impression was cast. The lift card should also contain significant information about the orientation and/or position of the impression on the surface, ideally including the location of the flap/strip.

18.12.3.15 If placing the cast in a small coin envelope, identifying information, as outlined in 16.9.3.7, should be included on the outside of the coin envelope.

18.12.3.16 Casts may become stuck to one another if packaged in a way that they could contact one another. For this reason, each cast should be packaged separately in a small envelope or box.

18.12.3.17 Multiple casts from the same surface/location (e.g. several pry marks on a window frame) may be packaged in the same outer evidence envelope/sack as long as the casts are contained in individual inner packages.

18.12.4 Safety

18.12.4.1 Do not allow the Mikrosil hardener to contact the eyes or mucous membranes. In case of contact, immediately flush with plenty of water.

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S-1a (cont.)
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19.0 Vehicle Processing

19.1 Vehicles may hold an abundance of evidence, depending on the amount of contact the suspect and/or victim may have had with the vehicle. A vehicle should be examined thoroughly and should be treated in all aspects like a stand-alone crime scene.

19.2 A vehicle should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the vehicle and collection of any evidence.

19.2.1 A vehicle should be photographed as outlined in Section 8 of this manual. Section 8.31 outlines the specific photographs that should be taken of a vehicle.

19.2.2 Notes should include the location and condition of seals, including the time they were broken. Vehicle descriptions shall include the year, color, make, model, license plate number, and Vehicle Identification Number (VIN); note if the VIN plate/sticker and/or license plate(s) are missing. The general condition of the vehicle and its contents shall be noted.

19.2.3 Sketches/diagrams may be utilized as appropriate, depending on case circumstances. Diagrams of a variety of styles of cars, trucks, vans, and sport utility vehicles are available and may be printed out and used for efficiency. Sketches may be utilized to supplement notes as appropriate.

19.2.4 Consideration should be made to document the location/position of vehicle components (e.g. driver's seat) in case its location/position is relevant to the investigation. During processing, components may be moved/altered.

19.3 The Vehicle Identification Number (VIN) is available on a plate affixed to the driver's side of the dashboard (near the windshield), on the edge of the driver's door, and in the engine compartment.

19.3.1 Current models of vehicles have a standard VIN of 17 characters. Vehicles manufactured prior to 1981 might have fewer characters.

19.3.2 The 10th character of the VIN indicates its model year.

- A: 1980 or 2010
- B: 1981 or 2011
- C: 1982 or 2012
- D: 1983 or 2013
- E: 1984 or 2014
- F: 1985 or 2015
- G: 1986 or 2016
- H: 1987 or 2017
- J: 1988 or 2018
- K: 1989 or 2019

- L: 1990 or 2020
- M: 1991 or 2021
- N: 1992 or 2022
- P: 1993
- R: 1994
- S: 1995
- T: 1996
- V: 1997
- W: 1998
- X: 1999
- Y: 2000
- 1: 2001
- 2: 2002
- 3: 2003
- 4: 2004
- 5: 2005
- 6: 2006
- 7: 2007
- 8: 2008
- 9: 2009

19.4 A systematic approach to searching a vehicle may be accomplished by dividing the vehicle into areas based on the occupants/areas (e.g. driver, front passenger, rear driver side, rear passenger side, third row driver side, third row passenger side, cargo area, trunk, etc.).

19.4.1 Areas associated with the driver should be labeled as "driver", rather than as "driver's side" (e.g. driver's door rather than driver side front door).

19.5 The extent of the examination and/or processing of the vehicle is dictated by the type of crime and/or types of evidence that may be present.

19.5.1 Areas that are often overlooked include the headliner, visors, sunroof, engine compartment, and undercarriage.

19.6 A strong white light may be utilized at an oblique angle in order to visualize small evidence. If a particular type of evidence being searched for would react with a different wavelength of light, an alternate light source (ALS) may be utilized

19.6.1 A flashlight or the white light setting on an ALS are the most common sources for a strong white light.

19.6.2 An ALS may only be utilized by analysts who have received training in the appropriate use of an ALS.

19.6.2.1 When using an ALS to observe an item/surface, goggles shall be worn.

19.6.2.2 The appropriate goggles should be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

19.6.2.3 Permanent eye damage can occur from reflected, refracted, or direct illumination by the ALS to the eye. Extreme care should be taken around highly reflective surfaces. An analyst should never look directly into the light or allow beams to bounce off the surface into their own eyes or another person's eyes.

19.7 Trace evidence may be present on the interior surfaces of the vehicle and/or on items found in the vehicle.

19.7.1 Trace evidence should be examined and collected as outlined in Section 17 of this manual.

19.7.2 One piece of adhesive collection material may be used to collect trace evidence from one area in a vehicle (e.g. driver's seat cushion/backrest, rear passenger side floorboard, cargo area floor, etc.).

19.8 Biological stains may be present on the interior and exterior surfaces of the vehicle and/or on items found in the vehicle.

19.8.1 Biological evidence should be examined and collected as outlined in Section 12 of this manual.

19.8.2 Presumptive blood tests should be conducted as outlined in Section 10 of this manual.

19.9 Latent prints may be present on the interior and exterior surfaces of the vehicle, and/or on items found in the vehicle.

19.9.1 Latent print processing should be conducted as outlined in Section 15 of this manual.

19.10 Gunshot residue (GSR) may be present on the interior and exterior surfaces of the vehicle, and/or on items found in the vehicle.

19.10.1 Collection of GSR samples should be conducted as outlined in Section 18 of this manual.

20.0 Buried Body Excavations and Scattered Human Remains

20.1 Bodies that have either been buried or exposed to the environment for an extended period of time present challenges to crime scene investigation. The greater the amount of time that has elapsed since the body has been in an area, the greater the likelihood that evidence and items associated with the crime may have been dispersed. Evidence items associated with buried bodies or bodies that decompose on the surface over an extended period tend to be widely dispersed in the surrounding soil and vegetation. This demands the application of archeological techniques in an effort to locate and document the evidence and its scene context.

20.1.1 Care should be taken to examine the area for evidence that may help determine whether the death took place in the area, or if the death may have taken place at another location, and the body was taken to the area for disposal.

20.1.2 The examination of a scene containing a buried body or an outdoor skeletal recovery shall include consultation with the local coroner's office and should include consultation with a forensic anthropologist, anthropologist, or similarly trained expert.

20.1.3 ISPFS works to maintain partnerships with anthropologists who may be able to attend a scene as an advisor, give instructions for scene methodology, and/or differentiate between human and non-human bones.

20.1.3.1 Consideration should be given for the possibility of a burial related to the recovery of a Native American person and burial sites of possible historical significance.

20.2 Clandestine graves may be discovered by chance or by searching an area based on information provided by a subject. There are a number of different methodologies and tools that may be employed to attempt to detect a clandestine grave in an area.

20.2.1 A visual examination of an area of interest may indicate areas of disturbance. Depending on a number of factors (e.g. the length of time the body has been buried, the type of soil, etc.), the grave may vary in appearance from the surrounding area. There could be disturbed soil, a grave mound, soil compaction, and/or a change in vegetation between the grave and the surrounding area.

20.2.2 Non-invasive techniques used to search for graves include the use of aerial/drone photography, cadaver dogs, magnetometers, ground-penetrating radar, and infrared thermography. Intrusive techniques for locating graves include the use of probes and vapor monitors. These techniques may only be utilized by trained experts.

20.2.3 Shovels may be used to remove topsoil in an area. Care should be taken to penetrate the soil in a shallow, horizontal motion to avoid having the end of the shovel impact anything in the grave. If any item in the grave is inadvertently struck by a shovel, it shall be documented in the notes.

20.2.4 The use of heavy machinery in an attempt to locate a grave should be the last option undertaken, when all other attempts to locate a grave have failed.

20.2.4.1 Heavy machinery, such as a backhoe, may be utilized to slowly scrape topsoil in layers from the area in question. If any artifact is discovered, the process shall be halted, and standard excavation techniques are utilized.

20.3 The area of a potential gravesite should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the area and collection of any evidence.

20.3.1 If available and appropriate, aerial photography should be done in addition to traditional crime scene photography.

20.4 Once a gravesite has been detected or is suspected by any means, consideration for excavation should be undertaken. Additionally, the path in/out of the area, and the possibility of any discarded evidence along that path, should be considered and those areas preserved.

20.4.1 A grid search is often the most appropriate method to search an area involved in an excavation. A reference point (RP), or several reference points (RP's), may be established, depending on the size and elements involved in the terrain.

20.4.2 A physical grid may be established over the area to be excavated. All measurements can be made to the RP's established within the grid itself. Since the grave is a three-dimensional artifact, depth shall also be documented for each discovery.

20.4.2.1 The grid should be oriented north/south and east/west as much as practical, given the scene circumstances. Stakes should be driven into the ground at the four corners of the grid.

20.4.2.2 String or flagging tape should be used to connect the four stakes and establish the outer perimeter of the grid. At least one string line should be checked to ensure it is level; it may then be used for depth measurements to items of evidence.

20.5 The surface of the area should be examined first. Any visible items of potential evidence shall be documented prior to excavation.

20.5.1 Once surface finds are properly documented and collected, the site should be examined with a metal detector; any hits should be marked for further documentation and excavation; surveyor flags work well for this.

20.5.2 Loose debris (e.g. leaves, twigs, etc.) should be removed by hand and examined for any potential evidentiary value. Care should be taken for any items that have scene context (e.g. sticks fashioned in a cross formation) and to ensure that underlying items of evidence are not disturbed.

20.5.3 Once loose debris is removed, the ground should be reexamined for any objects or items of evidence. Ground plants should be removed by cutting them at ground level, unless a forensic botanist requests the root system to be retained.

20.6 Screens should be used to examine all litter, debris, or soil removed from the excavation site. This should preclude missing small items such as bullet fragments, teeth, small bones, and other small artifacts.

20.6.1 A methodology should be established prior to excavation so that the location from which soil was taken is not lost as screen sifting is undertaken. By doing so, the location of any evidence that's discovered can be documented properly. Additionally, if soil samples are to be collected, their location from the site can be determined.

20.6.2 A two-level screening effort is recommended. The first screen is usually made up of 1/4 inch mesh, while the second is made up of 1/16 inch mesh. Double screening will make it more likely that small objects such as hairs, fibers, or shot pellets are located and recovered.

20.7 Actual excavation of the site should be undertaken in levels. General archeological protocol dictates that excavations proceed in arbitrary levels following the surface contour until an evident stratum (i.e. layer) is located (man-made or natural).

20.7.1 A stratum may be a layer of some specific type of soil, a layer with some form of particular debris, or any level in which an artifact or artifacts become exposed.

20.7.2 Once excavated and mapped, the process continues for each newly discovered stratum.

20.7.3 The primary tools required for excavation include trowels and brushes. Use of these hand tools helps to prevent damage to the sides of the grave and the evidence contained in the grave.

20.7.4 Because the sequence of artifacts uncovered is important, dirt should be removed in no more than 2 to 4 inch layers. If a layer of a material is less than 2 inches (e.g. 1 inch layer of gravel), then less material should be removed when excavating that stratum.

20.7.5 As the grave sides are exposed, they should be examined for evidence of tool or footwear marks.

20.8 As each artifact is discovered, it shall be properly documented using photography, notes, sketches/diagrams, and location from RP's.

20.8.1 Each object's elevation shall be measured in relation to the grid RP. Elevation can be easily measured using a string, string level, and plumb bob.

20.9 Upon initial exposure of the body, there may be a desire to expose the remains quickly. However, it is important to maintain elevation control, slowly exposing the body and collecting any artifacts.

20.9.1 There should be a significant number of photographs taken as the body is exposed, documenting each step and the condition of the body.

20.9.2 Once the body is completely exposed, its position is documented in relation to the grid, and any associated articles found on or beside it are documented fully prior to collection. The body may be protecting evidence, including tool and footwear impressions; care should be made to prevent soil from filling in the impressions or compacting any impressions.

20.9.3 Once the body is removed, excavation continues until the base of the grave is reached; at least 2 to 4 inches below the body should be excavated. The total depth of the grave should be measured and documented.

20.10 Scattered or skeletonized remains may appear in two different ways; either a skeleton or badly decomposed body is found relatively complete in a single location or it is widely dispersed over a large area. Dispersal may vary greatly depending on animal activity, erosion, or flooding. Additionally, the body may have been dismembered and scattered intentionally as a countermeasure by the suspect.

20.10.1 While each type of scene shall follow the same general processes for documentation and collection of evidence, widely dispersed remains can be more difficult to map.

20.10.2 Scattered remains may be due to a suspect's actions, but is frequently the result of animal activity. Bones found in a remote setting should first be determined to be human before beginning full scene processing; a forensic anthropologist or other appropriately trained person should make that determination.

20.10.3 Once the remains are verified as human, a grid should be established over the primary location of remains. The size and scope of the grid is determined by the amount of scatter.

20.10.4 A line search is effective when dealing with remains scattered over a large area. When searching, any obvious remains should be marked with a flag until they can be documented and collected. If an item is questionable, it should be flagged for consideration; some small bones aren't easily

discerned from rocks. Once the search is done, the area should be checked with a metal detector.

20.10.5 After documenting the surface and all obvious remains, the area immediately surrounding the remains should be cleaned and exposed in the same way as a grave. Surface debris and plants should be removed. Care should be taken to document plants growing in and around the body as plant growth may help establish timelines. All items of evidence shall be documented, mapped, and collected. Once surface evidence is collected, the area beneath the remains should be troweled to a depth of at least 2 inches and the soil should be searched for artifacts.

20.10.6 When dealing with scattered remains, a human skeleton diagram/bone list may be utilized to keep track of which bones have been found and as a reference for the basic anatomy of human bones. Additionally, by keeping track of which bones have been found, the presence of too many bones of one type (e.g. three right femurs) immediately demonstrates the presence of more than one victim.

21.0 Entomology

21.1 Insect activity that takes place in, on, and around a dead body may assist a forensic entomologist in determining time since death.

21.1.1 In the absence of a forensic entomologist on scene, CSIs can collect specimens to be sent for later analysis.

21.2 Flies may begin laying eggs on the body within 20 minutes of death. Flies target any warm, moist areas of the body.

21.2.1 Flies lay eggs in the nostrils, eyes, mouth, or any opening that is available on the body. If eggs are present in an area that is not a natural opening to the body, it is likely the site of an injury.

21.2.2 Eggs develop into larvae (i.e. maggots). The maggots will be present together in a mass. When the maggots mature, they leave the body.

21.2.3 When the maggots leave the body, they enter the soil or other surrounding areas where they pupate, forming a hard casing from which a fly later emerges.

21.2.4 With careful collection of both living and preserved maggots, pupae casings, and adult flies, a time of death may be determined.

21.2.5 Usually, half of the specimens are preserved, while half are kept alive in order to allow them to mature.

21.3 Insect activity should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the area and collection of any evidence specimens.

21.4 Collection of specimens should occur immediately upon discovery, as adult flies relocate quickly once the body is disturbed.

21.4.1 Collection of larvae

21.4.1.1 The temperature of the larval mass should be noted. Larvae (~50-60, minimum) can be collected with forceps or by using a moistened paint brush.

21.4.1.2 Live samples (~20-30) should be placed in a container with moisture and a food source (e.g. piece of liver and moistened paper towel).

21.4.1.3 The same approximate number of larvae (~20-30) should be collected for preservation. They should be placed in vials of ethyl or isopropyl alcohol.

