laboratory methods and therefore, not routinely performed. Contact the discipline supervisor or technical manager if this type of analysis is required in a specific case.

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### DNA Testing

- 1) **STR Testing on Forensic Casework** - Samples retained in the biological screening process are subsequently processed through DNA analysis in an attempt to determine if the biological material may have originated from a specific individual. The analysts use a commercially available DNA typing kit which permits the scientist to simultaneously test several different areas of the DNA. DNA profiles for samples whose origin is in question are compared to DNA profiles from reference (known) samples. There are three possible results of a DNA comparison: individual is excluded as the source of DNA, individual cannot be excluded as the source of DNA, no conclusion can be made (inconclusive). If the DNA profile obtained from the questioned sample is consistent with the DNA profile obtained from the known sample (i.e. individual cannot be excluded), a statistical assessment is performed to give weight to the conclusion.
  - a) **CODIS** – DNA profiles (from crime scene evidence) that either match a suspect or can be reasonably believed to be attributable to the perpetrator of a crime, can be entered into the DNA database to generate investigative leads.
- 2) **STR Testing on Convicted Offenders/Arrestees** – The laboratory is the repository for the statutorily mandated DNA samples from certain convicted offenders and arrestees. The laboratory generates DNA profiles for the offender samples and enters them into the CODIS (DNA) database.
- 3) **Criminal Paternity/Maternity** - The laboratory performs DNA analyses in alleged sexual assault cases that result in the conception of a child. This type of analysis requires reference samples from both biological parents (or alleged biological parent) as well as the child. For live births or late term fetuses, a buccal swab is preferred. Blood or tissue samples may be submitted from miscarried or aborted fetuses. The laboratory cannot typically perform DNA analysis on fetal tissue less than 8 weeks gestation.
- 4) **Y-Chromosome DNA Testing (future capability)** - This testing is utilized primarily in cases with mixtures of DNA where there is a high female to male ratio, and in cases where seminal fluid is indicated but the sample is absent of spermatozoa. At this time, Y-chromosome DNA profiles are not searchable in a DNA database. Therefore, this testing will only be recommended in cases with known reference samples for the potential male contributors.

### EVIDENCE COLLECTION GUIDELINES

Biological fluids and body fluid stains are valuable evidence which can be used to either associate a victim or suspect with a crime/crime scene or eliminate them from consideration. The most frequently encountered biological fluids are blood, seminal fluid, and saliva.

### Safety Precautions

It is imperative when collecting or packaging biological evidence for submission to the laboratory that clean latex gloves be worn and changed often. Depending on the crime scene, shoe covers, gowns, masks, head covers, and safety glasses may also be appropriate. Body fluids, wet or dry, have been shown to carry disease. Dry stains may flake when disturbed or collected, sending minute particles airborne. These may be absorbed through mucus membranes (eyes, nose, mouth, etc.), open cuts, or chapped skin. Therefore, all biological materials and fluids must be handled with universal precautions. Wearing the appropriate protective clothing also helps minimize contamination of the evidence sample with your DNA.

### General Collection Guidelines

All biological evidence should be air-dried prior to submission to the laboratory. Refrigerating the evidence will retard bacterial growth on wet material. However it will not stop the growth which can then lead to degradation of the biological material. The sooner the biological evidence is dried, the more likely useful information can be obtained from the evidence through DNA analysis.

During the collection, air-drying, or packaging of any body fluid stains, caution should be used to ensure that a stained area from an item of evidence does not come in contact with another stained or unstained area. This applies to outer surfaces and inner surfaces. For example, a shirt should not be folded or rolled so that a stain on the front contaminates any stained or unstained area on the back or inside of the shirt. A barrier, such as paper or cardboard should be placed on the inside of the shirt, as well as under and over the garment to prevent stained areas from coming in contact with each other.

When air drying articles stained with body fluids, place them on or over a piece of clean paper. Any debris which falls from the material onto the paper during the drying process will be collected when the paper is folded with the article prior to packaging, labeling and sealing.

Body fluid evidence can be contaminated by the crime scene officer's own body fluids. The perspiration on the officer's hands may contaminate the cotton swabs used to collect the body fluids, or talking while collecting samples may spread the officer's saliva on the evidence. To prevent such contamination protective clothing (i.e., latex gloves, gowns, masks, and head covers) should be worn while collecting the evidence.

To avoid possible sample-to-sample contamination, change latex gloves (and other applicable protective wear) as necessary when collecting evidence.

When possible, the evidence (once packaged) should be submitted to the laboratory as soon as possible. Otherwise, the items should be stored in an appropriate secured storage location until submission to the laboratory is possible. To minimize degradation of DNA, evidence should not be stored in extreme humidity or at elevated temperatures. Dry, cool storage locations are best.

### Body Fluids on Non-Porous Surfaces (i.e., bottles, cans, window, knife, firearm, body, etc.)

1. Double-Swab Method: (For samples taken from non-porous objects like bottles, cans, windows, knives, firearms, etc.) A sterile swab is moistened with sterile/distilled water (WET) and the area of interest is swabbed. Using the second sterile swab (DRY) immediately re-swab the area. Let the swabs dry before packaging. Two swabs only should be collected per area of interest.
2. Single-Swab Method: (For samples taken from areas of the body such as external genitalia, finger/hand swabs, neck swabs due to possible strangulation, etc.) Moisten one sterile swab with sterile/distilled water and swab the area of interest. Let the swab dry before packaging. One moist swab only should be collected per area of interest.
  - Note: Double-tipped swabs and Q-tips should not be used.
  - Note: Avoid scraping crusts due to risk of airborne flakes.

Swabs from an item of evidence, such as the mouth of a bottle or an area of the grip of a firearm of no value for latent print examination, can be submitted for DNA analysis while the actual item of evidence can be submitted for examination by the Latent Print or Firearms disciplines. If it is not clear where to

## Laboratory User's Guide

Issued: 10/24/2014  
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Version: LUG 2014 R1  
Status: Archived

swab the item, it is best to submit the entire item of evidence to the laboratory for evaluation. If an item has been swabbed by the agency, the laboratory will not analyze the item the swab was taken from for DNA analysis.

The Forensic Biology Section no longer analyzes control swabs, therefore there is no need to collect or submit a control swab to the laboratory.

### **Body Fluids on Porous Surfaces (i.e., clothing, bedding, carpet, untreated wood, etc.)**

Submit the air-dried item of evidence if possible. For large items (large carpets, upholstered furniture, etc.) it may be necessary to cut out the stained areas or swab the stained area with a sterile swab moistened with one to two drops of water. Saturate one swab with the stain before absorbing onto the next swab. Allow the swab(s) to air dry or place the swab(s) in a new labeled swab box for drying. It is not necessary to collect more than 2 saturated swabs for submission to the laboratory.

