SECTION-SPECIFIC REQUIREMENTS

Trace Evidence
Trace Evidence Services

- Fire Debris
- Hairs
- Fibers
- Footwear/Tire Impressions
- Paint
- Pressure Sensitive Tape
- Gunshot Residue
- Physical Matches
- Glass
- General Unknowns
- Misc. comparisons
Edmond Locard’s Principle

- Something is left behind
- Something is altered
- Something is taken away
Impressions

- Footwear
- Tire
- Fabric
Importance

- Footwear and tire impression evidence can be identified to an individual source
  - Footwear: wear pattern, height, weight, gait and surface
  - Tire: air pressure, alignment, surface, and miles traveled
- Can be used to exclude someone from a scene based on design and or size
  - There is only $1/6$ of an inch difference between half sizes (footwear)
Types of Impressions

- **Two dimensional**
  - Dust
  - Oil
  - Paint
  - Blood

- **Three dimensional**
  - Soil
  - Sand
  - Clay
  - Snow
Always photograph impressions before attempting to collect.

A scale **MUST** be included

- Scale **MUST** be set into same depth as the impression

Use a tripod, with the setup perpendicular to the impression
Photographing the Impression

Equipment:

- Camera
- Tripod
- Flash
- Sync Cord
- Level Finder
- Scale
- Fill Frame
- Capture in **Tiff or Raw**
3-Side Lighting Rule for 3D Impressions

- Take photographs of 3-D impressions using light from three different sides.
- Remember-“Between the legs”
- Keep the flash at a 45 degree angle approximately 3-4 feet away
Dust Impressions - Lighting is Key
Dust Impressions-Lighting Documentation
Due to the placement of the scale, a true and accurate size of the unknown impression cannot be achieved.

Footwear differs only 1/6\textsuperscript{th} of an inch between half sizes.
Scales placed at different depths

Same type of scale used.

Placed at different levels.

Can see the distortion of the size of the scales the further down you go.
# Impressions-Collecting

- **#1 Try to collect the **ENTIRE** item**
  - Example: mat being stepped on
  - If not possible to collect the whole item:
    - Dental stone, gel lifts, mikrosil, Electrostatic lifting
- **Submit pictures of impressions on a CD (TIFF or RAW NOT JPEG)**
- **Take images of ALL impressions at the scene**
Why Take Images of All Impressions?
Impression Detail Differs
3D- Impression Collection Casting

- Casting: 2lbs dental stone 10oz water.
- Can use other liquid besides water if needed.
- Allow to dry approximately 1 hour prior to removal.
- Remove from inner side NOT ENDS.
- Do not clean cast off. Submit the entire cast with dirt/soil/rocks/leaves attached.
Casting Techniques - Footwear

- Can support very fine particles by spraying them with hairspray prior to casting
  - Impressions in flour, wood shavings
- Can cast a 3D Impression in Snow
  - Must use snow wax to place a “shell” on the snow
  - Dental stone will get warm when it is being processed
  - If you don’t add snow wax-the impression will melt
Packaging the Cast

- Allow cast to fully harden prior to packaging.
  - Cast will take 72 hours to fully harden.
- Don’t clean cast
- Need to protect cast from breaking
  - Use bubble wrap/boxes/paper towels
2D Impression Collection - Gel Lifts

- Gel Lifts
- Great for curved surfaces
- Dried bloody impressions
- Impressions on doors
Gel Lifts-Collection

- Place cover on
  - Use roller to smooth out air bubbles
- Air bubbles will hinder examination
- Do not take cover off even if you didn’t get the cover to align
  - If you do take the cover off you can create a double impression
Packaging 2-D Impression

- Package the unknown impression in an envelope with support.
- Example a gel lift is placed between a folder and then placed into an envelope.
- Write on the packaging: This side up! Fragile! Do not bend.
- This can also be done with a tape lift.
Recovered Shoes