21.4.1.4 The site of collection from the body should be noted.

21.4.2 Collection of pupae

21.4.2.1 Pupae are usually found in drier environments, away from the maggot mass; they may be found in clothing and surrounding soil.

21.4.2.2 Live specimens require moisture and air, but also demand careful sealing, as adult flies can emerge from the pupae at any time.

21.4.2.3 Samples collected for preservation should be placed in vials of ethyl or isopropyl alcohol.

21.4.3 Collection of adult flies

21.4.3.1 An insect net can be utilized to catch adult flies.

21.4.3.2 Live specimens require moisture and air, but also shall be carefully sealed to avoid escape.

21.4.4 Soil samples from a variety of areas, including beneath the body and at distances of approximately three feet around the body, should be collected and placed in small containers. The location of collection should be noted on the container.

21.5 Considerable notes should be taken to document the environment in which the insects have been living.

21.5.1 Note if the area is shaded or sunlit, the nature of the foliage (e.g. wooded, grassy), the weather conditions (including soil and air temperature), and the condition of the body (e.g. buried, partially buried, clothed).

21.5.2 Each specimen should have a notation as to the date and time collected, the stage of development, and the specific location on the body.

21.6 Entomology samples may be packaged in a variety of outer evidence containers, such as evidence sacks or boxes, depending on the size/type of vial or collection container used.

22.0 Fire Scenes

22.1 Fire scenes are one of the most complex and difficult scenes to work.

22.1.1 Conditions of fire scenes that create difficulties include the fire damage itself, the damage to the stability of the structure, the presence of debris covering items, the addition of water and/or fire retardant, the destruction of the scene/evidence during firefighting efforts, and the fact that dark surfaces do not reflect light well.

22.2 Safety should be the first concern prior to entering a fire crime scene.

22.2.1 Structural concerns may affect the way a CSI can move safely through the scene. Prior to entry, the scene shall be determined to be safe by the Fire Marshal or investigating fire department; a note should be made as to who made the authorization to enter.

22.2.2 Inhalation of dusts and gases are a health concern on scene. In order to prevent exposure, a particulate mask should be utilized (at a minimum), based on the condition of the scene.

22.2.3 The effects of fire and of firefighting may damage the structure and items in the scene. Care should be taken to avoid sharp objects when moving through the scene and moving items to search for evidence.

22.2.4 The fire marshal, fire investigator, or fire department personnel can advise analysts of fire scene safety and areas of concern.

22.3 Investigations of fire crime scenes involve coordination with the fire department and/or fire investigator.

22.3.1 Origin and cause determinations are made by the fire investigator. They can be helpful in determining areas of focus for documentation and evidence collection.

22.3.2 The fire department should be consulted in order to determine how they altered the scene during their response.

22.3.2.1 During fire suppression, firefighters may force entry into buildings, break windows, tear down walls, or move objects such as furniture.

22.3.2.2 During overhaul, firefighters search for hot spots and eliminate them. In doing so, debris may be removed from the scene.

22.4 Fire scenes should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the scene and collection of any evidence.

22.4.1 Camera settings and/or photographic techniques should be altered in order to adequately photograph a scene blackened by the action of fire. Adjustments should be made in order to increase the amount of light

gathered while the shutter is open, which can be accomplished through changes to the ISO, shutter speed, and f-stop in the camera, or by the use of additional lighting techniques.

22.5 Fire patterns leave effects in the scene which may be crucial to origin and cause analysis. While analysts may not be familiar with fire patterns, depending on their training and experience, they should document any patterns relevant to their investigation of the scene.

22.5.1 Fire patterns include char patterns, smoke and soot patterns, and damage patterns.

22.5.2 Fire signs may present themselves as a surface effect, such as bubbling of paint on a wall or the directional melting of glass in a light bulb.

22.6 When working in a fire scene, it may be helpful to begin working in areas with the least amount of damage and move toward areas with greater amounts of damage. By doing so, it can give the analyst a better understanding of the condition of the scene prior to the fire.

22.7 The evidentiary value of physical evidence in the fire scene may not be known until at or near the end of the fire scene examination. As such, the entire fire scene should be considered potential physical evidence and should be protected and preserved.

22.8 Evidence from fire scenes often include burnt fire debris, liquids recovered at the fire scene, a suspect's clothing, and/or ignitable liquids found in the suspect's possession.

22.9 For scenes in which an accelerant is thought to have been used, an area of substrate that was not affected by the accelerant should be collected separately as a control.

22.10 When collecting evidence from a fire scene, any tools that are used should be cleaned with water between collecting items. The use of an alcohol based cleaner could affect the analysis of the item.

22.10.1 The lid of a friction lid can could be used to help scoop/collect the evidence into the can; this would help to eliminate contamination during collection.

22.11 Fire scene evidence shall be packaged in clean, airtight containers.

22.11.1 Debris samples and clothing should be packaged in either a lined friction lid can, a glass jar, or a heat-sealable polyethylene or nylon bag that is designed for use with fire evidence.

22.11.1.1 Friction lid cans should not be filled more than 2/3 full.

22.11.1.2 The groove at the top of the can should be free of debris prior to attaching the lid.

22.11.1.3 The lids of friction lid cans shall be hammered down tightly, but not with such force as to damage/buckle the can itself.

22.11.1.4 If packing materials are to be used inside the can, the evidentiary item should first be placed in a paper sack before being placed inside the can. Alternatively, the packing materials could be placed inside a paper sack, then placed around the item of evidence. By doing this, small items or fragments of items won't get lost amongst the packing materials.

22.11.2 Glass vials should be used for liquids suspected of being or containing an ignitable liquid. The glass vial should be packaged in a friction lid can with adsorbent material to prevent the contents of the vial from contaminating adjacent samples and to protect the vial from damage/preserve the sample in case of breakage.

22.11.2.1 Glass vials should not be filled more than 2/3 full.

22.11.2.2 Samples packaged in glass vials shall be transported to the ISPFS lab via ground transportation.

22.11.3 External packaging may include paper sacks and cardboard boxes.

22.11.3.1 Friction lid cans may be sealed, labeled, and submitted without placing the can inside additional packaging.

22.12 For all evidence that requires special storage considerations, the external packaging should have the storage medium noticeably written (e.g. "freeze", "refrigerate") in bold print.

22.13 Fire evidence should be stored under refrigeration until analysis.

22.13.1 Fire evidence thought to contain substrate materials likely to contribute to the degradation of petroleum products such as manure, vegetation, and/or soil, should be frozen until analysis.

23.0 Documentation and Evidence Collection from Victims, Subjects, and Suspects

23.1 A variety of different people may interact with the victim, suspect, or crime scene. Documentation of their condition and/or collection of evidence from their person may be crucial.

23.2 A person should be properly documented using photography and notes prior to collection of any evidence.

23.2.1 Consideration for the different types of evidence that may be present should be contemplated prior to beginning the collection process.

23.2.2 Ideally, the person should be prohibited from changing their clothes or washing their body prior to evidence collection. If the person altered their clothing and/or condition, it should be noted.

23.3 When photographing a living person, identification and condition photographs should be taken.

23.3.1 Photography of living persons should take place as outlined in Section 8.29 of this manual.

23.4 Hands are often the location of different types of evidence.

23.4.1 If it is thought that a person may have had considerable interaction with a suspect or victim (e.g. fist fight, defensive movements), greater documentation should be made. This should also bear on the type(s) of evidence that may be present.

23.4.2 Injuries (or lack thereof) may help to corroborate or refute an account of the interaction(s).

23.4.3 The probative value of gunshot residue (GSR), blood, potential DNA, and other evidence should be weighed against one another, as the collection of one may affect the collection of another.

23.4.3.1 GSR should be collected as per section 18.6 of this manual.

23.4.3.2 Biological material should be collected as per sections 12.6-12.10 of this manual.

23.5 Biological materials may be present on other areas of a person's body. Biological material should be collected as per sections 12.6-12.10 of this manual.

23.6 A known DNA sample (i.e. reference sample) may be collected from a person to facilitate future DNA analysis.

23.6.1 Cap-Shure or standard wood/plastic shaft sterile swabs may be utilized to collect a known DNA sample.

23.6.1.1 Wearing disposable gloves, remove the swabs from the sterile packaging. Using two swabs simultaneously, place the cotton tips of the swabs in the person's mouth and

vigorously swab the insides of both cheeks. Move the swabs between the gum line and the fold of the check, and under the tongue. Remove the swabs from the person's mouth.

23.6.2 After collection, Cap-Shure swabs may be placed in an evidence envelope without allowing the swab to dry due to the capsule design.

23.6.3 After collection, standard swabs should be placed in a vented swab box or a small, coin-type envelope; time should be allowed for the swab to dry. It is effective to tent the envelope to keep it somewhat open in order to facilitate swab drying.

23.6.4 The external packaging should include the name of the person from whom known DNA swabs were collected, not just an indication of "victim" or "suspect."

23.7 Sexual Assault Kits shall not be collected by Crime Scene Investigators.

23.7.1 Sexual Assault Kits shall be collected in accordance with the "Idaho Sexual Assault Response Guidelines, Best Practices."

23.7.1.1 Best practice for medical forensic examinations are ones performed by a medical provider trained in sexual abuse evaluation. This may include a Sexual Assault Nurse Examiner (SANE), Sexual Assault Forensic Examiner (SAFE), or Pediatric SAFE.

23.8 Finger, palm, and foot print exemplars may be collected from a person to facilitate future comparisons.

23.8.1 Exemplars should be collected as per section 15.13 of this manual.

24.0 Validation

24.1 Procedures for the validation and/or performance verification of methods used in ISP Forensic Services are outlined in the ISP Forensic Services Quality/Procedure Manual.

24.2 Validation/performance verification data, results, and summaries for methods employed for Crime Scene shall be maintained in that section.

25.0 Forms

25.1 Form note pages may be utilized to supplement the note-taking process. The use of forms is not required and may be utilized based on CSI preference.

25.2 Forms that are being tested may be stored on a shared computer drive. Approved forms are stored in the quality system.

25.3 Approved forms:

- Crime Scene Notes Check List
- Evidence Collection Notes page
- Presumptive Blood Testing Notes page
- Vehicle Diagrams
- Clan Lab Notes Check List

26.0 Tools and Equipment

26.1 When responding to crime scenes, analysts may utilize a variety of tools and equipment. The proper use of tools and equipment ensures that evidence is documented and collected properly and that analysts remain safe.

26.1.1 If an analyst is unsure how to properly use a tool or piece of equipment, they should consult another CSI or the Crime Scene Coordinator.

26.2 ALTERNATE LIGHT SOURCE (ALS)

26.2.1 An alternate light source (ALS) is a portable, multi-waveband, and tunable light source that is used to enhance or visualize potential items of evidence. Different substances, such as latent print residue, body fluids, chemicals, or other organic substances may react differently to different wavelengths of light. When a luminescent deposit is excited with a particular wavelength of light, the deposit absorbs the light and re-emits it at a different wavelength. The short-lived light being re-emitted is termed fluorescence.

26.2.1.1 Crime scene response may include the use of an electrical, tunable ALS or ALS flashlights.

26.2.2 An ALS is used to attempt to create contrast between a substance and the surface upon which it is deposited.

26.2.3 Some surfaces may have fluorescent properties and may react to the ALS.

26.2.4 To operate the ALS, first turn on the ALS. Make sure the ALS comes to full operating power (fan and bulb reach consistent speed/brightness).

26.2.4.1 Choose the band-width that corresponds to the color of goggle being utilized.

26.2.4.2 When using an ALS to observe an item/surface, goggles shall be worn.

26.2.4.3 The appropriate goggles should be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

26.2.4.4 Turn off the ALS lamp and allow it to cool completely before powering off ALS unit.

26.2.5 Use of ALS shall be recorded in case notes, along with observations. The wavelength and filter combination should be noted, especially if it is unusual.

26.2.6 If the ALS malfunctions, it shall be taken out of service until it can be repaired. The ALS shall be tagged indicating that it is out of service.

26.2.7 As with other electrical appliances, guard against electrical shock. Ensure that all connections are proper and that no loose, damaged, or frayed wires exist. Make sure the ALS is unplugged before attempting any maintenance. Do not use outdoors if wet conditions exist.

26.2.8 The eyes are generally more vulnerable to the ALS than the skin, and appropriate eye protection shall be used. Permanent eye damage can occur from reflected, refracted, or direct illumination to the eye. Most of the light emitted by an ALS is not absorbed, but is reflected and scattered off the surface being examined. Extreme care should be taken around highly reflective surfaces. Never look directly into the light or allow beams to bounce off the surface into the analyst's eyes or the eyes of another person in the vicinity. Filtered googles or shields shall be utilized when using this equipment as they provide protection from potentially harmful rays and provide additional enhancement for viewing evidence.

26.3 INFRARED THERMOMETER

26.3.1 A gun-style infrared thermometer can be used to measure the surface temperature of objects or fluids.

26.3.2 For greatest accuracy, the "measurement spot" on the area being measured should be measured at an 8 to 1 ratio (at 8" from the target, the "measurement spot" would be 1" in diameter; at 16" from the target, the spot would be 2" in diameter, etc.).

26.3.3 To operate the thermometer, point it at the surface to be measured (at the appropriate distance) and depress the "trigger" mechanism. The readout screen will display the measured temperature.

26.3.3.1 The temperature can be set to read in either Celsius or Fahrenheit.

26.3.4 The thermometer is set to read in a temperature range of -4 degrees to 605 degrees Fahrenheit and to be accurate to +/- 2%.

26.3.5 The thermometer requires a 9-volt battery for power.

26.3.6 For safety, the infrared thermometer should not be pointed at any person. Personnel should avoid looking at the thermometer's infrared light.

26.4 LASER MEASURING DEVICE

26.4.1 A laser measuring device can be used to take measurements easily and quickly in a crime scene; it can be used indoors or outdoors.

26.4.1.1 Use of the laser measure outdoors may be negatively impacted by bright sunlight.

26.4.2 A laser measure may be preferable to a standard measuring tape in taking measurements because it can be used by one person alone. Additionally, it

doesn't have to be deployed across long expanses of potentially contaminated surfaces in the way a standard tape measure would.

26.4.3 The laser measure is pre-set with the rear edge of the unit as the reference point (RP) for measurements.

26.4.3.1 The unit can be set with the RP at the front edge of the unit or to the tripod (if the unit is attached to a tripod). When the unit has powered down and then is powered on again, it will reset the RP to the rear edge of the device.

26.4.4 Once the laser measure is powered on, the laser is automatically activated and the laser measure is measuring.

26.4.5 To take a measurement, place the laser measure against the desired starting point of the measurement (e.g. wall) and aim at the surface to be measured to. Press the measure button (black triangle) to take the measurement.

26.4.5.1 For a highly reflective surface, the laser may not be able to fix itself against the surface. In that situation, the target card or a similar surface can be placed against the target surface in order to collect a measurement.

26.4.6 The last three measurements will show on the unit's display.

26.4.7 The last thirty measurements are automatically stored in the unit.

26.4.7.1 To retrieve stored measurements, press the function button [Func] and use the plus or minus buttons to cycle through the measurements functions until "Memory" is selected; then press the black triangle button. Use the plus or minus button to scroll through measurements recorded.

26.4.8 For safety, the laser should not be pointed at any person. Personnel should avoid looking at the laser light; the laser beam could cause blindness.

26.5 RECHARGEABLE FLASHLIGHTS

26.5.1 Flashlights are an important tool for navigating poorly lit areas in a crime scene and for discovering/locating items of evidence.