If cuttings/swabbings are taken from different areas on an item, package the cuttings/swabbing from each area separately. The packages from separate cuttings/swabbings of a single item may be sealed individually and then combined into a larger package.

- Note: Double-tipped swabs and Q-tips should not be used.
- Note: Avoid scraping crusts due to risk of airborne flakes.

The Forensic Biology Section no longer analyzes control swabs, therefore there is no need to collect or submit a control swab to the laboratory.

### **Sexual Assault Evidence Collection Kit (SMART Kit)**

A kit used for the recovery of physical evidence from the body of the potential victim or suspect of an alleged sexual assault. A specialized kit exists for pediatric victims. The kit contains supplies to recover foreign secretions and trace evidence (i.e., hairs) from the body. In addition, the kit contains supplies for the collection of a known sample from the individual for comparison with the foreign secretions and hairs. Kits are available for law enforcement officers and hospitals, requests for kits should be sent to [dps.crime.lab.web@alaska.gov](mailto:dps.crime.lab.web@alaska.gov).

Medical personnel are urged to follow the instructions supplied with the kit and to complete all portions of the kit paperwork. The forensic history in particular, is essential to laboratory scientists during their analysis.

Only underwear worn by the subject to the exam, are to be included in the kit itself. Other garments should be packaged as separate items of evidence.

- If the underwear worn to the exam are not the same ones worn immediately post event, law enforcement should attempt to obtain those underwear and submit them as a separate item of evidence. The underwear worn immediately post event are most likely to contain biological materials related to the event.

The kit should be sealed immediately upon completion and initialed by the examining clinician/doctor and turned over to law enforcement for submission to the laboratory.

### Contact DNA Evidence

Submit the item of evidence or take a swabbing of the evidence with a single sterile cotton swab that has been slightly moistened with one (1) to two (2) drops of water. Allow the swab to air dry or place the swab in a new labeled swab box for drying. A single swab is recommended for collection to concentrate the foreign DNA that may be present and to increase the likelihood of collecting sufficient biological material to obtain a DNA profile.

- Note: Double-tipped swabs and Q-tips should not be used.

### Known/Reference Buccal Swabs

Buccal swabs are collected by taking two (2) sterile cotton swabs and swabbing the inner cheeks of the mouth. The swabs should be rotated during the collection process to maximize collection of cells. Let swabs dry then place both swabs together into one labeled envelope. It is not necessary to collect separate samples from the left and right inner cheeks. This is considered all one sample.

Reference samples should be collected from all persons suspected of involvement in an investigation, who may be contributors of biological evidence. These samples are part of the SART kit, but must be collected separately for persons on whom a SART kit has not been collected.

“DNA on file” with the DNA database (CODIS) is NOT an acceptable substitute for an evidentiary known sample with a proper chain of custody. Known/reference samples should be collected for each separate criminal investigation that an individual is associated with. These samples should be submitted along with other evidentiary material to ensure that laboratory testing is not suspended pending receipt of known samples.

### DNA Database Collection Kit

These kits are exclusively for use in collecting the statutorily mandated samples from arrestees and convicted offenders. The kit contains instructions for the proper collection of the samples (buccal swabs and thumb prints) and completion of the information card. These kits are NOT for use in collection of the required known/reference samples for a criminal investigation.

### Products of Conception (for Criminal Paternity Investigations)

Tissue collected from an aborted fetus that is 10 to 12 weeks old may contain identifiable body characteristics (i.e., hands and feet) that can easily be isolated by the DNA analyst for testing. If the fetus is less than 10 weeks old, the body characteristics may not be easily identified by the examiner.

When possible, request the medical doctor to isolate a portion of the fetal tissue from the maternal tissue and place the fetal tissue into a hard plastic container (i.e., specimen cup). Alternatively, the entire aborted fetal material may be submitted.

- Note: The fetal tissue/material should not be stored in a saline solution or any other type preservative.

Submit the container to the laboratory the same day. If it is not possible for the aborted fetal tissue/material to be submitted to the laboratory the same day, place the container into a refrigerator and submit to the laboratory the next day. Within a short period of time fetal tissue/material stored in plastic, even if refrigerated will promote bacterial growth, which can destroy biological material and potentially preclude the examiner from obtaining DNA results.

### **CASE MANAGEMENT**

Cases submitted for biological screening and/or DNA testing are prioritized for analysis. Crimes against a person are given priority over property crimes, with the most severe offenses being placed ahead of other cases.

The number of samples analyzed will be kept to a reasonable number and limited to relevant items based on the case synopsis. Once probative results are obtained, additional analysis will not be performed.

Analysis cannot proceed without submission of the required known samples. The submitting agency should contact the Forensic Biology discipline supervisor if circumstances prevent the agency from collecting the required knowns (i.e. unable to obtain search warrant or unable to locate individual).

When the required known samples are not received within 30 days of the original request for analysis, the request may be inactivated and evidence may be returned to the submitting agency. Requests will be reactivated upon receipt of the required known samples with a new Request for Laboratory Services (RLS) form. It may be necessary to resubmit items that were returned to the submitting agency.

The following guidelines, utilized by laboratory personnel in sample selection, have proven effective, but may vary slightly on a case-by-case basis.

#### **1. Sexual Assault Cases**

Known – Victim(s) - required

Known – Suspect(s) – required except in unknown suspect cases

Known – Consensual sex partner(s) – recommended when consensual sexual contact occurred within 5 days

Two to three questioned samples

#### **2. Non-Sexual Assault Cases**

Known – Victim(s) - required

Known – Suspect(s) – required except in unknown suspect cases

Typically, up to three questioned samples will be analyzed. Exceptions may occur based on the number of individuals involved and the number of items with probative value, essential to either proving or disproving the alleged events.

#### **3. Homicide Cases**

Known – Victim(s) - required

Known – Suspect(s) - required except in unknown suspect cases

The number of questioned samples will be determined based on the number of individuals involved and the number of items with probative value, essential to either proving or disproving the alleged events.

#### **4. Criminal Parentage Cases**

Known – Mother or Alleged Mother

Known – Father or Alleged Father

Known – child or product of conception

No partial submissions will be accepted, unless dictated by case circumstances (such as mother is deceased or maternity is in question and the father is unknown).

### 5. Property Crime Cases

Known – Victim(s) – required in cases where tested items were handled by victims (ex. vehicle theft)

Known – Suspect(s) - required except in cases with no known suspect

Typically, only one or two questioned samples will be analyzed. Bloodstains and saliva samples (e.g. cigarette butts, mouth areas of cans and bottles) are most likely to yield DNA profiles suitable for comparison.