- Do not put the exemplar shoes back into the impression or next to the impression!!
- **Do not** put any ink or fingerprint powder on the exemplar samples (shoes) to make test impressions
- Consider the possibility of the presence of other evidence:
  - Glass, paint, soil, hairs, fibers
- **Shoes**
  - Package each shoe separately (do not clean)
  - Paper
  - Box
  - **DO NOT PLACE IN PLASTIC!**
Do Not Do This!!!
The Examination

- If we are doing a comparison
  - **NEED** to have suspect shoes
- will make exemplars of the shoes to compare with unknown
- look at class characteristics first
  - size, tread pattern
- look for randomly acquired characteristics
  - cuts, breaks
Class Characteristics

Footwear impression created on vinyl chair at crime scene.

Both impressions displayed the same size and pattern.

Exemplar footwear impression from suspect’s boots.

Brand name
Randomly Acquired Characteristics

Both impressions displayed the same individual characteristics.

Footwear impression created on vinyl chair at crime scene.

Exemplar footwear impression from suspect’s boots.
Randomly Acquired Characteristics

Exemplar footwear impression from suspect’s boots.

Footwear impression created on vinyl chair at crime scene.
Footwear Database-No Shoes

- FBI
- Regional Labs
- European Databases

- What to submit?
  - Digital images (Tiff or Raw) of unknown impressions on a CD.
  - Sealed Envelope
Example of Database Search

INQUIRY MADE ON 10/8/2008

RESPONSE FSS-United Kingdom and Latvia 10/9/2008
What Can Tire Tracks Tell You?

- Determine number of vehicles involved
- Enter or Exit
- Can help to ID:
  - brand of tire
  - manufacturer of tire
- Size of tire
- Type of tire
- Make, model, and year of vehicle
- Problems with vehicle
  - front end alignment etc.
DOCUMENTATION of a TIRE

- Document all information on sidewall of tires
- Document on all 4 tires on the vehicle and the spare tire
- Most Important information is the DOT # and brand
  - Tells you week and year the tire was made
DOT Number
To document a full circumference of a tire impression, it is recommended to photograph at least 8 feet of the tire impression. This is tricky…

- You need to link all photographs together…
- By using 2 scales and overlapping photographs

Documentation of Tire Impressions
Place “L” shaped ruler at the beginning of your impression
Place “steel” ruler at the bottom of the impression
Fill Frame- 14 inches of impression
- Move “L” scale ruler to top of the impression
- Overlap photo 2 inches
- Fill the Frame-Start at 10 inches end at 24 inches
Place “L” shaped ruler at the end of your impression
Overlap photo 2 inches
Fill the Frame-Start at 20 inches end at 34 inches
Overlap Photos
What you bring to the Lab

- Need test impressions of all tires while on the vehicle
- Do not drive vehicle
  - You do not want to cause any damage to the tread design
- Tow vehicle to impound
- Submit tires for full comparison
  - Or submit test exemplar of the exemplar tires
- Submit all casts, lifts, photos
- Call the Laboratory 874-4114 for Amy or Kim to help you.
Tire Tread Search

- Tire Tread Design Guide
- No Suspect vehicle to compare
Fabric Pattern Impression

See fabric impressions primarily in hit and runs.

Photograph first—scale MUST be included.

Try to collect impression with gel lift.

Or remove vehicle part and send to lab.
Fabric Pattern Impression

Impression made by sleeve

Sleeve
Large Items With Impression Evidence

- Bring entire item to lab
  - Protect area of interest (use placards and butcher paper)
  - Mark on packaging area to protect (ex. This side up, Fragile, Do not shake)
  - Tape down inside a box (glass fragments, mat, etc)
PAINT AND HIT AND RUN EVIDENCE
Paint-Importance in Forensic Science

- Types of paint
  - House
  - Decorative
  - Automotive
    - Hit and Run
    - Willful Damage
    - Homicide Incidents
      - Important for paint color, layer sequence, and elemental composition
Paint Collection-Vehicle

- Need to get all the layers
  - Go down to metal/bumper substrate
- Collect exemplar sample from a clean area near the impact site(s)
- Items to consider:
  - Two toned cars
  - Repaints-esp. older cars
  - Detailed areas
  - Bumpers
Paint Collection - Techniques

- Use a clean razor blade
- Use tweezers to peel paint from area of damage
Paint Layer Structure

This is really small!