26.5.2 Streamlight flashlights feature a multi-function switch for varying lighting effects.

26.5.2.1 Press the switch momentarily to turn the flashlight on at full intensity; release to turn off.

26.5.2.2 Press and hold the switch to cycle through brightness levels; release at desired level.

26.5.2.3 A single press of the switch from any "on" mode will turn the flashlight off.

26.5.2.4 A quick double-click of the switch will activate the strobe function.

26.5.3 After using a flashlight, it should be returned to the charger so that it is ready for the next use.

26.5.4 To charge the flashlight, turn it off and insert it into the black charger/holder. The switch module (below the head) fits into a mating recess in the charger. Many flashlights have both an AC charger and a vehicle charger.

26.5.4.1 When the Streamlight flashlight is properly inserted in the charger, the LED in the switch module will illuminate with the following indication:

26.5.4.1.1 Steady glow- battery is charging.

26.5.4.1.2 Steady flash- charging is complete.

26.5.4.1.3 Rapid flash- problem with charging the battery.

26.6 ADAMS WEB / FORAY

26.6.1 Digital images (i.e. photographs) are frequently captured for documentation of crime scenes, vehicles, evidence, and people.

26.6.1.1 Photographs shall be captured as outlined in Section 8 of this manual.

26.6.2 Adams Web is a digital imaging system that provides a way of storing, filing, annotating, and viewing digital images. The digital image name assigned by the camera shall be included in Adams Web as the "File Name." Information about the Event/Location may be entered in the "Description" field. "Tags" may be used to group images for convenience.

26.6.3 All digital images taken during a field services response shall be uploaded to the Adams Web digital imaging system as soon as practical.

26.6.3.1 Folders in Adams Web shall be named by the lab case number.

26.6.3.2 When uploading digital images, the lab number, crime and date of crime should be entered.

26.6.4 When images are acquired into a case Folder, they should be acquired in batches, based on the response event/location. If an analyst responds to three different scenes, one batch of images should be uploaded for each of the three events/locations.

26.6.4.1 Adams Web can sort digital images based on groups of images that are uploaded together, which is called a "Set."

26.6.4.2 When acquiring images, the "Category" should be selected as "Crime Scene Documentation".

26.6.4.3 When uploading digital images, a description can be entered during the acquisition process, which shall be applied to every image in that set. By entering a description during the acquisition process, the analyst only has to enter the description once, instead of in each individual image.

The description should contain information about the images depicted (e.g. address, vehicle description, subject's name, date of response).

26.6.5 Tags can be used as a way to group images together for reference. Tags are created by editing the image(s) and adding an identifier (e.g. analyst initials, key word) in the "Tag" field.

26.6.5.1 Tag identifiers should be entered exactly the same in each image in order to sort correctly.

26.6.5.2 Multiple images can be selected at once, and a tag can be entered that shall apply to all selected images.

26.6.5.3 One image may have multiple different tags.

27.0 Report Writing

27.1 Crime scene documentation and report writing shall be according to the ISPFS Quality Manual.

27.2 Reports shall be entered in the Field Services matrix of the case assignment in the ILIMS system.

27.2.1 An assignment shall be created with the "Section" selected as "Field Services"; the "Task Type" shall be selected as "Field Services". The Case File should be assigned to the analyst who will be writing the report, unless there is associated evidence (e.g. Digital Media) associated with the Field Services response.

27.2.2 In the "Scene Personnel" panel, a separate entry shall be made for each CSI, for each response date. In each entry, the total travel time, total time on scene, and number of locations shall be entered.

27.2.3 In the "General Crime Scene" panel, a separate entry may be made for each response event or location. Only the pertinent fields shall be entered in this panel, based on the processing conducted. If three vehicles were processed at a department's garage, it may make sense to create an entry for each vehicle. If the information can be sufficiently conveyed in one entry, without confusion, then only one entry may suffice.

27.2.4 In the "Autopsy Services" panel, a separate entry should be made for each decedent. Enter the pertinent fields based on the quantity of each item that was collected at autopsy.

27.2.5 In the "Subject Exemplars" panel, list the quantity for each type of exemplar collected from a person.

27.2.6 In the "General Notes" panel, additional information may be added to the notes for the case.

27.2.7 In the "Report" panel, the case narrative is entered. There is a limit on the number of available characters per entry, so multiple entries may have to be made in order to write a long report.

27.2.8 In the "Verification of Accompanying Personnel" panel, there are three entries to be made. Each accompanying CSI shall fill out a verification panel. After reviewing the content of the notes and report, any suggested changes or corrections should be entered in the "Notes from Accompanying Responder" field. Once the corrections have been completed, the accompanying CSI shall fill in the "Information Verified" field (password entry required) and the date field.

27.2.9 Once all accompanying personnel have verified the content of the report, it can be sent for technical review.

27.3 Reports shall be as clear and concise as possible, but shall include enough detail to adequately describe the scene, evidence, and activities performed. The reader should be able to clearly understand the scene from the report, without having to reference photographs or sketches.

27.4 Reports shall be written in the first person and shall be in an active voice. If multiple people performed tasks, the report shall indicate which people performed which tasks. Only the tasks performed by ISPFS personnel shall be included in the report.

27.5 All time notations shall be in military time and shall include the time zone abbreviation (e.g. MST/MDT, PST/PDT).

27.6 Reports shall not contain any information that is not represented in the crime scene notes, which includes the crime scene sketch.

27.7 Reports do not need to be broken down into sections with headings, unless the report is so complicated that the additions of section headings would help the reader to better understand the report.

27.7.1 If headings are used, recommended headings would be "Scene Description", "Victim(s)", "Evidence", and "Scene Activities".

27.8 Reports shall be organized in the following order, including only those sections and information relevant to the activities performed:

27.8.1 Basic scene and response information, including date, time, names of analysts responding to the scene, location, type of investigation, personnel who were present at the scene, how the scene was secured, and environmental conditions.

27.8.2 Description of vehicles, buildings, and other scenes

27.8.2.1 Vehicle descriptions shall include the year, color, make, model, license plate number, and Vehicle Identification Number (VIN). The vehicle's location and the condition of any seals shall be noted, including the time the seals were broken. The general condition of the vehicle and its contents shall be noted.

27.8.2.2 Building descriptions shall include the type of building, the number of stories, the direction it faces, the type of location, and the number and types of rooms contained therein. The general condition of the building and rooms of importance shall be noted. Specifically note any damage that may be pertinent to point of entry or exit.

27.8.2.3 Other types of scenes shall be described using cardinal directions referenced from a landmark or location or described generally, including GPS coordinates.

27.8.3 Description of rooms of importance

27.8.3.1 Starting with the doorway to the room, moving around the room (either clockwise or counterclockwise), describe the furniture and items in the room, including structures. For fixed items, like doors and windows, use *present tense* to describe. For items that are moveable, use *past tense* to describe, as the report only indicates their location at the time you were on scene. Note condition of lights (on, off), window shades (up, down, open, closed), appliances, etc.

27.8.4 Description of Victim(s)

27.8.4.1 Describe the body's position in the scene. Describe all clothing, visible jewelry, and accessories. Note the location of any visible injuries and note the presence of apparent blood or other fluids, if present.

27.8.5 Description of items of evidence in the scene

27.8.5.1 Describe the item of evidence sufficiently that it can be distinguished from other similar items of evidence. Use serial numbers or identifying numbers, brands, or labels, as applicable. Include evidence markers with descriptions.

27.8.5.2 If the investigating agency assigns their own item number to an item of evidence, that number may be included so that the items can be easily correlated with that agency's reports.

27.8.6 Scene Activities

27.8.6.1 Photography

27.8.6.1.1 Include a general statement that the scene or vehicle was photographed for overall location, identification, and condition, including who captured the photos.

27.8.6.1.2 If any victims, suspects, or subjects were photographed, note that they were photographed for overall identification and condition. If there is something specifically photographed that is pertinent to the investigation, it should be specifically included in the report.

27.8.6.1.3 If any photographs are taken of fingerprints, footwear, tire tracks, or tool marks, make note that comparison quality photographs were taken of that evidence, and from what location(s) in the scene.

27.8.6.2 Presumptive Test for Blood

27.8.6.2.1 All items that were tested shall be noted. If there are a small number of items, they may be listed individually. If there are a large number of items, they may be grouped to indicate a number of items from a particular location within the scene.

27.8.6.2.2 Positive results shall be reported by individual items, if there were few items, or by quantity and location, if there were numerous items.

27.8.6.2.2.1 Positive results shall use the term "indicating" in regards to the presence of blood.

27.8.6.2.3 Negative results shall either be reported indicating that for all other items tested, blood was not detected, or that for specific items/areas, blood was not detected.

27.8.6.3 Evidence Collection

27.8.6.3.1 Each item of evidence that is collected from the scene shall be listed in the report.

27.8.6.3.2 If multiples of the same type of evidence were collected (e.g. swabs, adhesive lifts, latent lift cards, etc.), they may be grouped to indicate the number of items from a particular location within the scene.

27.8.6.3.3 If the location of a particular piece of evidence is significant, its measurement to a reference point shall be included in the report.

27.8.6.3.4 Note the person to whom evidence was turned over and at what time.

27.8.7 Final Notes

27.8.7.1 Note the time that you cleared the scene.

27.8.7.2 If digital images were transferred to the investigating agency, note the person/agency and the time that the images were transferred.

27.8.7.3 Note that all digital images were uploaded to the digital imaging system.

27.8.7.4 If a CD/DVD/thumb drive of images was made for the agency, indicate which type of media was used, to whom it was delivered/sent, and on what date/time.

27.9 The following are basic report writing examples. There may be situations that do not fit the examples given and wording shall be developed as the need arises. (Blanks and items in parentheses indicate a choice or description should be entered).

Basic Scene Information

On (date), (other analyst title/name and) I responded to (location – address, city, county, Idaho) to assist with a (type) investigation. (People/agency) were present upon my arrival and the scene was (cordoned off with crime scene tape/secure). The weather was _____ and the temperature was approximately _____ degrees F.

Description of Scene- Vehicle

Vehicle 1 (V1) is a (year) (color) (make) (model), (license plate state/number), VIN: (17 characters, tenth character is vehicle year). V1 was located at (location) and (each door/trunk/hood) was sealed upon my arrival; I broke the seals at (time).

Description of Scene- Building

(Location) is (single/two/three) story home that faces (direction) in a residential neighborhood. The house consists of (number and type of rooms).

(Location) is a(n) (apartment/condominium) that faces (direction) in a multi-unit complex.

(Location) is a commercial building that faces (direction). The building consists of (number and type of rooms).

Description of Scene- Other

...an undeveloped area (direction) of (landmark, location).
...a (desert/wooded/etc.) area at (GPS coordinates).

Description of Rooms of Importance

The door to the master bedroom is in the northeast corner of the room. South of the doorway, on the east wall, there is a closet door and the door to the master bathroom. There are two windows on the south wall. A freestanding mirror was in the southeast corner of the room, south of the bathroom door. A bed was against the west wall, extending eastward into the room. A nightstand with a lamp (powered on) was against the west wall, north of the bed.

Description of Body

The victim, tentatively identified as (First Last) was lying on the floor, north of the bed, with his head to the west and his feet to the east. His head was turned so that the right side of his face was against the floor. His right arm was bent at the elbow, his right hand resting palm side up, next to his right hip. His left arm was straight at his left side. His right leg was straight, and his left leg was bent slightly at the hip and the knee. The victim was wearing a dark blue hooded sweatshirt, blue jeans with a black belt, gray

socks, and gray athletic shoes. A gold colored chain was visible around his neck. There was an area of apparent blood on the left side of his mouth and on his right hand, at the base of his thumb.

The victim, an unidentified (female/male)...

Description of Items of Evidence in the Scene

In the master bedroom, there was a Glock G43 semi-automatic handgun (SN ABC123) on the nightstand (Marker 4/ PPD Item 2), a box of ammunition on the floor (Marker 5), and one cartridge case on the floor (Marker 6). Swabs of apparent blood were collected from the closet door exterior handle (Marker 12), closet door frame (Marker 13), and baseboard south of closet (Marker 14).

Photography

I photographed the (scene/vehicle) for overall location, identification, and condition.

I photographed the (victim/suspect) for overall identification and condition.

I took comparison quality photographs of (footwear/tire track/fingerprints) from (location in scene)

Presumptive Test for Blood

I performed a presumptive test for the presence of blood on (number) items from (locations). Positive results, indicating the presence of blood, were obtained on (number) stains from (locations). Blood was not detected on the other items tested. Swabs were collected from (locations).

Results from presumptive chemicals tests for the presence of blood were (negative/inconclusive) for (locations).

Evidence Collection

I collected twelve latent lifts: four from exterior of the window east of the front door, six from the master bedroom, and two from the kitchen. I collected three (gel lifts) of footwear impressions (Markers A-C) from the floor east of the front door of the residence.

All evidence collected was turned over to (person/agency) at (date/time).

Final Notes

I cleared the scene at (time).

I transferred digital images to (person/agency) on (date).

I uploaded all digital images to the digital imaging system and provided a (CD/DVD) of the images to (person/agency) on (date).

28.0 Review

28.1 Technical and Administrative reviews shall be conducted in accordance with the ISPFS Quality/Procedure Manual.

28.2 Reports shall be written as outlined in Section 27 of this manual.

28.3 One report may be written that represents the work of all the analysts who responded to a scene or series of scenes.

28.3.1 If analysts respond to multiple locations, process multiple vehicles, and/or document multiple people in the course of one crime scene response, all of the responses may be included in one report.

28.3.2 If the crime scene response is conducted over several consecutive days, one report may be written.

28.3.3 If additional requests for further crime scene assistance are received at a later date, a separate report should be written for each subsequent response.

28.3.3.1 The subsequent responses should have separate reports from prior responses so that they don't impede the completion and release of the reports from the prior responses.

28.4 Each CSI shall review the content of the notes and the report prior to the report being considered for review.

28.4.1 Each CSI shall initial each page of the notes packet.

28.4.2 Each CSI shall verify the content of the report, indicate the need for any corrections and/or changes, and sign and date the Verification of Accompanying Personnel panel in the lLIMS matrix.

28.5 Review may not be completed by one of the analysts who responded to the scene. Only those CSIs who have been trained by the Crime Scene Coordinator can complete report reviews.

28.6 The information in the matrix regarding scene personnel, actions taken, tests performed, etc. shall be consistent with the information contained in the field notes.

28.7 Any information present in the report shall be contained in the notes, including sketches.

28.7.1 Identifying numbers, including marker numbers, serial numbers, license plate numbers, etc. should be checked for omissions and/or transposals.

28.7.2 Any direction indications should be checked against sketches.

28.7.3 For any presumptive tests that were conducted, results should be clearly indicated in the report.

28.8 Administrative documentation for the case should be attached in the Case info tab in ILIMS.

28.8.1 Copies of search warrants should be attached in the Case Info tab, rather than included in the notes packet.

28.8.2 If the reviewer chooses to print the report and make suggested changes and/or corrections on it, that document shall be scanned and attached to the Case Info tab.

28.9 All photographs taken at the crime scene shall be uploaded to the digital imaging system.

28.9.1 Information may be entered in the description field; it may contain date, location, or other pertinent information related to the images.

28.9.2 A notation should be made in the report that digital images are being retained by ISPFS.

28.9.2.1 A disposition statement should be automatically generated from the ILIMS system upon entry of photography in the general crime scene panel in the matrix. If it does not generate, a statement should be added to the report manually.

28.10 The matrix entries, notes pages, and report should be free of spelling and grammatical errors.

29.0 Proficiency Testing

29.1 Annual proficiency testing shall be conducted for any disciplines, processing, or testing for which a training program is in place and an analyst has satisfactorily completed the training program.