Contact DNA samples will be limited to items brought to and/or left at the scene by the suspect. Items inherent to a scene that were only briefly touched or handled by a perpetrator do not typically yield interpretable DNA profiles and will not typically be processed by the laboratory.

Only steering wheel and gear shift contact/touch swabs will be processed from vehicles, as these have proven the most likely to yield interpretable DNA profiles.

#### **The following will not be processed by the laboratory:**

- The laboratory does not perform biological screening and/or DNA analysis on controlled substance cases.
- The laboratory will not perform DNA analysis on items dusted for fingerprints prior to swabbing, as fingerprint brushes have been shown to be a potential source of DNA contamination. The discipline supervisor or technical manager should be contacted to request an exception. Items that require both DNA and latent examination may be submitted directly to the laboratory for examination.
- The laboratory will not perform DNA analysis on charred or burnt evidence, and fired cartridge casings as these items have been shown to routinely yield little to no interpretable DNA.
- The laboratory will not perform DNA analysis on items of evidence directly taken from a subject in a possession case (i.e. body cavity, pockets, or waistband).

#### **RUSH Analysis**

The laboratory collaborates with the Department of Law (DOL) to ensure that analysis is completed in a timely manner for cases with pending court dates/deadlines or where there is an immediate threat to public safety. Requests for RUSH analysis shall be made by the assigned prosecutor, in writing, to a member of the DOL DNA Backlog Committee. RUSH analysis will not be approved if the laboratory has not received the required known samples.

#### **Communication**

Often, the assigned laboratory analyst will require additional information or evidence to complete analysis. It is imperative that law enforcement/prosecutors reply to requests in a timely manner to prevent long delays in evidence processing.

When requests for additional information or evidence (typically known samples) are not replied to within 30 days, requests for analysis may be inactivated and evidence may be returned to the submitting agency. Requests will be reactivated upon receipt of the information or the required known samples with a new Request for Laboratory Services (RLS) form. It may be necessary to resubmit items that were returned to the submitting agency.

### FIREARMS/TOOLMARKS

#### Contact Us

If you have any questions concerning the Firearm/Toolmark examination capabilities, please contact the Firearms Discipline supervisor, Dale Randolph Bivins at 907-269-0722 or [dale.randolphbivins@alaska.gov](mailto:dale.randolphbivins@alaska.gov).

#### Overview

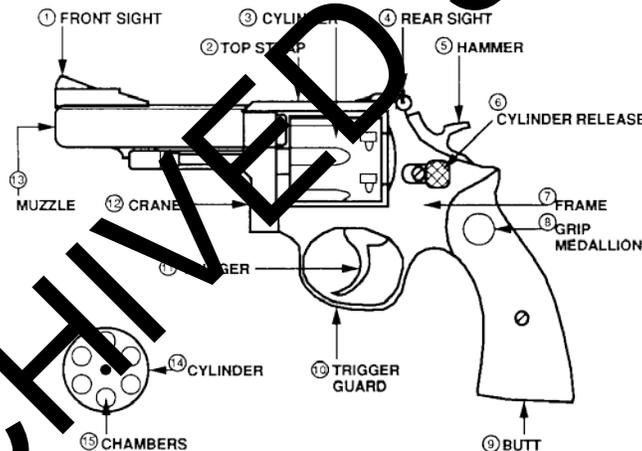
The primary concern of the firearm examiner is the examination of firearms and ammunition components in an attempt to associate a particular firearm as having fired particular ammunition components, through microscopic study, to the exclusion of all other firearms.

### FIREARMS NOMENCLATURE & DEFINITIONS

#### HANDGUNS

##### Revolvers

A firearm, usually a handgun, with a cylinder having several chambers so arranged as to rotate around an axis and can be discharged successively by the same firing mechanism.



##### Pistol

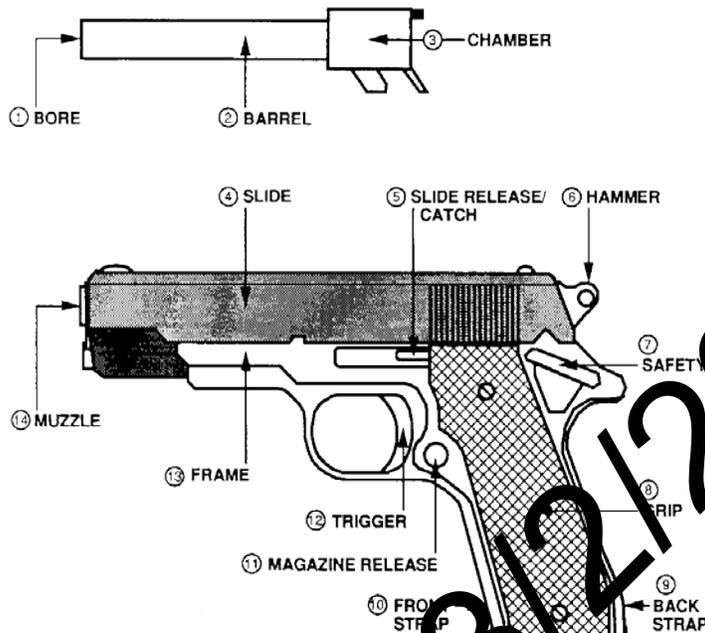
A repeating firearm requiring a separate pull of the trigger for each shot fired, and which uses the energy of discharge to perform a portion of the operating or firing cycle.

##### Magazine

A container for cartridges which has a spring and follower. The magazine serves to provide a new cartridge for loading into the chamber of the firearm during the firing cycle.

##### Clip

A detachable metal frame or box, generally disposable, which contains cartridges and serves to facilitate the loading of an internal magazine. *Not to be confused with a magazine.*

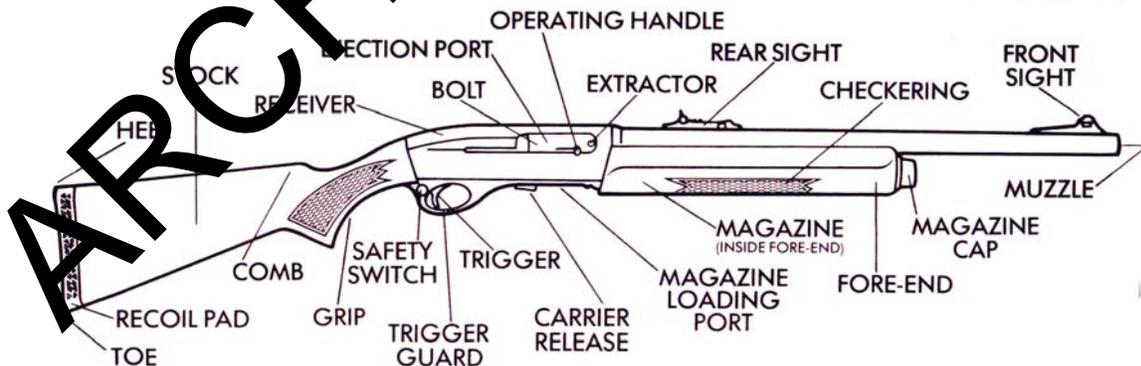


**SHOULDER GUNS**

**Rifle** A firearm having rifling in the bore and designed to be fired from the shoulder.

**Shotgun** Generally, a smooth bore shoulder firearm designed to fire a shotshell containing numerous pellets or sometimes a single projectile (slug). Shotguns can also be equipped with a rifled barrel.