- Clear coat
- Color Coat
- Primer Coat
Collect in a **PAPER** bindle, small canister or gel lift.

- **DO NOT** collect samples and place them directly into small envelopes.
- The small envelopes have holes at each corner.
Suspect Vehicle

- Point of Impact—there may be more than one!!!!
- Collect areas of transfer
- Package each sample separately
- Need to collect exemplar (control) samples of suspect’s vehicle paint
  - From each area that the victim may have had contact with
  - Maybe different paint chemistry on different areas of vehicle
  - Need to collect down to metal or plastic if a bumper
Hit and Run Evidence

- The road (Sweepings)
  - Sweep an area 20 feet on either side
    - Use a dollar store brush and pan-collect evidence into a paint can
      - DO NOT REUSE BRUSH
  - Look for any pieces of the automobile, headlights that have broken off, can be used for fracture match to suspect vehicle

- The windshield
  - Package in butcher paper-protect with cardboard
Hit and Run Potential evidence: victim

- Clothing
  - Package each item separately
  - Make sure the clothing is dried prior to packaging
  - Package in paper bags

- Submit all items found on person
  - Cell phone case, purse, etc

- Shoes
  - Package each separately in paper bags
PAINT CLOTHING TRANSFER
Tool Paint Evidence

- If you have a tool mark case that you need paint comparison + tool mark impression evidence, TRACE will get the item first.
- Protect the tool end of interest
  - Tie down the tool in a box
  - Protect the ends of the tool with a plastic bag or envelope
Paint transfer from the tool to the door.
PAINT DATABASE
SEARCHES

No suspect hit and runs
Paint Data Query

- Database maintained by the FBI and the RCMP
- Uses FTIR data to develop a list of possible make/model/years/plants for unknown paint chips
- Only able to search original paint layers
  - Cannot search repaints
  - Tough to search single layer transfer
FIRE DEBRIS ANALYSIS
Types of Samples

- charred debris
- liquids
- containers
- clothing
- furniture
- bedding
- miscellaneous

Arson
Packaging

- Lined paint cans
- Do not dry clothing
- Do not put your gloves in the can
- Make sure the lid is on tight
Seal Cans Properly

- Make sure the lid fits on the can
Just Right

Fill the cans with material with enough room for a hanging charcoal strip
Containers

- For large items:
  - Seal opening as best you can
  - Bring to the lab immediately
FRIENDLY REQUESTS

- Submit only small sample of liquid
  - Be careful when pouring liquid in container (contamination)
- Notify analyst of evidence in soil
- Make sure lid is on tight
- Do not submit rusted cans
- Request Alcohol testing
HAIRS AND FIBERS
Hair as Evidence

- See in many different types of cases
  - Sexual Assaults

- Class characteristic
  - Hairs are **NOT** a positive means of identification
  - Great elimination tool
  - Durable evidence
Collection of Known Head Hairs

- Need 10 pulled hairs from five sections of the head.
  - Total of 50 head hairs
  - Pubic Hairs (pulled)-25

- We do NOT compare body hairs (beard, eyelash, etc.)

- If you do not give us enough hairs to compare then the report will state that the comparison was a limited comparison
Packaging of Hair

- Do not place hair directly into envelope
  - Chance of losing it with the holes on the ends of the envelope
  - Or getting stuck on adhesive in envelope
- Place hair into druggist fold
  - Canister
  - Then into an envelope
Hair Comparison

- Compare unknown hairs to exemplar hairs
- Gross characteristics
  - color, shape
- Microscopic characteristics
  - Medulla, pigmentation, cuticle
Fibers as Evidence

- class characteristics
- possibility of individualizing evidence
  - Fracture match
- often overlooked in cases
- can be an investigative aid
Fiber Collection and Packaging