29.1.1 Analysts may be trained in different disciplines, processing, and testing that are utilized in crime scene.

29.1.2 Annual proficiency testing shall be conducted in presumptive blood testing.

29.1.3 Analysts who complete annual proficiency testing in their primary discipline shall not perform an additional proficiency test for crime scene if they also perform the duties of their primary discipline at crime scenes.

29.1.3.1 For example, a latent print examiner who completes a processing proficiency test in the latent print discipline shall not have to complete an additional proficiency test in order to perform latent print processing at crime scenes.

29.2 Testing shall be in accordance with the ISPFS Quality/Procedure Manual.

29.3 Documentation of any mock crime scene, processing, and/or testing that is completed in the course of a proficiency test shall be entered in ILIMS in the same way as standard case work.

30.0 Safety and Well Being

30.1 Safety is a primary concern when responding for field services requests. Analysts should reference the Idaho State Police Forensic Services Health and Safety Manual or seek guidance from the Laboratory Health and Safety Officer regarding general safety procedures.

30.2 Personal protective equipment and clothing should be worn when working in scenes that may have biological or other hazards.

30.2.1 Tyvek suits, booties, disposable gloves, face masks/shields, and safety glasses are available and may be utilized based on the scene hazards.

30.3 Boots that prevent puncture and crushing of the foot should be worn on all crime scene responses.

30.4 Chemicals and reagents used in crime scene processing may be hazardous; the appropriate precautions should be taken prior to the use of any chemical or reagent, especially in confined areas.

30.4.1 CSIs should consult the Safety Data Sheets (SDS) for further safety information for particular chemicals. SDS may be found at: http://www.msds.com or http://www.hazard.com/msds

30.5 Firearms located in crime scenes are often loaded and ready to fire; all firearms should be handled as such.

30.6 When searching a crime scene for evidence, caution should be taken by the CSI as there may be hidden hazards (e.g. needles, razor blades, etc.) that may be inside other items.

30.7 Environmental concerns, such as very high or very low temperatures, can quickly affect CSIs. CSIs should take breaks sufficient to maintain hydration and to avoid heat exhaustion or heat stroke. Wearing PPE, such as Tyvek suits, can accelerate the likelihood for heat exhaustion and/or heat stroke. CSIs shall follow safety guidelines as outlined in the ISPFS Quality Manual and ISPFS Health and Safety Manual.

30.8 Vicarious Trauma is exposure to the traumatic experiences of other people, which is inevitable for CSIs who respond to crime scenes involving trauma. Vicarious trauma can cause CSIs to experience reactions including, but not limited to, unpredictable emotions, flashbacks, nightmares, headaches, and nausea.

30.8.1 On scene, CSIs should check in with one another to determine if they are experiencing symptoms of the stress of vicarious trauma. If they are, they should remove themselves from the scene temporarily to take a break. If they don't feel that they can continue working the crime scene, they should contact the Crime Scene Coordinator.

30.8.2 Vicarious trauma may manifest hours, days, weeks, or longer after completing work at the crime scene. If a CSI is experiencing Vicarious Trauma as a result of exposure to a traumatic crime scene, they should contact the Crime Scene Coordinator to discuss resources available and to discuss future crime scene responses.

REBUTTAL EXPERT DISCLOSURE: [redacted]
EXHIBIT S-2

Anticipated Rebuttal Testimony

On January 16, 2025, Defense filed expert disclosures for Sy Ray and Tom Slovenski regarding Cellular Forensics. The following anticipated testimony is in response to Ray's Case Report dated January 21, 2025 (Defendant's Exhibit D11-B), and Slovenski's Final Report dated January 22, 2025 (Defendant's Exhibit D14-B). The claims raised by the defense's disclosures are numerous; however the majority of these claims can be sorted into the following broader topic areas: (1) flaws in drive testing; (2) omitting records in the CAST Report, primary handoff data; (3) mapping of only small portions of the records received; (4) changes between "Draft Report" and "Final Report" and; (5) FBI's "refusal" to turn over Timing Advance records for subject's phone. The State intends to introduce the following anticipated testimony from [redacted] in response to the above claims:

1. **Defense Claim: Flaws in Drive Testing**

The defense alleges drive test results don't show actual coverage or show coverage where no measurement is taken. These allegations made by defense appear to take issue with the interpolation of the drive test data. In other words, the way that the results of the drive test are plotted on a map. The FBI Cellular Analysis Survey Team (CAST) conducts drive testing using a Gladiator Autonomous Receiver (GAR) developed by Gladiator Forensics. The GAR collects the data, which is then analyzed by Gladiator Forensics software. The software creates the coverage maps seen on several pages of the report. The coverage maps are created using the actual measurements taken by the GAR and interpolation using the natural neighbor algorithm. In other words, it's looking at known values at known locations to determine the expected value at a location where a measurement couldn't have been taken. The natural neighbor algorithm was

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first published by Robin Sibson in 1981 and it is widely accepted in both academia and as an industry standard in determining the coverage of a particular cell site within a broader cellular network. Along with the collected measurements and interpolation of the data, the Gladiator Forensics software determines if a phone could connect to a cell site at a particular location based on the observed measurements. This determination is made using the same rules that a phone would use to determine if it could use a particular cell site. Using this data, a map displaying the coverage area is generated. For defense to indicate that their witness' methods are somehow superior to this widely accepted methodology is an argument that should be presented in front of a jury. Addressing specifically defense' allegation that measurements were not taken at each and every location on the map, the State would highlight that drive testing equipment can only be taken to locations where physical and lawful access is permitted. Cellular providers use similar methodology to manage and maintain their network since they also cannot drive in all locations but still want to guarantee certain levels of coverage and services to an overall area and detect areas where they need to improve coverage and services.

Regarding the Final Report, Pages 26 and 27 show cellular activity for Madison Mogen and Xana Xernodle's phones along with the drive test data for the cell site used by their phones. (See State's Exhibit S-2(b) to State's Supplemental Response Re: Expert Disclosures) The drive test data was not shown to determine where their phones could have been. Their phones were recovered from inside their residence, 1122 King Rd, Moscow, ID (hereinafter the "Crime Scene"). It was shown to illustrate that the drive test data and coverage maps are consistent with a known event, their phones used that particular cell site and were located at the Crime Scene.

2. **Defense Claim: Records were not included in the CAST Report, primary handoff data**

Regarding analysis of AT&T data records, there is a difference in how analysis is interpreted depending on the type of record being analyzed. Specifically, FBI CAST examines each transaction in the raw records to determine reliability, based on several factors. As an example, when an AT&T data session is initiated on AT&T's network that is not following a timeout of a previous data session, AT&T records the first cell site and then the subsequent cell sites associated with the session if applicable. The first cell site recorded in this session is the only cell site that is chosen based on measurements made by the cellphone representing the best signal from these measurements and ranking of surrounding cell sites. Once the session is initiated, the handoff cell sites are chosen by the network. This is significant because the initial cell site will be the best signal that the cellular phone measures, while the handoff cell sites will be chosen by the network based on known neighbors to the selected cell site. In other words, the location of a device is best estimated by the initial cell site versus the handoff cell site. Handoffs are mapped on a case-by-case basis, which is determined by the needs of the investigation.

FBI CAST's conclusions and opinions of the phone's location in this case do include the analysis of the handoff data. On page 13 of the CAST Final Report, the defendant's phone uses cell site with eNodeB and Sector 424199-15, which is consistent with the phone not being at the defendant's residence. (See State's Exhibit S-2(b) to State's Supplemental Response Re: Expert Disclosures) This conclusion would have been reached with or without drive test data, but was further supported by the drive test data.

AT&T call detail records include voice, data, and SMS (text message) connections. The

AT&T data connections will include the first cell site used and any other cell sites that the phone was handed off to during the data session. Each data session includes the initial date and time for the connection and in the case of a data session with handoff cell sites, the "time on tower" or more simply described as the time until the next tower. For example, if the initial date and time for a data session is 12:01:30 PM and the time on tower is 60 seconds, the phone connected to the first tower at 12:01:30 PM and it connected to the second tower at 12:02:30 PM. A time on tower of 60 seconds does not mean that the phone continuously transferred data for the entire 60 seconds, it only means the time until the next tower was used.

3. Defense Claim: The FBI is mapping only portions of the records received

FBI CAST conducts analysis of records in cases based on the facts associated with each investigation. Specifically, this means analyzing records for reasons such as determining the general location of a phone on specific dates and times of interest, whether a phone was in the vicinity of specific locations, or whether multiple devices were generally in the same location. The analysis and reports generated in this case are specifically for the incident that occurred on November 13, 2022. Generating a report of all of the defendant's movements from June 2022 to December 2022 would be overly broad, unnecessary, and prolong the jury's service with details not relevant to prosecution.

4. Defense Claim: Changes between Draft Report and Final Report

Defense raises concerns regarding differences in the FBI CAST Draft Report and the FBI CAST Final Report. The Draft Report is exactly as it is titled, a draft. For background, CAST utilizes a peer review process of any work product prior to it being presented at trial. This peer review process is meant to ensure the final report is accurate, provides clarity to raw cellular records, and relevance to the State's case presentation. The length of the final report was

drastically reduced by replacing numerous pages in the draft with a summary, visible on page 29 and 30 of the CAST Final Report. (See State's Exhibit S-2(b) to State's Supplemental Response Re: Expert Disclosures) The State has no intention of introducing a draft report at trial for the specific reason that it is a raw work product and is not peer reviewed or finalized by CAST. Additionally, the CAST Draft Report was provided as a courtesy since the State recognized that there is a significant amount of data in this case that needed to be analyzed prior to a final report being produced.

5. **Defense Claim: FBI's "refusal" to turn over Timing Advance records for subject's phone**

AT&T's records are produced by their Global Legal Demand Center (GLDC). AT&T GLDC did not begin producing timing advance records until May 2023. All responsive records for the defendant's phone have been produced in discovery.

REBUTTAL EXPERT DISCLOSURE: JEFFREY TANZOLA, HEATHER BARNHART, AND JARED BARNHART
EXHIBIT S-3

To the extent Carol Peden intends to offer opinions on any of the topics listed in her disclosure, the State does not believe those opinions have been properly disclosed under Rule 16, which means the State cannot (and is not required) to disclose rebuttal testimony. *See* I.C.R. 16(b)(7) ("This subsection does not require disclosure of expert witnesses, their opinions, the facts and data for those opinions, or the witness's qualifications, intended only to rebut evidence or theories that have not been disclosed under this Rule prior to trial.").

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosure for Carol Peden, and in addition to previously disclosed testimony, the State may call Jeffrey Tanzola, Heather Barnhart, and Jared Barnhart as expert witnesses to respond, rebut and testify in response to Peden's disclosure as follows:

Overall, Peden's disclosure does not contain any substantive opinions to rebut, nor any facts or data for any opinions, other than the reference to "eraser.dll file" discussed below. In order to sufficiently rebut the disclosure, our experts would need the following information as noted below.

1. **The examination and analysis of the data or lack of data on the Windows PC and laptop belonging to the defendant.**

   To sufficiently rebut, the State needs information regarding (1) definition if this is one system or two; (2) which computers are being testified to and what specifically about the examination and analysis is Peden going to testify about; (3) what does Peden mean by data or lack of data.

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2. User behavior, actions, and patterns seen upon review of the Windows PC and laptops seized in this case.

To sufficiently rebut, the State needs information regarding (1) definition if this is one system or two; (2) which computers are being testified to and what specifically about the examination and analysis is Peden going to testify about; (3) What specific behavior, actions, and patterns were seen upon review.

3. The use of Virtual Private Networks (VPN), browsers, apps, and software programs on the devices seized in this case.

To sufficiently rebut, the State needs information regarding (1) What specifically about the use of a VPN is she going to testify about and what devices; (2) What specifically about the use of browsers is she going to testify about and what devices; (3) What specifically about the use of apps is she going to testify about and what devices; (4) What specifically about the software programs is she going to testify about and on what devices?

4. The use, activity, movement, and habits on Bryan Kohberger's laptop computer, desktop computer, and mobile devices.

To sufficiently rebut, the State needs information regarding (1) what specifically about the use, activity, movement and habits on Bryan Kohberger's laptop computer is she going to testify about; (2) what specifically about the use, activity, movement and habits on Bryan Kohberger's desktop computer is she going to testify about; (3) what specifically about the use, activity, movement and habits on Bryan Kohberger's mobile devices is she going to testify about.

5. The use, activity, and movement on Bethany Funke's, Dylan Mortensen's, Madison Mogen's Xana Kernodle's, Kaylee Goncalves', Ethan Chapin's mobile devices.

To sufficiently rebut, the State needs information regarding (1) what specifically about the use, activity, and movement on the specific mobile devices is she going to testify about; (2) if defense referencing more than one device, which devices; (3) what specifically about the use, activity, and movement on Bethany Funke's iPad is she going to testify about; (4) what specifically about the use, activity, and movement on Bethany Funke's social media activity is she going to testify about.

6. Ms. Peden may testify about findings, impressions, and/or conclusions drawn from the work of other experts who previously examined or handled the evidence in question.

To sufficiently rebut, the State needs information regarding specifically what findings, impressions, and/or conclusions drawn from the work of other experts is she going to testify about.

7. Interpretation of cellular data that might be relevant in this case such as browser history, communications, social media, pictures, videos, location data, log files, if the file activity was consistent with witness statements and any missing data based on these statements.

To sufficiently rebut, the State needs information regarding (1) was any file activity identified that might be relevant in this case such as browser history, communications, social media, pictures, videos, location data, log files, and what that was; (2) if any file activity identified that was consistent or inconsistent with witness statements, and what; (3) if missing data identified, if so, what.

8. Eraser.dll file on Bryan Kohberger's Acer laptop

The State's experts will testify Erasers dlls were found on 11/16/2022, but the experts couldn't find any prefetch associated with it being run. This artifact may be associated to a virus scan that was run on 11/16/22.

To sufficiently rebut, the State needs information regarding: (1) the significance of the eraser.dll file; (2) how was eraser.dll used; (3) what is meant by "suggested use by the State's expert"; (3) is it Peden's opinion this was "Anti-forensics"?

9. All forensic data extractions and social media applications provided in discovery for Bethany Funke, Dylan Mortensen, Madison Mogen, Xana Kernodle, Kaylee Goncalves, and Ethan Chapin.

To sufficiently rebut, the State needs information regarding: (1) what is she going to testify about forensic data extractions; (2) what is she going to testify about the social media applications.

REBUTTAL EXPERT DISCLOSURE: JEFFREY TANZOLA, HEATHER BARNHART, AND JARED BARNHART
EXHIBIT S-4

To the extent Kevin Peden intends to offer opinions on any of the topics listed in his disclosure, the State does not believe those opinions have been properly disclosed under Rule 16, which means the State cannot (and is not required) to disclose rebuttal testimony. *See* I.C.R. 16(b)(7) ("This subsection does not require disclosure of expert witnesses, their opinions, the facts and data for those opinions, or the witness's qualifications, intended only to rebut evidence or theories that have not been disclosed under this Rule prior to trial.").

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosure for Kevin Peden, and in addition to previously disclosed testimony, the State may call Jeffrey Tanzola, Heather Barnhart, and Jared Barnhart as expert witnesses to respond, rebut and testify as follows:

Overall, Peden's disclosure does not contain any substantive opinions to rebut, nor any facts or data for any opinions, other than the reference to "eraser.dll file" discussed below. In order to sufficiently rebut the disclosure, our experts would need the following information as noted below.