**Semiautomatic Rifle or Shotgun Schematic**



# Alaska Scientific Crime Detection Laboratory

## Laboratory User's Guide

Issued: 10/24/2014  
Effective: 10/24/2014

Version: LUG 2014 R1  
Status: Archived

### **AMMUNITION COMPONENTS**

- Bullet** A non-spherical projectile designed for use in a rifled barrel.
- Cartridge** A single unit of ammunition consisting of the cartridge case which contains a primer, propellant, and the bullets or projectiles.
- Discharged Cartridge Case** The metallic container, which is no longer filled with the components that originally, comprised the cartridge.
- Shotshell** A single unit of ammunition consisting of the shotshell hull, which contains a primer, propellant, and one or more projectiles.
- Discharged Shotshell** The shotshell hull, may be plastic or paper, which is no longer filled with the components that originally comprise a shotshell.
- Shotshell Wad** The components of a shotshell, which typically separate the powder and projectiles, and are used to adjust the volume of the contents of the shotshell. Wads are made of a variety of material types (e.g., circular cardboard, fiber or felt disks, plastic one-piece or multi-piece shot cup and/or shot columns).
- Slug** A term applied to a single projectile loaded into shotshells.
- Shot** Pellets ranging in size, normally loaded in shotshells. (Note: there are several cartridges currently available for handguns that contain pellet loads)

### **CAPABILITIES AND SERVICES**

#### **Mechanical Condition of Firearm**

Each firearm that is submitted to the firearm section is examined to determine whether it is in mechanical operating condition and it is test fired, when possible. This examination includes the operability of the safety features, physical characteristics of the firearm and trigger pull. In addition, examinations can be conducted to determine whether the firearm will or will not fire without pulling the trigger, when necessary. Also, capability of full automatic fire is determined.

#### **Identification of Firearm Parts**

Firearm parts found at a crime scene may be identified as to:

- a. The type of firearm from which they originate
- b. Whether the part came from an evidence firearm (Fracture Match)

#### **Identification of Brand**

Bullets, wad components, cartridge cases and shotshells recovered at a scene or from a body may be identified by brand.

#### **Possible Brand and Caliber of Firearm**

By determining the class characteristics (caliber, number of lands and grooves, direction of twist and their dimensions, breechface and/or firing pin shapes, other various markings) exhibited on fired

ammunition components (bullets, cartridge cases, shotshells), the firearm examiner may be able to provide information concerning the brand and type of firearm which the component was fired. This may be particularly useful when no firearm has been recovered.

### **Bullet Identification to a Particular Firearm**

When a rifled firearm is manufactured and through its use, unique toolmarks are left on the inner surface of the barrel. When the firearm is fired, striated marks are engraved in the bullet. These striations are individual to a particular firearm.

When a firearm is submitted to the laboratory for comparison, the examiner tests the firearm and uses a comparison microscope to compare the striations of the test fired bullet to those present on the evidence bullet. By this microscopic study of the markings on both bullets, the examiner can determine if the evidence bullet was fired from the submitted firearm. The following conclusions may be reached:

- a. The bullet was identified as having been fired from the firearm.
- b. The bullet was eliminated as having been fired from the firearm.
- c. It is not possible to identify or eliminate the bullet as having been fired from the firearm.

### **Firearm not Recovered**

Bullets and cartridge cases/shotshells recovered from the same or different incidents can be compared to determine if they were fired from/in the same firearm.

### **Bullet Fragments**

The firearm examiner may be able to provide the same type of information from a bullet fragment as that of a whole bullet. A bullet fragment can be identified as having been fired from a particular firearm if sufficient marks are present. The quantity and quality of these marks are determined by microscopic examination. All bullet fragments should be collected and submitted to the laboratory.

### **Cartridges**

If the cartridge has been cycled (loaded, extracted and ejected) through the action of a bolt-action, lever-action, slide-action or autoloading firearm, the markings left by this process may be associated with a particular firearm. In some cases markings left on cartridges may be associated to a particular magazine. If these types of marks are present on cartridges, it may also be possible to associate them to cartridge cases, if no firearm has been recovered.

### **Cartridge Cases**

Generally, there are five surfaces of a firearm that may leave identifiable marks on various areas of a cartridge case: breechface, firing pin, extractor, ejector, chamber. Generally, if a fired cartridge case can only be identified to a particular firearm by the extractor and/or ejector mark(s), this only identifies the cartridge case as having been extracted and/or ejected (i.e., cycled) in a particular firearm.

### **Identification of Possible Brand of Firearm**

By determining the class characteristics (caliber, type of breechface marks and firing pin shape) exhibited on a fired cartridge case, the firearm examiner may be able to provide information concerning the type and brand of firearm which fired the cartridge case(s). This may be particularly useful when no firearm has been recovered.

### Shotshells

These may be associated to a firearm in the same manner as cartridges. The gauge may be determined and the brand of the components may be characterized.

### Discharged Shotshells

These may be identified in the same manner as a fired cartridge case. In addition, the components that may have been commercially loaded into the shotshell may be identified.

### Shotshell Components

Recovered wad material and/or projectiles may be identified as to gauge, type, and/or brand of commercial manufacture.

### Distance (Proximity) Determination

The approximate distance the muzzle of a firearm was from an object at the time of firing may be determined by examining clothing or other materials for the presence of gunshot residues. Gunshot residues are discharged from the firearm in the form of burnt, partially burnt and un-burnt gunpowder particles, vaporous lead, and particulate metals. When packaging objects thought to contain gunshot residues, use packaging techniques that protect the surface and minimize cross-contamination.

Generally, the firearm and all ammunition components associated with the firearm should be submitted along with the object to allow for a thorough examination for approximate distance. If no firearm is available for submission, the laboratory can still examine the object for the presence of gunshot residue. However, distance determination when no firearm is available is limited to contact gunshots.

Pellet patterns can also be examined for distance determination based on the rate of pellet spread over a given distance for a particular weapon and ammunition.