- Collect trace of interest to gel lifts
  - Label the back of each lift
- Druggist fold
  - Seal in envelope (careful of coin envelopes-holes)
- Vacuum sweepings
- Tape lifts
- Carpet –exemplar samples (vehicle)
- Collect each item of clothing and package separately
Fabric Rub on Car Seat
Blue Jean-Cotton Fibers

This is small!
The distance between two lines is 1mm!
Fiber Analysis

- Determine if something was cut using a scissors, razor, or tearing motion.
Physical Match
Comparison

Exemplar cotton/polyester blend Item 2.3.1

Unknown cotton/polyester blend Item
Silence is golden. Duct tape is silver.
Duct Tape

- Found on bodies
- Clothing
- Boxes
- Trash
- Drug bales
Duct Tape-Packaging

- If the tape is in pieces, place sticky side down gently on plastic cover/evidence bag
  - Place that into an envelope or box
  - Do not expose sticky side to cardboard/envelope
Duct Tape Evidence

- Careful with handling
  - Possible DNA, Fingerprints, Trace Evidence
- Keep tape wrapped on Item
  - Example-box used to bury evidence
    - Wrap butcher paper around the item as best as you can
Exemplar Duct Tape

- Submit all rolls of duct tape found for comparison
- May look alike, but are different (adhesive color, fiber)
GUN SHOT RESIDUE (GSR)
Firing a weapon may cause microscopic particles of primer residue and gunpowder to be deposited on the hands of the shooter.

The results need to be interpreted carefully.
Collection of GSR

- Do not let the suspect wash their hands
- Always wear gloves!
- Collect within four to six hours of the shooting
- **MUST** use SEM adhesive stubs
- **NO Swabbing!!!**
  - old method: cannot be processed at our lab.
  - If you still have GSR swabs…throw them away!
GSR sampling kits

- prepared kits containing 2 or 4 stubs
- 2 stubs: one for right hand, one for left
  - Preferred
- 4 stubs: right back, right palm, left back, left palm
- sample from areas of high concentration to areas of low concentration
- fill out information sheet with the kit
GSR Collection Adhesive stubs

- Aluminum stubs with black carbon double sided sticky tape on top.
- Housed in a protective plastic cover
- If the stubs come with a protective white cover over the black tape, remove them before collecting and do not attempt to put them back on.
- Do not attempt to remove the black sticky tape. It is supposed to be there!!
Gunshot residue status

- Due to instrumentation issues, GSR analysis for primer residue is currently being sent to another forensic lab for analysis.
  - Distance determination is still performed in house.
- This will only performed upon written request from the AG’s office.
The results

- Particles characteristic of gunshot residue were detected.
  - Three component particles: Pb/Ba/Sb
- Particles consistent with gunshot residue were detected.
  - Two component particles: Ba/Sb, Pb/Ba, Pb/Sb
- Particles commonly associated with gunshot residue were detected.
  - Single component particles: Pb
Positive: What does it mean?

- The individual fired a weapon.
- The individual handled a weapon right after it was fired.
- The individual was very near when a gun was fired.
- The individual touched a surface that had GSR on it.
- Etc. etc. etc.
Negative: What does it mean?

- The individual did not fire a weapon.
- The individual washed their hands.
- The samples was collected after the recommended 4-6 hour time window.
- The individual was wearing gloves when they fired the weapon.
- Etc. etc. etc.
TOUCH DNA
Touch DNA

- If you are requesting an Item to be processed for touch DNA and the item is also submitted for Latent Prints and/or Firearms—the TRACE section will get it first.

- We need to know right away that you are requesting this.

- We have started a new procedure in handling items for Touch DNA since the analysis is very sensitive.

- We need to double glove, wear face mask during processing and eliminate foot traffic in the lab.
Touch DNA

- We can still process an item for Touch DNA after it has been processed for latent prints.
- The swabs collected are then returned to your department and you must submit the swabs to DOH.
Thank You

- Any questions regarding trace evidence please call Amy or Kim at 874-4114