1. **Digital programs, software, browser and application general use and purpose.**

To sufficiently rebut, the State needs information regarding what opinions he will offer.

2. **Forensic examinations and tools used by examiners.**

To sufficiently rebut, the State needs information regarding (1) what specifically is he going to testify about regarding forensic examinations; (2) his opinion on how a forensic examination should be conducted; (3) tools he going to testify about were used and by which examiners; (4) how he believes the tools function; (5) what opinions he will offer.



3. 3rd party digital data

To sufficiently rebut, the State needs information regarding (1) his definition of "3rd party digital data"; (2) does this include data from 3rd party applications and/or software; (3) which devices; (4) which applications or software does he plan on testifying about; (5) what opinions he will offer.

4. Life patterns based on digital usage as appropriate to meet the State's evidence

To sufficiently rebut, the State needs information regarding (1) what specific life patterns; (2) based on what digital usage (3) what device and specifically what usage; (4) what opinions will he offer.

5. Eraser.dll file on Bryan Kohberger's Acer laptop

The State's experts will testify Erasers dlls were found on 11/16/2022, but the experts couldn't find any prefetch associated with it being run. This artifact may be associated to a virus scan that was run on 11/16/22.

To sufficiently rebut, the State needs information regarding: (1) the significance of the eraser.dll file; (2) how was eraser.dll used; (3) what is meant by "suggested use by the State's expert"; (3) is it Peden's opinion this was "Anti-forensics"?

6. Use of Virtual Private Networks (VPN)

The State's experts will testify that VPNs can be used for a variety of reasons to include masking the IP address. Masking the IP address can anonymize who is using the Internet and the location where the Internet is being accessed from. It is the State's experts' opinions this is why the VPN was used in this case. This can also be used as anti-forensics.

To sufficiently rebut, the State needs information regarding: (1) how the encrypting of data prevents the slowing down of Internet speeds with Internet Service Providers; (2) what

factual basis does he have to indicate that the VPN was used for preventing the slowdown of Internet speeds in this case; (3) what factual basis Peden has to indicate that the VPN was used for unblocking streaming content in this case; (4) what factual basis Peden has to indicate that the VPN was used for preventing data interception from third party software and applications in this case; (5) what factual basis does Peden have to indicate that the VPN was used for accessing public Wi-Fi hotspots safely in this case; (6) what does "safely" mean in regards to accessing public Wi-Fi hotspots.

7. **Use of Incognito browsers to keep user activity private and to protect personal information.**

The State's experts will testify people use Incognito browsers to keep user activity private and to protect personal information. The State's experts will testify Incognito browsers can be used to mask identity and not leave a browser history. This would be a form of anti-forensics.

To sufficiently rebut, the State needs information regarding: (1) the context; (2) which device or devices is he referencing in regards to the use of Incognito browsers; (3) what factual basis does he have to indicate that Incognito browsers were used for keeping user activity private and to protect personal information in this case.

8. **The Google Maps cache file regarding storing portions of map data such as tiles of locations, searches, search suggestions, reviews, and recent directions.**

The State's experts will testify the Google Maps cache file stores portions of map data such as tiles of locations, searchers, search suggestions, reviews, and recent directions.

To sufficiently rebut, the State needs information regarding: (1) the context; (2) the relevance to this case; (3) what device or devices are they referring to as "Google Maps".

REBUTTAL EXPERT DISCLOSURE: JEFFREY TANZOLA, HEATHER BARNHART, AND JARED BARNHART
EXHIBIT S-5

To the extent Josiah Roloff intends to offer opinions on any of the topics listed in his disclosure, the State does not believe those opinions have been properly disclosed under Rule 16, which means the State cannot (and is not required) to disclose rebuttal testimony. *See* I.C.R. 16(b)(7) ("This subsection does not require disclosure of expert witnesses, their opinions, the facts and data for those opinions, or the witness's qualifications, intended only to rebut evidence or theories that have not been disclosed under this Rule prior to trial.").

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosure for Josiah Roloff, and in addition to previously disclosed testimony, the State may call Jeffrey Tanzola, Heather Barnhart, and Jared Barnhart as expert witnesses to respond, rebut and testify in response to Roloff's disclosure as follows:

Overall, Roloff's disclosure does not contain any substantive opinions to rebut, nor any facts or data for any opinions. In order to sufficiently rebut the disclosure, our experts would need the following information as noted below.

1. **How digital devices are forensically extracted, subsequent extracted data examined, and specifically about the tools utilized in the various digital forensic capacities**

To sufficiently rebut, the State needs information regarding (1) what specifically is he going to testify about regarding how digital devices are forensically extracted; (2) which devices is he testifying to; (3) what specifically is he going to testify about regarding subsequent extracted data; (4) what specifically is he going to testify about the tools utilized; (5) what does

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he mean “various digital forensic capacities”?

2. **How information is stored on a digital device and conclusions that can be drawn from various log files that demonstrate how a device is configured.**

To sufficiently rebut, the State needs information regarding (1) What specifically is he going to testify about regarding how information is stored on a digital device; (2) what conclusions are drawn from various log files regarding the device configuration; (3) specifically which log files is Roloff referencing; (4) which devices were these log files obtained.

3. **Different kinds of digital forensic extractions performed on devices during the investigation and prosecution of Mr. Kohberger.**

To sufficiently rebut, the State needs information regarding (1) what specifically is he going to testify about regarding the different kinds of digital extractions; (2) which devices.

4. **Analysis of the produced electronic datasets has been conducted to analyze and create timelines, review the context surrounding specific activity, and generate patterns of life conclusions.**

To sufficiently rebut, the State needs information regarding (1) what specific electronic datasets did Roloff analyze; (2) what is the timeline; (3) what “context” are they referencing and what are the specific activities; (4) conclusions regarding patterns of life.

REBUTTAL EXPERT DISCLOSURE: GARY DAWSON
EXHIBIT S-6

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosures, the State may call Dr. Gary Dawson as an expert witness in pharmacology and toxicology to testify about the degree of impairment of the victims, particularly Madison Mogen, at the time of the homicide. Dr. Dawson's CV and opinion letter are attached as Exhibits S-6(a) and S-6(b).

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CURRICULUM VITAE

Gary Dawson, PhD, FASCP, BCPP, MSL-BC

EDUCATION:

Institution	Degree	Major
Idaho St. Univ.	BS	Pharmacy
Idaho St. Univ.	MS	Pharmacy
Univ. of Alberta	PhD	Pharmacology

PROFESSIONAL ACTIVITY:

Consulting or Testimony on matters of Pharmacology and Toxicology for the State of Idaho Attorney General
Consulting or Testimony on matters of Pharmacology and Toxicology for numerous county Prosecuting Attorneys (Idaho, Utah, CT)
Consulting or Testimony on matters of Pharmacology and Toxicology for the Ada County Coroner (Investigation and Inquest)
Consulting or Testimony on matters of Pharmacology and Toxicology for Idaho State Insurance Fund
Consulting or Testimony on matters of Pharmacology and Toxicology in civil matters of the effects of drugs on the human body
Instructor for Ada County Sheriff's Office, DUID Enforcement Training
Certified Breath Testing Specialist, Draeger 9510, State of Idaho
Certified Breath Testing Specialist, Lifeloc FC20, State of Idaho
Research on the Effects of Drugs and Alcohol on Performance and Behavior
Certified, ARIDE (Advanced Roadside Impaired Driving Enforcement)
Board Certified Psychiatric Pharmacist

PROFESSIONAL EXPERIENCE:

7/17 - **Private Practice**
Consulting, training and contract services in clinical pharmacy, pharmacology and toxicology.

5/15 - 7/17 **Sr. Medical Science Liaison, Medical Affairs, Takeda Pharmaceuticals America**
Field-based clinical and scientific support for a global drug discovery company. Responsibilities in part include identification and support of Neuroscience programs at key academic and healthcare institutions and the development of research and educational programs.

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4/12 - 5/15 **Private Practice**
Consulting, training and contract services in clinical pharmacy, pharmacology and toxicology.

7/05 - 4/12 **Sr. Clinical Science Liaison, Medical Affairs,Takeda Pharmaceuticals America, Inc.**
Field-based clinical and scientific support for a global drug discovery company. Responsibilities in part include identification and support of Neuroscience and Metabolic programs at key academic and healthcare institutions and the development of research and educational programs.

10/04 - 7/05 **Medical Science Liaison, Medical Affairs Praecis Pharmaceuticals, Inc.**
Field-based clinical support for a US pharmaceutical company. Identified and developed Key Opinion Leaders in oncology and urology. Identified, qualified and recruited sites for clinical trials and Investigator Sponsored Studies. Territory included Northern CA, WA, OR, ID, UT, MT, WY, ND, SD, MN, CO, and AK.

5/04 - 10/04 **Director of Pharmacy (Interim), Catholic Health Initiatives**
General and operational supervision of a multi-site specialty pharmacy with 35 professional and clerical staff.

10/00 - 4/04 **Medical Liaison, Medical Affairs Novo Nordisk Pharmaceuticals, Inc.**
Field-based clinical support for NovoSeven® (rFVIIa). Identified and developed Key Opinion Leaders in oncology, hematology, liver disease, cardiothoracic and general surgery, critical care and neurology throughout territory. Identified sites and recruited investigators for Phase II-III clinical trials. Frequent formal presentations to Oncology, Neurology, Critical Care, Surgeons, Pharmacy, Nursing, and Managed Care. Territory included WA, OR, ID, MT, WY, UT, AK.

Prior experience includes:

Assistant and Associate Professor of Clinical Pharmacy
- Member, P&T Committee
- Hospital based clinical practice in Psychiatry and General Medicine

Director of Pharmacy
- Chairman, P&T Committee
- Ambulatory and Long-Term Care settings

Pharmacy Manager
Clinical Pharmacist

HONORARY AND PROFESSIONAL SOCIETIES:

Society of Forensic Toxicologists
American Society of Clinical Pharmacology and Therapeutics
Fellow, American Society of Consultant Pharmacists
College of Psychiatric and Neurologic Pharmacists
Rho Chi Academic Honor Society

AWARDS AND RECOGNITIONS:

Board Certified Psychiatric Pharmacist (BCPP)
Board Certified Medical Science Liaison (MSL-BC)
Fellow, American Foundation for Pharmaceutical Education
Graduate, The Borkenstein Course: Effect of Drugs on Performance

EDITORIAL BOARDS:

American Society of Consultant Pharmacists
ASHP Research and Education Foundation
Demonstration Projects Awards Committee
American Journal of Hospital Pharmacy, Ad Hoc
ASHP Midyear Contributed Paper Review

OTHER:

Licensed to practice pharmacy in Idaho, Nevada, and Arizona
Forty years of clinical experience in inpatient and outpatient psychiatry, drug and alcohol abuse treatment and rehabilitation, and drugs that effect the brain and behavior
More than 20 peer reviewed publications and book chapters in basic and clinical science
Recognized as expert witness in matters of pharmacology and toxicology and the effects of drugs and alcohol on performance and behavior

Gary Dawson, PhD, FASCP, BCPP
523 North Locust Street
Boise, ID 83712



February 10, 2025

Bill Thompson
Latah County Prosecuting Attorney
522 S. Adams St., Ste. 211
Moscow, ID. 83843

RE: CR01-24-31665 ID v Kohberger

Mr. Thompson:

Pursuant to your request for an opinion regarding the effect of alcohol[1] in the above-named matter, I have reviewed the following:

1. NMS Laboratories Toxicology Report for Kaylee Goncalves dated 12/12/22
2. NMS Laboratories Toxicology Report for Madison Mogen dated 11/30/22
3. NMS Laboratories Toxicology Report for Xana Kernodle dated 12/5/22
4. NMS Laboratories Toxicology Report for Ethan Chapin dated 12/5/22
5. Statement of Brett Payne dated 12/29/22
6. Latah County Supplemental Report by Dustin Baker dated 12/28/22
7. Personal communication from Dr. Veena Singh dated 2/7/25

Background and Discussion

I am a doctoral (PhD) trained Pharmacologist and Toxicologist. I offer the following qualifications to speak to this matter:

a. I am actively practicing the science of Forensic Toxicology and Pharmacology
b. I am a Board-Certified Psychiatric Pharmacist (BCPP)
c. I am a Full Member of the Society of Forensic Toxicologists
d. I have more than forty years of clinical practice and experience in the effects of drugs and alcohol on the human body
e. I have had extensive clinical practice in inpatient and outpatient drug and alcohol rehabilitation
f. I have had extensive clinical practice in academic medical center settings
g. I have testified over 200 times on matters of drugs and alcohol in civil and criminal matters in Idaho, Utah. and Connecticut
h. I have lectured extensively and provided training on the toxicology of drugs and alcohol to a variety of settings including law enforcement, lawyers, universities, and lay people

[1] The terms "ethanol" and "alcohol" are used interchangeably and refer to ethyl alcohol



The following is in part the basis for my opinion in this matter. This is not an exhaustive literature review but is representative of the current understanding of the effects of alcohol on the human body and intended to provide insight into its effect on performance and behavior.

Ethanol is a central nervous system (CNS) depressant. Consumption of ethanol impairs the brain in a dose-dependent manner (see Table 1) with impairment first appearing at blood levels well below the *per se* limit of 0.08% for non-commercial vehicles (Tagawa et al, 2000; Starkey and Charlton, 2014; Van Dyke and Fillmore, 2015; Charlton and Starkey, 2015; Moskowitz et al, 2000; Hendler et al, 2013). The more ethanol consumed, the greater its effects and the greater the impairment (Taylor et al, 2010). Ethanol impairs both cognition[2] and psychomotor[3] skills to a degree often unappreciated by the consumer (Verster and Roth, 2012; Brick and Erickson, 2009).

Even low doses of alcohol commonly consumed during social drinking (1–3 drinks) produce mild intoxication: euphoria, stimulation, disinhibition, talkativeness, loss of social fear, relaxation, sedation, and produce an impact on cognition, attention, motor behavior, and emotional processing (Dry et al, 2012; Bisby et al, 2010; Jaaskelainen 1999; Breitmeier et al, 2007; Kamboj 2013).

The quantitative determination of ethanol in postmortem specimens has become a relatively simple analytical procedure and accurate, precise, and specific results are possible (Jones and Pounder, 1998). However, interpreting postmortem BAC results and drawing correct conclusions about antemortem levels and the person's state of inebriation and degree of behavioral impairment at the time of death is fraught with difficulties (Leikin and Watson, 2003; Ziavrou et al, 2003; Wigmore, 2011). The condition of the body, the time between death and autopsy, the environmental conditions (temperature and humidity), and the nature of the specimen collected for analysis are important factors to consider. Under some circumstances alcohol might be produced after death by microbial activity and fermentation of glucose, which is a concern if the corpse has undergone decomposition. Postmortem diffusion of alcohol from the stomach to central blood sampling sites is another complicating factor if a person died shortly after a period of heavy drinking. Care is needed to ensure that biological specimens are not contaminated with ethanol or other extraneous solvents during any lifesaving treatment or in connection with external examination of the body (Kugelberg and Jones, 2007).

In this case there is limited information available to me about the extent of the alcohol consumption by Madison Mogen on the night of 11/12 – 11/13/22 other than she appeared "intoxicated" upon returning home. The information suggests that the interval from the time of last alcohol consumption by Mogen and the time of the attack was about 3 hours. This interval would allow for complete absorption of alcohol (i.e. the post-absorptive stage) from the stomach and minimize the confounding of postmortem redistribution from stomach contents (Wigmore 2011).