### Reconstruction/Trajectory Analysis

The analysis of objects brought to the laboratory can be conducted to aid in the investigation for determination of trajectory and origin of the shots fired, help locate other pertinent evidence, and help determine the position of the victim and/or the shooter.

## COLLECTION GUIDELINES

**ITEM** - Firearm (handgun or shoulder gun)

**METHOD** - All firearms to be submitted to the laboratory should be made safe. Unload firearms after properly documenting the cylinder in revolvers or the chamber and magazine in pistols, rifles and shotguns. Package firearms in a rigid container, seal, mark container and indicate condition of firearm on container as **LOADED** or **UNLOADED**. Firearms submitted for DNA must be sealed with tape over all edges and any openings (such as holes in the box) prior to submission (see example in General Submission of Evidence).

**DISCUSSION** - Safety is the first consideration; therefore, firearms should be unloaded prior to delivery to the laboratory. If this is not possible, call the firearm supervisor to discuss. Packaging material may rub latent prints and destroy evidence; therefore, it is important to package in a manner so the gun contacts the packaging material as little as possible. Documenting the cylinder in a revolver may

# Alaska Scientific Crime Detection Laboratory

## Laboratory User's Guide

Issued: 10/24/2014  
Effective: 10/24/2014

Version: LUG 2014 R1  
Status: Archived

help determine the sequence of events and aid in scene reconstruction. If latent prints are not a concern, package in a rigid container with proper labeling. It is requested that you not package guns in plastic.

**ITEM** – Bullets, shot pellets, slugs and shotshell wads

**METHOD** - Recover using rubber tipped forceps or latex examining gloves, so as not to contaminate or add trace or other biological evidence. Place in a plastic zip lock type bag. Package projectiles separately, clearly label and seal properly. It is currently suggested not to mark the item itself. Bullets, etc. collected from doctors in the emergency room should be washed off with water (not disinfectants) prior to submission and air dried before packaging. Body fluids may destroy some microscopic markings.

**DISCUSSION** - Handling these items with your fingers may add additional trace or biological evidence. Bullets, etc. should be handled as if biohazards are present and in a manner to protect any DNA that may be present. The chain of custody can be maintained by marking the packaging material and carefully noting your actions.

**ITEM** - Cartridge, cartridge case, shotshell

**METHOD** - Recover using rubber tip forceps or gloves so as not to obliterate fingerprints, or damage trace evidence. Cartridges, cartridge cases, and shotshells may be placed in a ziplock bag if fingerprints are not a concern. Properly label and seal the container. If fingerprints are a concern, package in a manner that will immobilize the item and/or reduce the contact with the packaging material. Never mark the headstamp area or other portions of the cartridge, cartridge case, or shotshell. In incidents where the use of sabot ammunition is suspected, the investigator should be aware that the sabot may have separated from the projectile (bullet or slug).

**DISCUSSION** - Handling these evidence items may destroy fingerprint evidence. The marks in the headstamp area and other portions are used in the laboratory comparison and identification process. Ammunition found at the scene or in the suspect's house may be helpful in the comparison process. The sabot bears the identifying marks (the bullet/slug in this instance does not).

**ITEM** - Clothing for gunpowder/gunshot residues related to distance (proximity) determination

**METHOD** - Completely air dry the clothing. Place clothing item flatly onto a clean piece of butcher paper sufficiently larger than the item itself. Properly label and seal the container. Also, please submit the autopsy report from the M. E., the police report, room size, constraints, witness/suspect statements, and any information that may be pertinent to the investigation.

**DISCUSSION** - This packaging approach ensures that the area of the clothing bearing the gunshot residue will not come in contact with other areas of the garment. This is also a good procedure for bloody garments. Plastic will cause the biological material on the clothing to deteriorate, even if it is thoroughly air dried.

### Toolmarks Overview

Toolmark Identification is a discipline of forensic science which has as its primary concern to determine if a toolmark was produced by a particular tool. Toolmark cases may involve any type of criminal activity, ranging from burglary to homicide. Toolmarks may be encountered on many varied surfaces including wood, metal, and even human tissue; therefore, all cases and many surfaces should be considered for potential toolmarks.

The examination of toolmarks involves an attempt to associate a particular toolmark with a particular tool, through microscopic study, to the exclusion of all others. Toolmark examinations also include identification of objects which forcibly contacted each other, were joined together under pressure for a period of time and then removed from contact or were originally a single item before being broken or cut apart.

### TOOLMARK NOMENCLATURE & DEFINITIONS

**Tool** An object used to gain mechanical advantage; the harder of two objects which when brought into contact with each other, results in the softer one being marked.

**Toolmark** A mark produced on a softer receiving surface by a harder object.

**Cast** The reproduction of a toolmark on the surface of a tool using a molding material such as silicone rubber, Mikrosil™, Forensic S™, Kerr Permlastic™ or other suitable material.

### CAPABILITIES AND SERVICES

#### **Examination of the Toolmark Prior to the Recovery of a Suspect Tool**

The laboratory can provide valuable investigative information to the investigating officers through the careful examination of the toolmark. The possible determinations are as follows:

1. Type of tool used (class characteristics)
2. Size of tool used (class characteristics)
3. Unusual features of tool (class and/or individual characteristics)
4. Action employed by tool in its operation
5. Most importantly, examination can determine if the toolmark is of value for identification purposes

#### **Examination of the Suspect Tool with a Toolmark**

The tool will be examined for foreign deposits such as paint or metal for comparison against the marked object. This trace evidence may help to associate the tool with the marked surface; however, the trace evidence in these circumstances usually provides class characteristic evidence.

# Alaska Scientific Crime Detection Laboratory

## Laboratory User's Guide

Issued: 10/24/2014  
Effective: 10/24/2014

Version: LUG 2014 R1  
Status: Archived

After the examination for foreign materials, class characteristics are compared to establish consistency. Finally, several test marks are made with the suspect tool, and microscopic comparisons of the test against the questioned toolmark are made. Three possible conclusions may be reached:

1. That the tool produced the toolmark
2. That the tool did not produce the toolmark
3. That there are not sufficient corresponding individual characteristics between the known and the unknown to determine if the tool did or did not produce the mark

### COLLECTION GUIDELINES

#### **ITEM** - Toolmarks

**METHOD** - If the object bearing the toolmark is reasonably mobile, bring the entire object to the laboratory. Protect the toolmark area by covering it carefully with paper; however, always consider latent fingerprints when packaging. If the object is particularly large or is completely immobile, the toolmark area may be cut out (depending on the situation, e.g., security considerations and damage to property) or cast using a suitable casting material. Package the toolmark cast in a rigid container (such as a pill box), properly seal and label. Include a range or orientation photographs, sketches and reports.

DO NOT place suspect tool into toolmark as it could destroy markings.