When alcohol is absorbed into the blood it distributes to total body water not to any particular tissue or organ. The source of the blood toxicology sample from Mogen was noted to be "cavity blood" or extravascular blood and was reported as 0.282 g/100 ml.

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[2] Cognition encompasses processes such as knowledge, attention, working memory, judgment and evaluation, reasoning and "computation", problem solving and decision making, comprehension and production of language

[3] Psychomotor skills are demonstrated by movement, coordination, manipulation, dexterity, grace, strength, and speed

While cavity blood is the least preferred source for drug analysis, it can still be instructive under certain circumstances, particularly with alcohol, as alcohol distributes throughout the body water (Olds and Jones, 2024). Given the known pharmacokinetics of alcohol, the likely 3-hour interval between last consumption and Mogen's death, and the absence of disruption of the intestinal tract (Dr. Singh personal communication), the measured alcohol concentration would be indicative of gross intoxication. Some minor change in alcohol concentration postmortem cannot be ruled out and a cautious interpretation would be appropriate.

Summary/Conclusion

It is my opinion that Madison Mogen would have been markedly intoxicated from the effects of alcohol around the time of her death. She would not have the ability to mount a meaningful response to a sudden threat to her person. See Table 1 for a summary of the clinical signs and symptoms.

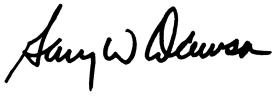
I have limited my review to that of Madison Mogen. However, the same general principles would apply to Kaylee Goncalves (cavity blood), Xana Kernodle (peripheral blood) and Ethan Chapin (cardiac blood).

This response is based upon the limited facts and information provided to me and my advanced doctorial prepared education, training, research and clinical experience in the disciplines of Pharmacy, Pharmacology and Toxicology, and as a recognized expert in the absorption, distribution, metabolism, elimination, and effects of drugs and alcohol for more than four decades.

This opinion is subject to review and revision in the event additional pertinent facts are disclosed.

Thank you for the opportunity to be of assistance.

Regards,



Gary Dawson, PhD, FASCP, BCPP
Full Member, Society of Forensic Toxicology
Fellow, American Society of Consultant Pharmacists
Board Certified Psychiatric Pharmacist

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Table 1. Stages of Acute Alcoholic Influence/Intoxication

Blood Alcohol (mg %)	Stage of Influence	Clinical Signs/Symptoms
0.01 – 0.05	None/Minimal	No or minimal apparent influence Behavior appears normal by ordinary observation Slight motor changes detectable by specialized tests Sedation in alcohol sensitive individual
0.03 – 0.12	Euphoria	Mild euphoria, sociability, talkativeness Increased self-confidence, decreased inhibitions Diminution of attention, judgment, and control Loss of efficiency in finer motor control and performance Increasing time to perception and latent response time, especially in divided attention situations Reduction of glare resistance and recovery Lateral gaze nystagmus
0.09 – 0.25	Excitement	Emotional instability, decreased inhibition Loss of critical judgment Impairment of short-term memory and comprehension Decreased sensory response, increased reaction time Muscular coordination begins, slurred speech, gait, balance Impairment of binocular coordination, impairment of depth perception
0.18 – 0.30	Confusion	Disorientation, mental confusion, dizziness Exaggerated emotional states Disturbances of sensation and perception of color, form, motion, dimensions Decreased sense of pain Impaired balance, muscular incoordination, staggering gait, slurred speech
0.27 – 0.40	Stupor	Apathy, general inertia, approaching paralysis Marked decreased response to stimuli Marked incoordination, difficulty standing or walking Vomiting, incontinence Impaired consciousness, stupor
0.35 – 0.50	Coma	Complete loss of consciousness,
> 0.50	Death	Respiratory arrest

Adapted from Dubowski, KM. Am J Clin Pathol. 1980;74:747-750; Crow, KE and Batt, RD. (eds) Human Metabolism of Alcohol. Vol.1. Pharmacokinetics, Medicolegal Aspects and General Interests. CRC Press 1989. Garriott, JC (ed) Garriott's Medicolegal Aspects of Alcohol. 5th Edition. 20

REBUTTAL EXPERT DISCLOSURE: DARREN GILBERTSON
EXHIBIT S-7

Anticipated Rebuttal Testimony

In response to Defendant's expert disclosures filed on January 23, 2025, the State may call Darren Gilbertson, Detective for the Idaho State Police (ISP), to testify regarding the following:

Gilbertson will testify he was assigned and worked as the lead investigator for the Idaho State Police, assisting the Moscow Police Department in this case. As the lead investigator for the Idaho State Police, Gilbertson is familiar with most of the evidence recovered by law enforcement in this case. For purposes of this disclosure, Gilbertson relied on the autopsies of the victims, his personal observations of 1122 King Road and the surrounding area, the photographs and video taken of 1122 King Road, and the reports detailing the processing of the crime scene at 1122 King Road.

Gilbertson will testify he arrived at the crime scene on November 13, 2022, at about 2:40 p.m. From November 13, 2022, to November 14, 2022, ISP Detectives documented and processed the crime scene. On November 16, 2022, ISP Forensic Services were briefed on the scene information. On November 17, 2022, ISP Forensic Services arrived and took over documentation and processing of the crime scene.

Gilbertson will testify based on review of surrounding video surveillance, investigators believe the homicides occurred between 4:07:47 to 4:20:47 a.m. Gilbertson will testify investigators conducted timed runs at 1122 King Road to gain an understanding of the approximate time needed to have carried out the homicides. (See Supplemental Report 194 previously discovered to defense and attached as States S-7(a)) Specifically, this was done to see if one person could have committed the four homicides in the approximately 13 minutes time

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frame estimated by investigators. Gilbertson will discuss his experience with timed runs and how those timed runs were conducted (as detailed in his attached report). Gilbertson's CV will be disclosed in upcoming discovery.

Gilbertson will testify investigators included two possible routes back to the vehicle parking area above and to the south. The shortest and most direct path, going from the parking area, and moving east to west along the back of the house took approximately thirty (30) seconds. A second path, starting at the southern edge of the property and walking a fence line through some trees, and moving in a south-to-north direction towards the back of the house took approximately one minute (1:00). The times to make the same two paths at a running pace were approximately six to seven (6-7) seconds for the short path and ten to twelve (10-12) seconds for the longer path.

Gilbertson will testify Defendant could have gone from his car to the home, carried out the four homicides, and returned to his car in as few as two minutes and six seconds (2:06), going at a fast pace on the shortest route to the vehicle, or three minutes and forty-five seconds (3:45), going at a slower pace on the longer route to the vehicle. Gilbertson will testify this would allow Defendant time to clean up or change clothes before leaving the scene.

TIMED RUNS 1122 KING
Idaho State Police

D22000030 Supplement No 0194

700 S. Stratford Drive

Meridian, ID 83642
Phone
(208)884-7000
Fax

Reported Date
07/26/2023
Rpt/Incident Typ
AGCY ASST
Member#/Dept ID#
GILBERTSON,DARREN

Administrative Information

Agency	Case No	Supplement No	Reported Date	Reported Time	Status
Idaho State Police	D22000030	0194	07/26/2023	16:47	Investigate

Rpt/Incident Typ: AGENCY ASSIST OTHER

Location	City
1122 KING ROAD	MOSCOW

County	Region	From Date	Member#/Dept ID#
1L1	L2	07/26/2023	3329/GILBERTSON,DARREN

Assignment	Entered By	Assignment	RMS Transfer	Prop Trans Stat
DETECTIVE SGT DIST 2	3329	DETECTIVE SGT DIST 2	Successful	Successful

Report Title	Approving Officer	Approval Date	Approval Time
TIMED RUNS 1122 KING	3249	07/27/2023	13:18:46

Summary Narrative

On November 21, 2022, I, Idaho State Police (ISP) Sergeant (Sgt.) Darren Gilbertson, conducted timed runs through the residence at 1122 King Road, Moscow, Idaho. Kaylee Goncalves (GONCALVES), Madison Mogen (MOGEN), Xana Kernodle (KERNODLE), and Ethan Chapin (CHAPIN) were murdered there during the early morning hours on November 13, 2022. Bryan C. Kohberger (**KOHBERGER**) was subsequently arrested and charged with four counts of First-Degree Murder. The purpose of the timed runs was to gain an understanding of the approximate time needed to have carried out the murders.

I was assigned and worked as the lead investigator, for the Idaho State Police, in assisting the Moscow Police Department (MPD) with the multiple homicides.

Narrative

1. Based upon the processing of the crime scene and evidence collected, investigators believed **KOHBERGER** drove to the area and parked at the back of the residence. There is a paved parking area directly to the south that overlooks the back of the residence. **KOHBERGER** most likely entered the residence through a sliding glass door located on the second level and rear of the residence and then proceeded as follows:

A. After entering through the sliding glass door, **KOHBERGER** walked through the kitchen area and to a set of stairs that led up to the third floor. **KOHBERGER** then went up the stairs to the third floor. At the top of the stairs and directly to the left side is a door which was GONCALVES's bedroom and to the right is a short hallway that ended into a bathroom and another door to MOGEN's bedroom. Most likely **KOHBERGER** checked GONCALVE's bedroom, saw it was empty, and then moved into MOGEN's bedroom where we believe both GONCALVES and MOGEN were asleep in MOGEN's bed. **KOHBERGER** murdered both of them in the bed.

B. **KOHBERGER** most likely went back down the stairs, walked through the second-floor living room, and then down the hallway which ended at KERNODLE's bedroom. Based on the evidence, KERNODLE was initially attacked just inside the bedroom near the entrance. KERNODLE fought the suspect in the bedroom area and was ultimately killed on the floor of the bedroom next to the bed. CHAPIN, who we believe was asleep, was murdered in the bed.

C. **KOHBERGER** left the bedroom area, walked back down the hallway, passed through the living room, kitchen, and exited through the sliding glass door leaving the door partly open. **KOHBERGER** then walked back to his vehicle and drove away from the area.

2. ISP Detective (Det.) Jeff Talbott and MPD Corporal (Cpl.) Brett Payne assisted with the timed runs. Cpl. Payne tracked the times for each run. Det. Talbott walked through the residence with me calling out the number of strikes to simulate the number of wounds to each victim, based on autopsy reports.

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Narrative

3. I conducted two timed runs, the first being a quick as possible run and the second a slower, deliberate timed run.

4. During the first trial run, I began at the rear of the residence and came through the sliding glass door. I then quickly moved through the kitchen and up the stairs, I looked into the bedroom to the left and then moved down the hallway and into MOGEN's bedroom. I simulated the number of strikes that were inflicted upon MOGEN and GONCALVES. Det. Talbott counted and kept track in an attempt to re-create the movements and motions believed to have occurred based on the evidence collected and autopsy reports. I moved out of the bedroom, down the stairs, through the living room, down the hallway, and into KERNODLE's bedroom. Again, with the assistance of Det. Talbott, I simulated the number of strikes that were inflicted upon KERNODLE and CHAPIN. I then exited back down the hallway, through the living room, through the kitchen, and out the sliding glass door. Cpl. Payne reported a time of approximately one minute and thirty seconds (1:30) on the quick-as-possible timed run.

5. On the second run, slower and deliberate, I followed the same path throughout the residence but at a much slower methodical pace. I again entered through the rear sliding glass door, opening it slowly to make no noise while doing so. I then walked as quietly as I could through the kitchen and up the stairs attempting to make no noises. I looked into the first bedroom and then slowly moved down the hallway and into MOGEN's bedroom. Det. Talbott counted and kept track again as I re-created the movements and motions believed to have occurred inside the bedroom. I exited the bedroom, moved back down the stairs, through the living room, down the hallway, and into KERNODLE's bedroom. The movement to KERNODLE's bedroom was slower than the first run, but still somewhat quick. I again simulated the movements and motions that took place inside KERNODLE's bedroom. I then exited back down the hallway, through the living room, through the kitchen, and out the sliding glass door. Cpl. Payne reported a time of approximately two minutes and thirty-three seconds (2:33).

6. We additionally walked through simulated paths that **KOHBERGER** may have possibly taken from the vehicle to the back of the residence. The shortest and most direct path, going from the parking area, and moving east to west along the back of the house took approximately thirty (30) seconds. A second path, starting at the southern edge of the property and walking a fence line through some trees, and moving in a south-to-north direction towards the back of the house took approximately one minute (1:00). The times to make the same two paths at a running pace were approximately six to seven (6-7) seconds for the short path and ten to twelve (10-12) seconds for the longer path.

7. The timed runs revealed that it was possible for **KOHBERGER** to have carried out the murders in as few as two minutes and six seconds (2:06), going at a fast pace on the shortest route to the vehicle, or as much as three minutes and forty-five seconds (3:45), going at a slower pace on the longer route to the vehicle.

8. This concluded the simulated timed runs through the residence.

REBUTTAL EXPERT DISCLOSURE: [redacted]
EXHIBIT S-8

Anticipated Rebuttal Testimony

On January 16, 2025, Defense filed an expert disclosure for Steven Becker regarding digital forensics and vehicle identification. In response to Becker's Technical Report, dated January 23, 2024, (Defendant's Exhibit D2-B), the State intends to introduce the following anticipated factual testimony from FBI Special Agent [redacted] will testify regarding the defense's claim that investigators were not able to determine if there was or was not a front license plate on the suspect vehicle, identified as a 2011-2016 white Hyundai Elantra (hereafter referred to as "Vehicle l"), on collected video surveillance in the early morning hours of November 13, 2022. In addition, [redacted] will testify to the investigative significance of Vehicle 1 not having a front license plate.

[redacted] will testify he has reviewed surveillance footage in order to determine which, if any, video clips showed whether or not Vehicle 1 was displaying a front license plate in the early morning hours of November 13, 2022.

In reviewing the surveillance footage [redacted] located video clips which showed a clear view of the front bumper of Vehicle 1, and in doing so, showed that there did not appear to be a front license plate attached to the vehicle. The below is only a summary of the collected video surveillance showing no license plate and is not intended to be an all-encompassing disclosure of the entirety of the collected video showing Vehicle 1. A full summary of video of Vehicle 1 has been previously disclosed. The below noted camera locations were checked for their time stamp accuracy as compared to actual current time as noted below:

1. 1311 S Main Street, Moscow, Idaho, Channel 7, at 3:27:46 a.m.

The camera time approximately one minute and 43 seconds behind local time. A vehicle

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matching the description of Vehicle 1 is seen traveling westbound on Styner Avenue crossing Main Street and continuing westbound onto Lauder Avenue. The vehicle does not appear to have a front license plate attached.

2. 1455 SE Bishop Blvd, Pullman, WA, Channel 10, at 5:25:30 a.m.

Camera time approximately seven seconds behind local time. This time is approximate, determined by time comparison with other cameras at the same business, due to frame glitches in the surveillance footage. A vehicle matching the description of Vehicle 1 is seen turning from northbound Johnson Avenue onto northbound Bishop Boulevard and continues northbound. The vehicle does not appear to have a front license plate attached.

3. NE Stadium Way at SE Nevada, Pullman, WA (Washington State University (WSU)), East Camera, at 5:28:44 a.m.

Camera time accurate to local time. A vehicle matching the description of Vehicle 1 continues northeast on NE Stadium Way through the intersection. The vehicle does not appear to have a front license plate.

4. NE Stadium Way at Grimes, Pullman, WA (WSU), West Camera, at 5:29:33 a.m.

Camera time accurate to local time. A vehicle matching the description of Vehicle 1 continues north on NE Stadium Way through the intersection. The vehicle does not appear to have a front license place attached.

5. NE Stadium Way at Wilson Rd. Pullman, WA (WSU), West Camera, at 5:29:41 a.m.

Camera time accurate to local time. A vehicle matching the description of Vehicle 1 continues north on NE Stadium Way through the intersection. The vehicle does not appear to have a front license plate attached.

6. NE Stadium Way at Cougar Way, Pullman, WA (WSU), North Camera, at 5:30:18 a.m.

Camera time accurate to locate time. A vehicle matching the description of Vehicle 1 is northbound on NE Stadium Way then turns eastbound onto NE Orchard Drive. The vehicle does not appear to have a front license plate attached.

Each of these sightings of vehicles matching the description of Vehicle 1 also corresponded with times and locations of travel related to the homicide scenes.

REBUTTAL EXPERT DISCLOSURE: [redacted]
EXHIBIT S-9

Anticipated Rebuttal Testimony

On January 16, 2025, Defense filed an expert disclosure for Steven Becker regarding digital forensics and vehicle identification. In response to Becker's Technical Report, dated January 23, 2024, (Defendant's Exhibit D2-B), the State intends to introduce the following anticipated testimony from [redacted]:

1. **Defense Claim: "In the Make-Model Chart #2 by the FBI, image 8 above is highlighted that the FBI concludes that the 3nrd brake light is low on the rear window. This is an assumption and not a fact as the rear window is not visible in Image 8." (Page 12)**

[redacted] Anticipated Testimony: The vehicle charts are for derivative visual assistance only – the conclusion of the make, model and year exam was conducted with the totality of the submitted videos and images – not specifically represented within the charts. In [redacted] opinion, the balcony videos depicting the questioned vehicle on November 13, 2022, depicted the 3rd brake light in the lower window approximately six times at the listed times of: 03:33:01, 03:40:26, 03:58:24, 04:00:42, 04:06:34 and 04:20:47.

2. **Defense Claim: Three different vehicles should have been considered during the elimination process. A 2015 Hyundai Sonata, 2019 Subaru Legacy and a Kia Forte (no year listed). (Page 16 and 18)**

[redacted] Anticipated Testimony: 6,863 4dr sedans were reviewed during this examination (multiple times). The three suggested vehicles claimed by Mr. Becker were reviewed and eliminated due to a significant class characteristic difference. The Hyundai Elantra (depicted below) side window has an arrowhead style shaped window – none of the three vehicles suggested has this specific window shape, as such they were eliminated as a possible match.

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2015 Hyundai Elantra:



2015 Hyundai Sonata:



2019 Subaru Legacy:



2010 through 2020 Kia Forte – 2 window configurations:



3. **Defense Claim:**

"Photogrammetric measurements were not reported to have been performed by the Police to determine the unknown suspect vehicle's size. Without a size and shape overlay comparison or in video measurements the Police did not distinguish between the models of vehicles that have consistent size in the videos from near the incident scene. There is no evidence that the Police presented that shows other models of vehicles did not have similar features to the unknown suspect vehicle or unknown vehicles of interest (for example one popular model sedan, the Honda Accord does not have the body lines similar to the unknown suspect vehicle and can be ruled out as not similar). The Police only provided confirmation bias, by using a known target vehicle model, and matching characteristics instead of eliminating all other potential similar vehicles that contain these characteristics (otherwise they would have included the Sonata and Legacy). This fails to meet reasonable scientific certainty from their analysis. The Police analysis and determination of the make and model of the unknown suspect vehicles was improper and lacked other possible vehicle models with similar characteristics." (Page 17)

[redacted] Anticipated Testimony: The video depicting the vehicle in the Ridge Road video at 4:01, is not conducive to an accurate photogrammetric examination to determine the vehicle length. The vehicle is not parallel to the camera, resulting in the inability to visually see the rear and front of the vehicle allowing for an accurate measurement. There is also motion blur and blooming of the headlights that obscure the front of the vehicle. A photogrammetric examination is not currently part of the standard operating procedure used for identifying a vehicle make, model and year within the FBI.

REBUTTAL EXPERT DISCLOSURE: DAVID MITTELMAN
EXHIBIT S-10

Anticipated Rebuttal Testimony

On January 23, 2025, Defense filed expert disclosures for Daniel Hellwig and Leah Larkin regarding single nucleotide polymorphism (SNP) testing, whole genome sequencing (WGS), and genetic genealogy. The following anticipated testimony is in response to Hellwig's disclosure and testimony at the Motion to Suppress hearing on January 23, 2025 (Defendant's Exhibit D4-A), and Larkin's report dated January 22, 2025 (Defendant's Exhibit D5-B). The State intends to introduce the following anticipated testimony from David Mittelman, Chief Executive Officer at Othram Inc. Mittelman will provide an overview of how SNP testing and Forensic Genetic Genealogy (FGG) works. (See State's Exhibit S-10(a): "Prioritizing privacy and presentation of supportable hypothesis testing in forensic genetic genealogy investigations"). Mittelman's CV is attached as Exhibit S-10(b).

Mittelman will testify that in order to render a credible opinion a witness would need to have extensive direct experience (including creating SNP profiles and doing Forensic Investigative Genetic Genealogy) in order to speak to many of the points including validation, quality standards, and proficiency testing for SNP testing.

Regarding a connection between SNP testing and personal medical information, Mittelman will testify Othram does not look for personal medical information through the use of SNP testing. Regarding Promethease, Promethease is not a medical diagnostic test; it is an automated data interpretation tool that compares consumer DNA data to publicly available genetic research from published scientific studies. It does not provide medical diagnoses but instead suggests associations based on studies cataloged in SNPedia. The associations can be

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incomplete, misleading, or misinterpreted without clinical validation. The FDA has been very clear that tools like Promethease are not appropriate for medical testing, as they lack regulatory approval and do not meet the standards required for clinical diagnostics. Because it is not designed for medical use and does not analyze genetic markers in a clinical setting, it should not be used as a substitute for professional medical testing. Finally, Promethease is not used in forensic genetic genealogy, nor does it bring value to forensic genetic genealogy.

Regarding a difference in the SNP profile sizes, Mittelman will testify Othram developed a SNP profile from the DNA evidence and uploaded it to GEDmatch PRO and FamilyTreeDNA (FTDNA) for forensic genetic genealogy analysis. GEDmatch PRO does not provide an option to retrieve the uploaded SNP profile from its interface, meaning once a profile is uploaded, it cannot be downloaded. In contrast, FTDNA does allow users to retrieve the uploaded SNP profile from its interface. However, when a profile is uploaded, FTDNA automatically converts the file to align with its internal database format. This ensures compatibility with its matching system but results in a file that is not identical in format or size to the originally uploaded SNP profile. A simple comparison of these files might show differences in size and structure, but they represent the same underlying genetic information. A useful analogy is writing a paragraph in a text editor and then copying and pasting it into a Word document—while the file formats and sizes will differ, the informational content remains unchanged.

Regarding consumer genetic genealogy, consumer genetic genealogy operates on very different data than forensic genetic genealogy and the challenges, workflows, and processes are very different. Mittelman will provide testimony regarding how Forensic Genetic Genealogy works.

Regarding genome sequencing, Othram uses Whole Genome Shotgun Sequencing (WGSS) as a method to recover useful DNA information from forensic evidence. However, Othram is not performing Whole Genome Sequencing (WGS), which aims to capture the entire genome at high resolution. Instead, WGSS allows Othram to analyze many DNA markers across the genome without the biases of targeted sequencing methods or the limitations of microarrays, which struggle with degraded or low-quantity forensic samples. Othram's goal is to extract the most meaningful genetic data for forensic identification, not to sequence the full genome.

In addition, Mittelman will testify that the collection of DNA evidence from the crime scene, the development of an STR profile, and its entry into CODIS all took place before Othram's involvement in the case. With an STR profile already in CODIS, identifying the suspect was ultimately a matter of time.

Othram was engaged to build a SNP profile and perform forensic genetic genealogy to accelerate the investigative process. While this approach expedited the identification, it did not change the inevitable outcome—the suspect would have been identified regardless.

At some point, the local agency instructed Othram to halt its work, and the FBI became involved in the process. The FBI's role may have further accelerated the work Othram had already begun, but Othram was on track to reach the same conclusion. This is evident from the preliminary, incomplete report Othram provided after being asked to stop its efforts.

FGG does not replace traditional forensic testing—it serves as an investigative tool to guide law enforcement toward reference testing. In this case, additional reference testing was always going to lead to the identification of Mr. Kohberger, regardless of which agency completed the process or when it occurred.



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Prioritizing privacy and presentation of supportable hypothesis testing in forensic genetic genealogy investigations

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REPORT

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Prioritizing privacy and presentation of supportable hypothesis testing in forensic genetic genealogy investigations

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ABSTRACT

Investigative leads are not generated by traditional forensic DNA testing, if the source of the forensic evidence or a 1st degree relative of unidentified human remains is not in the DNA database. In such cases, forensic genetic genealogy (FGG) can provide valuable leads. However, FGG generated genetic data contain private and sensitive information. Therefore, it is essential to deploy approaches that minimize unnecessary disclosure of these data to mitigate potential risks to individual privacy. We recommend protective practices that need not impact effective reporting of relationship identifications. Examples include performing one-to-one comparisons of DNA profiles of third-party samples and evidence samples offline with an "air gap" to the internet and shielding the specific shared single nucleotide polymorphisms (SNP) states and locations by binning adjacent SNPs in forensic reports. Such approaches reduce risk of unwanted access to or reverse engineering of third-party individuals' genetic data and can give these donors greater confidence to support use of their DNA profiles in FGG investigation.

METHOD SUMMARY

This paper illustrates measures that can be implemented to protect genomic data derived from reference testing of third-party individuals during a forensic genetic genealogy investigation. Privacy of the genetic data of these individuals is paramount and can be enhanced by offline kinship association analyses between the single nucleotide polymorphisms (SNP) data of third-party individuals and those of crime scene evidence or human remains. Additionally, SNP matching information are aggregated into bins. Instead of individual SNP marker states displayed as homozygous or heterozygous match or no match, binning obscures SNP states and reduces chances of reverse engineering of an individual's genomic data.

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forensic genetic genealogy; massively parallel sequencing; mitigation; privacy; risk; security; single nucleotide polymorphisms; third-party donors

1. Introduction

More than a decade ago, advancements in DNA testing technology revolutionized diagnostics across various scientific disciplines, including medicine and forensics. In recent years, these capabilities have extended the field of forensics genetic analyses to distant kinship associations, giving rise to the subdiscipline of forensic genetic genealogy (FGG). FGG leverages the power of massively parallel sequencing (MPS) to establish near and distant kinship relationships, providing valuable investigative leads for identifying crime scene sample donors or unknown human remains (UHRs) [1–11]. Several countries (Australia, Norway, New Zealand, US, UK, Finland, Estonia and greater Europe) are now exploring or implementing FGG to develop new leads in cases where standard forensic DNA technology (i.e., short tandem repeat markers) and national DNA database searching have been unsuccessful [11–18]. While FGG is a powerful tool that is being successfully applied to some of the most challenging cases, the generated genetic data contain private and sensitive information. Therefore, it is essential to develop and deploy approaches that minimize unnecessary disclosure of these data to mitigate potential risks to individual privacy.

The workflow for FGG investigations is similar in many ways to that of standard DNA typing in that biological evidence is located, DNA is extracted and quantified, and a DNA profile is generated. The main differences are that a comprehensive genetic profile of single nucleotide polymorphisms (SNPs) is built using techniques such as whole genome shotgun sequencing or targeted genotyping, and the genetic data are used for detecting kinship associations found in genetic genealogy databases com-

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prising DNA profiles from donors who have consented to their use by law enforcement. With the DNA profile established and potential kinship associations (near and distant) identified in the genetic genealogy database(s), the investigation transitions to the next step: genetic genealogy research [4]. This phase employs traditional genealogical methods to expand the family tree(s) and identify potential connections (i.e., a most likely common ancestor) with the unknown donor of the evidence. To date, SNP-derived kinship relationships and genealogical research have been the approaches used to hone a FGG investigation to one or a few candidates.

Genealogical research is crucial for formulating hypotheses about an unknown individual's identity. Investigative leads are progressively refined through the DNA analyses of potential genetic relatives [4]. The additional DNA analysis of potential relatives is strategic and serves multiple purposes. DNA testing can assist in determining kinship relationships between an unknown individual and potential relatives, thereby supporting the accuracy of constructed family trees or indicating further research is needed. Such kinship associations are facilitated by use of dense SNP data. Also, the genetic data from tested relatives can refine family trees, making it easier to pinpoint the unknown individual's position within a tree. It allows investigators to focus on the most likely branches of the family tree, thereby accelerating the identification process and making the best use of resources [4]. Moreover, in cases with multiple possible interpretations, additional DNA testing can provide key evidence needed to support the most likely hypothesis.

Dense SNP reference testing of third-party individuals can assist in selecting trees or branches of trees that may be more informative to locate the source of crime scene evidence or human remains. Consented third-party donors, although not persons of interest in a case, are critical in testing hypotheses in FGG investigations. Thus, measures should be implemented that particularly protect the privacy of third-party donors as well as to promote their willing participation. Today, FGG investigations culminate with a confirmation of the unknown individual's identity through orthogonal DNA testing, usually based on short tandem repeat (STR) markers [19]. While some practices regarding data sharing fall under legislation, country policies and/or court orders, there are some considerations that DNA testing laboratories can undertake to maximize privacy and security in FGG investigations. Along with administrative and physical controls [20] that all FGG providers, public and private, should undertake, there are technical controls that the genetic laboratory can implement to reduce risk of access to third-party donor genetic data. When the SNP profile from the third-party donor is compared in a one-to-one manner with the evidence profile, it is often done making use of online tools and databases [21]. However, it is feasible to perform these one-to-one comparisons in an offline manner, using local tools, which would keep donor data in-house. Second, immediate access to tools and innovations in DNA sequencing technology have enabled implementation of rapid SNP testing methods. These tools represent another strategy for enhancing privacy in FGG investigations. They can reduce the turnaround time for SNP analysis, which in turn provides leads more quickly minimizing the need for investigators to seek testing multiple hypotheses (and therefore individuals) simultaneously to be expeditious. This approach can streamline investigations and is key to minimizing unnecessary DNA testing of donors.

Once testing is completed, a report is generated presenting the findings, which may include a summary of the SNP profile (in a graphic format) and the estimated kinship association(s). This report will likely be disseminated and used in judicial proceedings. The judicial proceedings and related documentation become part of the public record and underscore the importance of thorough and accurate record-keeping, but in a manner consistent with genetic privacy protections. We propose and demonstrate some approaches for maintaining control of reference sampling genetic data and for effectively presenting relevant FGG data regarding hypothesis testing contained within reports that can be modeled by providers to protect genetic privacy by making use of data encryption and other practices well-established in data security.

2. Materials & methods

To demonstrate approaches for reporting pairwise kinship comparisons, a dataset was generated, *in silico*, in the ped-sim pedigree simulator [22] (at https://github.com/williamslab/ped-sim), that probes the range of relatedness across individuals up to 9th degree given reasonably informative SNP data. The simulated SNP datasets were focused to the SNP markers on the version 3 format of the 23andMe microarray that were ascertained to detect population and pedigree scale variation and relatedness [23].