**DISCUSSION** - The actual toolmark is preferred over a cast of the toolmark; therefore, the microscopic marks need to be protected to provide the best possible results. Placing the tool into the toolmark may destroy microscopic detail. Submission of photographs, sketches and reports may help the examiner determine the action of the tool.

#### **ITEM** - Tools

**METHOD** - Package in a manner to protect the working end of the tool (e.g., on a screwdriver place a paper fold over the tip). After the working end has been protected, place in a rigid container.

### SPECIALIZED TOOLMARK EXAMINATIONS

#### **Fracture Match**

Fracture match examinations are conducted to associate items such as broken bolts, automobile ornaments, tips of knives and screwdriver blades with objects from which they were broken.

### COLLECTION GUIDELINES

**ITEM** - Items to be examined for fracture match (examples: broken tools, glass, vehicle parts, etc.)

**METHOD** - Package in a manner that will protect the edges of the items to be fracture matched. For example, when submitting glass, wrap and package each piece separately and clearly label and seal. In

the request clearly indicate which items should be compared. For fragile items such as paint, a rigid container cushioned with tissue is probably best.

**DISCUSSION** - The edge will contain the areas to be fracture matched. If these areas are damaged it may prevent any possibility of a successful match.

### **MISCELLANEOUS PRESSURE OR CONTACT EXAMINATIONS**

These examinations may make it possible to associate any two objects that were in contact momentarily or for more extended time

#### **Number Restorations**

Serial numbers provide a means of identifying and tracing items of equipment, vehicle, guns and other products using this form of identification. The numbers or letters are stamped into an appropriate metal surface, compressing the molecules beneath the die strike. Serial numbers can be obliterated using several different techniques, such as scraping, grinding, punching or filing. Usually the perpetrator obliterates the number sufficiently only to make the number invisible.

The compressed molecules are often still present under the obliterated area. The obliterated area is first prepared for the restoration process where possible or practical. This usually involves polishing the surface with an abrasive material to remove the grinding marks, gouges, etc. After the surface has been properly prepared, it can be treated in a number of ways that may make the number visible. The type of metal may dictate the most appropriate approach. For many obliterations, an acidic solution is swabbed over the polished surface. The acid reacts at different rates with the compressed molecules under the location of the die strike and the non compressed molecules. Often this procedure enables the examiner to visualize and document the number in an appropriate manner.

### **COLLECTION GUIDELINES**

**ITEM** - Obliterated Serial Numbers

**METHOD** - Protect the area needing restoration. Do not attempt to restore the number in the field.

**DISCUSSION** - The first attempt to restore the number is the most productive and further attempts will likely destroy the evidence.

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### LATENT FINGERPRINTS

Friction ridge skin is a unique and persistent arrangement of ridges and furrows found on the gripping surfaces of the hands and feet of each person. These impressions or "latent prints" can then be identified to the individual that left that impression through comparisons to a set of known prints.

#### The latent print section performs the following duties:

1. Process physical evidence for the presence of ridge detail and preserve ridge detail for further analysis.
  - Latent print processing consists of developing and recovering latent prints from items of evidence. Analysts and technicians in the latent print section process latent print evidence. If a technician works a case and documents latent prints, a "Latent Print Processing" report will be issued. This will not mention any comparisons or identifications.
2. Compare ridge detail to known ridge skin from individuals associated with the case.
  - Any recovered latent prints will be reviewed by an analyst. The analyst then decides if the prints contain enough information for identification through the comparison process. Many areas of ridge detail preserved during evidentiary processing will not contain enough characteristics to establish identity.
3. Any unidentified ridge detail may be entered and searched through the automated search process.
  - Automated Fingerprint Identification System (AFIS), which is a computer system that searches prints against databases of known fingerprints.
  - Examples include: AAFIS (Alaska Automated Fingerprint Identification System), WIN (Western Identification Network), and IAFIS (Integrated Automated Fingerprint Identification System).

#### Physical Evidence:

Physical evidence is anything collected at the scene of a reported crime. Various items can be conducive to latent print recovery.

Such items include, but are not limited to:

- Glass (bottles, pipes, windshields, mirrors, etc.)
- Plastic (scales, bags, baggies, plastic wrap, bottles, etc.)
- Paper (receipts, notes, etc.)
- Smooth metallic items (spoons, knives, weighing trays, firearms, etc.)
- Tape (smooth and sticky sides)

#### Considerations should be made regarding evidence that needs to be analyzed in other sections.

- **Controlled Substance:** Faster results will occur when separating the items needed for analysis in each section (controlled substances and latent print examinations).
- **Firearms:** Latent print examinations will occur prior to any firearms analysis. Due to normal handling during firearms analysis, latent print recovery cannot be done after this occurs.
- **Biology/DNA:** Biological screening is typically done prior to latent print examinations. Usually smoother items (blades, slides of guns, etc.) are better for latent print recovery. Whereas, textured surfaces (grips, handles, etc.) are better for contact DNA recovery.

# Alaska Scientific Crime Detection Laboratory

## Laboratory User's Guide

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### **Collection Guidelines:**

**PLEASE WEAR GLOVES WHEN HANDLING EVIDENCE!**

If you choose to field process (powder, superglue, etc.) your own items or scene, please take in consideration proper procedures and methods for these processes.

- Don't over powder.
- Use appropriate fingerprint lift tape.
- Gray prints will appear darker on white cards.
- Apply lifted print onto appropriate (usually glossy) side of card.
- Fill out the provided information (on most latent lift cards) concerning the case, date, location, and orientation of the latent.

In some instances, latent fingerprints can be developed at the crime scene. Dusting with powders and then searching with a flashlight is a simple and quick method for processing numerous items and areas at a scene. However, if any item of evidence is to be submitted to the laboratory for processing, it is best not to attempt any field recovery of latent prints prior to submission. Certain powders and other on-scene processes may interfere with the processing techniques utilized in a laboratory setting.

### **Common Dos and Don'ts:**

- Don't attempt to process an item and then submit that item to the laboratory for further latent print recovery unless your facility has adequate equipment and conditions to process.
- Otherwise, if an item can be submitted to the laboratory for latent print recovery, please submit to the laboratory without any field or on-site processing.

### **Packaging:**

- Tape-seals must accompany the outermost packaging of any item.
- Typically paper envelopes, brown paper bags, and cardboard boxes are adequate for most items.
- To reduce latent print evidence loss, properly secure an item into a container that minimizes movement, contact, and moisture.
- The packaging should be proportionate to the size of the item. In other words, larger items should be packaged in larger packages and smaller items should be packaged in smaller packages.

### **Photography:**

The latent prints should always be photographed with a scale. The scale is necessary for 1:1 (actual) size reproduction for comparison purposes. It is recommended that the scale include individual latent print identifiers.

The camera should be held perpendicular (at a right angle) to the latent print so that the lens plane and the print surface are parallel. Fill as much of the camera frame as possible with the print to maximize photographic detail.

Photography and powder lifter are not mutually exclusive. If a print is hard to photograph, do your best to lift the print. If a print will not lift, photography might be the only means of documentation. Vice versa, if you do not have adequate photographic equipment (i.e. high resolution, digital cameras capable of recording in .TIF or RAW format) a lift will be better than a low resolution photograph.

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Submit all photographs and lifts from a scene to the laboratory via the laboratory request form. Due to proper chain of custody as well as size limitations in email attachments, all digital photographs must be submitted on a CD or DVD and as an item of evidence.

An analyst will review all photos and latent lift cards and will choose the photos and/or lift cards best used for comparison purposes.

### **Known Prints:**

Known prints or known exemplars are friction ridge impressions from an individual intentionally recorded in a controlled manner using printer's ink or electronic scanning. The most common example of known prints is a ten print card. It is important for the submitting officer to verify if an individual has known prints on file with the State of Alaska or the FBI and to provide any identifiers (APSIN number, FBI number, name, date of birth, social security number, etc.) on the laboratory submission form. If an individual does not have known prints on file, the submitting officer will need to collect them and submit them to the crime laboratory.

JUST an individual's name is not adequate for recovering their fingerprint record. Many times there are individuals sharing a name. An examiner does not necessarily know "John SMITH" is associated with that case. Many times the AKDL number is not the same as the individual's APSIN number.

### **CONTACT INFORMATION:**

If you have any questions concerning the Latent Print section's examination capabilities, evidence handling procedures, case status, reports or discovery information, please contact the Latent Print supervisor Dale Randolph Bivins at 907-559-4722 or via email at [dale.randolphbivins@alaska.gov](mailto:dale.randolphbivins@alaska.gov).

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### FIRE DEBRIS

The Fire Debris Discipline analyzes evidence submitted by law enforcement agencies for the presence or absence of chemical accelerants (ignitable liquids).

#### Best Evidence to Submit

- Ignition Sources: cigarette butts, matches, matchbooks, etc.
- Porous Materials: suspect clothing, carpet & padding, wood flooring, concrete, soil, etc.
- Liquid Fuel Sources: flammable or combustible liquids

#### Best Packaging Containers

Use Only these Vapor-Tight and Non-Reactive containers for Fire Debris evidence: New and Clean Epoxy-lined Metal Paint Cans, either gallon or quart sizes, or if the fire debris is too large for cans, use KAPAK/AMPAC® Fire Debris Heat Sealable Plastic Bags.

**Both of these containers must NOT be filled more than half way!**

#### Notes

- KAPAK/AMPAC® Fire Debris Heat Sealable Plastic Bags come on a continuous roll, and used for soft items of evidence such as clothing, and for evidence not fitting into paint cans. Use extra care as these bags can be punctured
- Footwear evidence must always be packaged separately from all other evidence!
- Solvent Containers such as gasoline, bug, charcoal lighter fluids, paint thinners, etc. may be submitted for Latent Prints if the containers are Empty and the exterior is protected for Latent Print processing
- Submit a very small amount (about 10 drops) of liquid in either new and clean epoxy lined metal paint cans or in Glass jars with Teflon lids, And Retain the bulk of the liquid at your office
- The Laboratory needs only a very small amount of liquid to analyze
- Try to submit a new and clean evidence container (can, bag, bottle) which is used for Comparison analysis of your used evidence containers
- Try to submit a Clean and Unburned sample similar to the evidence for Comparison purposes. Usually, good Comparison evidence is found in protected areas such as under furniture, or the opposite end of the room
- Change evidence collection gloves and clean tools between different evidence items. Be mindful of cross-contamination between evidence. Do not submit your gloves.

Contact the Fire Debris supervisor Nita Bolz at 907-269-0599 or [nita.bolz@alaska.gov](mailto:nita.bolz@alaska.gov) with any questions regarding types of evidence, evidence collection, evidence storage and packaging problems; and locating KAPAK/AMPAC® Fire Debris Bags, Paint Cans, Sample Bottles, or other supplies.

### CRIME SCENE RESPONSE

#### INTRODUCTION

The Crime Scene Unit (CSU) has been established to respond to calls for crime scene assistance requests from law enforcement agencies within the state. Forensic technicians are stationed in Fairbanks and Anchorage to provide technical support to agencies in the documentation, collection and processing of evidence at crime scenes. Services performed by Crime Scene Unit Forensic Technicians include:

- Crime scene processing
- Vehicle processing
- Field processing
- Latent print processing

#### GOALS AND OBJECTIVES

The goal of the crime scene program is to aid and assist law enforcement throughout the state of Alaska in the investigation of violent crimes. The CSU will respond to requests by the Alaska Bureau of Investigations (ABI) for all major crime scenes and other law enforcement agencies as warranted by circumstances and resources. Law enforcement agencies are encouraged to utilize Forensic Technicians for physical evidence collection, evidence processing, training information sources, and laboratory utilization questions. They are intended to be a first line of forensic support for officers in the field, to help ensure that the best the state has to offer in the field of forensic science has been applied to evidence associated with a crime.

#### This will be accomplished by:

- Responding in an expeditious manner to minimize the loss of evidence.
- Assisting in the processing of the crime scene by the recognition, collection, and preservation of pertinent physical evidence.
- Recording the crime scene in an appropriate manner, including photography, sketching, note-taking and assisting the agency with diagrams.
- Providing the requesting agency with a written report.
- Providing expert testimony.

#### Response CRITERIA

The CSU will respond to the following situations:

- Death investigations (except traffic fatalities)
- Sexual Assaults
- Assaults/shootings involving a law enforcement officer
- Other crimes as warranted by circumstance and resources

The Crime Scene Unit will process vehicles that are brought to the Anchorage Laboratory garage by a law enforcement agency. Standard crime scene response criteria do not need to be met and can include any felony offense.

### CALLOUT PROCEDURE

#### Crime Scene Response Guidelines:

The following are the guidance criteria to be considered by the Crime Laboratory Crime Scene Supervisor in evaluating calls. These criteria are obviously not exhaustive and consideration of appropriate response will depend both on the nature of the case, the needs of the requesting agency, and the availability of technicians. Whenever appropriate, response will be scheduled for normal business hours. Examples of this would be vehicles which have been secured and impounded or are in police custody.

*Before responding to any request, the requesting agency must have secured the scene and obtained a valid search warrant or otherwise legal permission to examine the scene.*

*Forensic Technicians will only process scenes that are secured and protected by the investigating law enforcement agency.*

#### Criteria to attend immediately:

- In the investigation of a homicide where the body (bodies) of the victim (suspect) is still at the scene and the agency needs any of the following: evidence recognition, collection and documentation, latent print processing, biological evidence collection and preservation.
- Where the suspect(s) are unidentified and remain a danger presenting a danger to the public if not identified as soon as possible.
- In the investigation of a serious crime where it is beyond the expertise of the requesting agency to best preserve and collect evidence that may deteriorate due to the weather. Examples of this would be buried or scattered body remains.
- Any investigations that involve the closure of public areas, such as an officer involved shooting on a roadway.

#### Criteria for Non-attendance:

- At a scene that has been thoroughly searched by the agency and the Crime Lab is being called to confirm that no further useful forensic evidence is present.
- At a scene where the agency has no good investigative information that the vehicle/residence/location is associated with the crime.
- At a scene where there is no compelling forensic reason to respond. An example of this is searching for hairs/fibers in a vehicle to which it was known that the victim/suspect had prior access.
- At a simple scene where verbal directions on evidence collection and preservation can be given to a Case Officer/Investigator.

#### Contact Information:

The requesting law enforcement agency can request assistance from the CSU in one of the following methods:

- Contacting the Alaska Bureau of Investigations. All major crime scene response will be requested through the Alaska State Troopers, Alaska Bureau of Investigations.
- Calling 907-717-6161 to request assistance.
- Contacting the Crime Scene Supervisor, Dale Randolph Bivins, at 269-0722 or [dale.randolpbivins@alaska.gov](mailto:dale.randolpbivins@alaska.gov).

The Crime Scene Supervisor will communicate with the requesting agency to assess the agency needs and determine the level of response.

### RELATIONSHIP TO REQUESTING AGENCY

Forensic Technicians will only process scenes that are secured and protected by the investigating law enforcement agency. The investigating agency must be and remain present while the Forensic Technician is processing the agency's scene.

The requesting agency will retain the responsibility, authority, control, and direction of the overall investigation.

All collected physical evidence will be formally seized by the investigating agency from the crime scene and maintained by the requesting agency. All biological evidence stains/swabs collected and packaged by CSU shall be maintained in the original packaging and not redistributed to fulfill agency requests for DNA.

With the exception of selected items for latent print processing, the CSU will not routinely transport evidence from the scene. Technicians may use their discretion regarding the transporting of evidence for the purposes of processing, if it is determined to be in the best interest of preservation and protection of evidence. Proper chain of custody will be maintained and recorded on the Request for Laboratory Services form in this event.

The requesting agency will be kept informed at all times of the status of the crime scene investigation.

The CSU Technicians are able to photograph, document and collect evidence from crime scenes, however, it may be determined by the Forensic Technicians that additional Crime Lab personnel are needed to respond to the scene.

The CSU will not engage in any activity deemed unsafe, unethical, or in violation of accepted crime scene practices.

Any requests for information from the news media at the scene will be referred to the requesting agency.

The CSU will provide completed reports to the agency.

The CSU members will be available for court testimony.

### GENERAL CATEGORIES OF EVIDENCE PROCESSING AT SCENES

#### A. Photography

#### B. Biological and Trace Evidence

- Bloodstain documentation and collection
  - CSU Forensic Technicians do not perform bloodstain pattern analysis
- Contact DNA/Saliva swabs
- Alternate Light Source (Semen, Hairs, Fibers)
- Bluestar® Forensic Reagent (Blood)
- Hemastix® (Blood)

#### C. Latent Print and Patent Print Evidence

- Amido Black (Blood enhancement)
- Fingerprint Powder
- Silicone Based Casting Materials

#### D. Firearm and Toolmark Evidence

- Shooting scene documentation - limited to photography and notes
  - CSU Forensic Technicians do not perform trajectory/bullet flight path analysis
- Silicone Based Casting Materials

#### E. Impression Evidence

- Gelatin Lifter
- Electrostatic Dust Print Lifter
- Dental Stone Casting Material
- Sulfur Cement Casting
- Leucocrystal Violet (Blood enhancement)
- 

#### REMOTE LABORATORY PROCESSING

It is recognized that the Forensic Technicians stationed remotely have limited equipment, facilities and materials for the processing of evidence. However, it is also recognized that there is great potential for the retrieval of forensic evidence such as latent prints, trace evidence and shoe impressions in dust, etc. if the evidence is processed without enduring the rigors of transportation to Anchorage. Therefore, it is the goal of the placement of remote laboratory sites to provide an intermediate step between the processing of the evidence in scene and the transportation of evidence to the Anchorage Laboratory. Under direction from the Crime Scene Support Supervisor, and at the discretion of the Technician, evidence may be processed at remote laboratory sites in lieu of or in addition to submission to the laboratory.

Please note: Items that can be physically sent to the laboratory in Anchorage should be sent to Anchorage for biological evidence screening and preservation. Remote Forensic Technicians can assist agencies in determining if items should be sent to the laboratory in Anchorage by searching evidence with an Alternate Light Source for areas of fluorescence and/or by testing visible and apparent red stains with a presumptive test for blood.

# Alaska Scientific Crime Detection Laboratory

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Services performed by remote stationed Crime Scene Unit Forensic Technicians include:

- Crime scene processing
- Vehicle processing
- Field processing
- Latent print processing
- Laboratory technician processing

The level of processing at remote sites is dependent on training, facility space and equipment available.

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### **SERVICES NOT CURRENTLY OFFERED**

Analysis of Abrasives, Adhesives, Audio, Explosives, Fibers, Glass, Questioned Documents, Shoe Prints, and Tire Treads is not currently available at the Alaska Scientific Crime Detection Laboratory. The FBI does provide these services and others to investigative agencies at no cost. For submission guidelines please consult with the FBI (<http://www.fbi.gov/about-us/lab>)

#### **Urine Analysis**

In some instances analysis of urine for the presence of impairing substances is required by an investigative agency. The Alaska Scientific Crime Detection Laboratory is not able to accept these samples for analysis. For State agencies, the current contract laboratory for these samples is NMS Laboratories.

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### REVISION HISTORY

2014 R1	2014 R0	Location	Revision made
1	1	cover page	Date changed to October 2014 and page numbering updated where necessary.
4	4-5	General Submission of Evidence	Removed all "Sample RLS Key information" and added new screen shot of RLS form.
34	35	Fire Debris	Removed "Generally, fire scenes throughout the State of Alaska are processed by the State Fire Marshall's Investigators (267-5481) except for those in areas which have a Municipality equivalent. These respective agencies should be contacted for guidance. However, situations may arise where they cannot be present or they ask for assistance on scene processing and evidence collection."
37	37	Crime Scene Response	Contact information changed from Jessica Hagan to Dale Randolph Bivins and added new cell phone number.

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