For simulated pedigrees, haplotypes from the 1000 Genomes Project (Phase III version 5) CEU population from Utah [24] were sampled without replacement to create 21 founders. The haplotypes of these individuals were pruned to intersect with the 23andMe SNP marker dataset. For each simulated mating in ped-sim meiosis was performed with independent assortment and crossover rates derived from the sex-averaged human genetic map [25]. The full pedigree consisted of

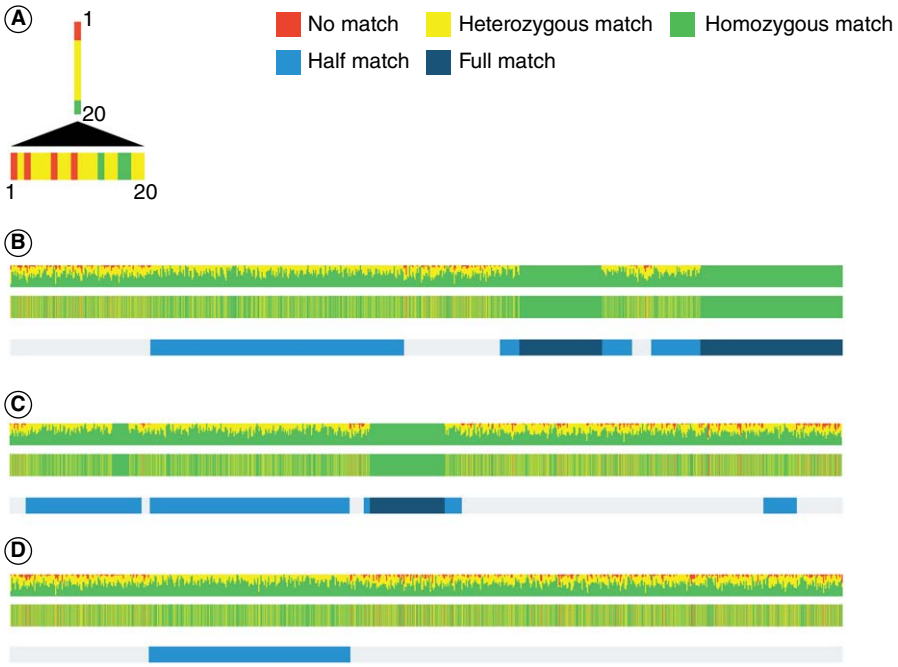


Figure 1. Various representations of single nucleotide polymorphisms and segment matching between relatives. **(A)** is an illustration of the SNP binning process performed with KinSNP® for one bin of 20 SNPs. The single vertical bar represents the proportion of SNPs designated as "no match", "heterozygous match", and "homozygous match" for the set of 20 SNPs. **(B–D)** are representations of comparisons for a synthetic full-sib, half-sib and 1st cousin pair, respectively, for chromosome 3. The top illustration in each comparison is the representation; the middle illustration in each relationship shows each SNP at each chromosome location as would be shown with a chromosomal location tool; the bottom illustration in each relationship shows shared segments. The relationships in each pairwise comparison are supported by 227.7cM, 134.1cM and 50.6cM total shared segments, respectively. **(B–D)** illustrate representations in the top bars, exact returns of SNP states in the middle bars and haplotype segment matching representations in the bottom bars. Rather than presenting implicit values of SNP state at a position unnecessary to establish coefficient of relationship, the average state across a fixed bin of positions is returned. Such a summary is sufficient to infer the nature of genetic relatedness without divulging specific SNP states. The top bar represents the proportion of loci at alternative homozygous states and loci at heterozygous states by the magnitude of the color in the bar which allows simple inference of relatedness without precise SNP states. The top bar is a reduced, but informative, representation of all the information presented in the middle and bottom bars of all the example individuals. SNP: Single nucleotide polymorphisms.

seven generations, ordered G0 to G6, with 44 individuals inclusive of founders and offspring. G1 consisted of three offspring from two founders, then mated to three unrelated individuals from the founder pool. G1 produced three offspring from three parental dyads and two offspring from one parental dyad. Every subsequent generation up to G5 produced one offspring from each parental dyad consisting of a single individual descended from the previous generation who then mated with an unrelated individual from the original founder pool of 21. G6 consists of four offspring from four parental dyads of founders and offspring of G4. The final pedigree includes nearly the full gamut of loopless and nonconsanguineous relationships, with the notable exceptions of noninbreeding loops, such as double cousins (e.g., two brothers marry two sisters).

Visual representations of kinship were generated using KinSNP®, an internally used software developed by Othram Inc. (https://othram.com/kinsnp.html). The software makes use of all SNPs that may be identified via whole genome sequencing. The visual representations illustrate that the herein proposed practices can be implemented to protect genetic privacy while still disclosing relevant findings in a public setting. All analyses in this study were performed in-house without accessing genealogical databases or on-line tools.

3. Results & discussion

As of December 2023, FGG has been publicly attributed to 318 criminal cases and 461 UHR cases [2]. These numbers are an underestimate of the total number of forensic cases that have been assisted with FGG. Many cases are not announced immediately, particularly if they are yet to be adjudicated, and some cases are resolved without public disclosure. FGG is a powerful tool, but the genetic data probed during an investigation raise concerns regarding privacy. To mitigate risk of disclosure of private and personal genetic data safeguards must

be put in place. If such measures are not put in place the use of FGG may be restricted, removing a powerful instrument in the forensic toolkit, leading to fewer solved crimes and no resolution for families or justice for victims. Service providers must physically protect and secure genetic and personal information, but the forensic field has an additional risk that could compromise genetic data privacy: the results presented in judicial proceedings will become part of the public record. This issue is not new to forensics. Almost a decade ago Sajantila and Budowle [26] identified the need to address protection of personal genetic data regarding reporting and presentation of molecular autopsy data in judicial proceedings. These data are similar to FGG data in that the markers can predict genetic health. Nevertheless, molecular autopsy has not developed practices to protect the genetic information presented in judicial proceedings. The same fate may await FGG, but the practices of the nascent field are still being formalized. Thus, there are opportunities to introduce practices, policies and tools that can both allow for presentation of relevant findings and protect genetic privacy of individuals. An extreme measure to remove risk of disclosure of private genetic data would involve not disclosing that the analysis was performed and/or not providing any genetic information in reports. But nondisclosure conflicts with transparency and required documentation. The responsibility of what not to disclose is the purview of the legal system, not forensic practitioners. If presented in a report or during testimony, some data may be necessary to convey and support expert findings and conclusions, as well as to record the findings for practitioner recollection.

In criminal cases a victim and a person of interest are typed for direct comparison to DNA profiles obtained from probative evidence. In UHR cases or with familial searching profiles comparisons are usually based on kinship associations which extend mostly to 1st degree relatives. But FGG kinship associations can extend to as distant as 5th and 6th cousins [27–33]. Dense SNP data compared between two individuals in one-to-one or one-to many manners can detect partially matching genomic regions which correlate with coefficient of genetic relationship(s) (i.e., near or distant kinship). Once genealogical connections are established between a set of individuals, trees can be constructed to determine a most likely common ancestor of the donor of a crime scene sample or unknown person with the "matches" (i.e., associations) within the genetic genealogy database(s). Some matches yield precise insights (e.g., a near kinship association and good quality genealogy records), while others can be interpretatively challenging (e.g., a more distant relationship and/or compromised genealogy records). With associations that are more distant determining which branch of a family tree to focus genealogical research can be laborious and may not generate a clear most likely common ancestor between the donor of a crime scene sample or UHR and a kinship association(s) derived from a database search. In the latter situations clarity may be achieved by performing reference DNA testing, in which potential members of a tree(s) provide a dense SNP profile to allow for efficient matching, faster and with fewer resources [4]. Refining research to viable branches of family trees can result in fewer third-party providers needing to be necessarily typed. Samples from these third-party candidates should be obtained voluntarily with informed consent. Third-party providers are not involved in the case itself; they are neither a person of interest, a victim, or an elimination reference sample, but may still be necessary for effective FGG investigations. Protection of their privacy is of utmost priority because without their cooperation some FGG investigations could not proceed or could be so labor intensive and cost prohibitive to become unwieldy. If these third-party candidates' data are uploaded to an aggregation site for further data analyses, then risk of privacy-breaching access and disclosure increases. If profile comparisons between third-party references and the evidence are performed in-house without interacting with online genealogical databases or tools, then their genetic data have increased security and privacy protection.

We propose that third-party data comparisons should be performed offline, thus reducing risk of privacy-breaching access to the underlying genetic data. The relative ease of this proposed practice is demonstrated herein using our internally developed KinSNP® visualization tool, but it is used only as an example of how to perform and report comparisons in a way that supports privacy. Many forensic teams will be able to implement similar approaches in the laboratory today.

Rather than return results on specific positions within the genome that might divulge sensitive information, unnecessary results that might impact privacy can be obscured. Inferences of genomic relatedness are summaries of patterns within the genome, not a full representation of the genome. Figure 1shows a stylized representation of a typical match return on a small number of genetic positions, allowing researchers to infer marker states of the comparison individual from the reference. With the same premise, marker states are represented as homozygous or heterozygous match or no match, but are aggregated into adjacent bins, in this case, bins of 20 SNP markers. Then a synthetic vertical bar is created in which colored proportions match the proportions of each state among the SNPs in the respective bin.

Currently, in most FGG cases victims and suspects are not sampled for SNP profiling. Instead, source attribution is confirmed or refuted by STR typing [19]. However, in cases with highly degraded DNA and rootless hairs STR data cannot be generated [34,35]. Also, for older UHR cases STR typing may be ineffective because no 1st-degree relatives may be accessible or alive at the time of testing. In these cases, a direct comparison of dense SNP profiles can be performed between an evidence sample and a suspected donor of the evidence or an antemortem sample or a close 1st or 2nd degree relative and human remains. The same approaches can be applied in cases where source attribution may rely solely on SNP data. A direct one-to-one comparison with thousands to hundreds of thousands of SNPs likely would yield likelihood ratios far exceeding those routinely achieved with STRs.

4. Conclusion

To reduce risk of disclosure of private data while still being effective in presenting relevant information the following recommendations are offered. First and foremost, comparisons can be done offline, with an "air gap" to the internet. Minimizing use of on-line tools, particularly for third-party reference testing, reduces risk of unwanted access to these individuals' DNA profiles or inadvertent exposure, and can give these donors confidence to support use of their SNP profiles in FGG investigations. Second, actual SNP calls and raw data should not be displayed in reports. Indeed, it would be impractical to present such copious data in a report or discuss it at any detailed level during a courtroom presentation. Literally tens of thousands to upwards of a million SNPs may have been relied on to develop associations and generate matches. The raw data and SNP calls can be maintained in secured case files for any re-analyses or revisiting of such data and for discovery purposes, hopefully with proper protections and non-disclosure agreements. Third, the findings of shared DNA between two individuals and estimated relationships may be necessary to report and/or present. Graphics of the degree of sharing that display all SNP coordinates can facilitate potential reverse engineering to obtain the individual's SNP profile [36], which is hampered by offline comparisons. Therefore, tools should be developed that maintain efficient genetic modeling and analyses and permit displaying genetic representations and comparisons, while maintaining the privacy of a genetic dataset(s). Such possibilities are illustrated herein. It is feasible to illustrate relationships in an analytically effective manner, facilitate data summarization, enable presentation of data in reports and court proceedings, maintain necessary document and at the same time protect third-party genetic data.

Such tools also will save time by allowing analysts to be expeditious and efficient. Efficiency also means that the number of individuals needed for third-party testing can be minimized, also reducing privacy risks. With many possible branches to explore, some investigators may prefer collecting as many third-party candidates as possible with the intention of speeding up the investigative process. With effective tools, kinship association analyses can be performed sequentially but expeditiously. Thus, once a good branch (i.e., a supportable hypothesis) is identified, no further collection and analyses of third-party candidates need to occur.

All service providers, stakeholders and practitioners making use of FGG should consider practices and policies of reducing risk to privacy while maintaining relevant information included in reports and court presentations, as well comprehensive programs that maintain documentation and transparency [37]. The practices described herein for illustrative purposes show it is feasible to impose data encryption and other security measures so that users can perform kinship associations and portray findings while reducing the risk of reverse engineering of the data that may be disclosed during judicial proceedings. Furthermore, the data can be analyzed offline to reduce access and thus protect privacy. With enhanced privacy measures in place, individuals can have greater confidence than exists currently with FGG that their genetic information is being used with greater protection and less risk of compromising their personal privacy.

5. Future perspective

The field of forensic DNA analysis has advanced substantially in the 21st century. With the advent of MPS a paradigm shift is occurring. High throughput and sensitive detection of relationships, afforded by MPS and dense SNP testing can be readily performed on a wide range of forensic biological evidence. Moreover, instead of relying on a direct comparison of a person of interest as a possible donor of a forensic sample, potential references can be expanded to relatives, both near and distant, thereby increasing the chances of identifying the source of crime scene evidence. These kinship associations coupled with genetic genealogy research have formed a subdiscipline known as FGG. FGG already has been used to help solve active and cold cases that were not possible with standard forensic DNA methods that have been in use for the last two decades. The value of FGG is not questioned and over the next five to 10 years it is anticipated that whole genome sequencing will become the primary method for generating forensic genetic data.

But full embracement of the methodology requires consideration of data security and mechanisms that reduce privacy risks. The measures illustrated herein, e.g., offline analyses of personal data and data obscuration, are but two approaches to meeting privacy challenges. FGG as the primary genetic investigative tool for developing investigative leads will come to fruition if the community continues to address privacy concerns in a proportional manner. These actions coupled with decreasing DNA sequencing costs will usher in better ways to help solve crimes, identify unknown persons, reduce trauma and uncertainty associated with victims, survivors, families, and communities, and meet the needs of stakeholders.

Article highlights

- The advent of massively parallel sequencing has facilitated the use of large sets of single nucleotide polymorphisms (SNP) markers to enable near and distant kinship associations.
- This capability has fostered the subfield of forensic genetics known as Forensic Genetic Genealogy (FGG).
- By generating SNP profiles from forensic evidence and comparing them with a database of SNP profiles from consented volunteers, kinship associations can be measured.
- These kinship associations are used in genetic genealogy research to potentially identify the source of forensic evidence.
- At times, the trees that are built are unwieldy or there is a need to expedite an investigation, so reference samples are sought from third-party individuals identified during genetic genealogy research.
- These individuals can facilitate investigations, but they are not persons of interest or volunteers who have previously placed their SNP profiles in a database.
- Therefore, protecting their genetic privacy is of the utmost importance.
- Some of the measures that can protect third-party individuals, illustrated herein, are performing one-to-one comparisons offline and encrypting SNP marker states, to reduce the chance of reverse engineering of personal genetic data.
- Data protection practices can enhance the use of FGG so that it can be leveraged to its full potential as an investigative tool to solve crimes and identify unknown persons.

Author contributions

B Budowle – concept, writing and reviewing manuscript; L Baker – software development, writing and reviewing manuscript; A Sajantila – writing and reviewing manuscript; K Mittelman – concept, writing and reviewing manuscript; D Mittelman – concept, writing and reviewing manuscript.

Financial disclosure

LB, KM, and DM are employees of Othram Inc. BB is a consultant to Othram Inc. The authors have no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript apart from those disclosed.

Competing interests disclosure

L Baker, K Mittelman and D Mittelman are employees of Othram Inc. B Budowle is a consultant to Othram Inc. A Sajantil has no conflict of interests to declare. The authors have no other competing interests or relevant affiliations with any organization or entity with the subject matter or materials discussed in the manuscript apart from those disclosed.

Writing disclosure

No writing assistance was utilized in the production of this manuscript.

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+ *Forensic Genetic Genealogy Testimony*

The cases in the below table signify cases in which Othram's technology was cross-examined in court, specifically on the topic of forensic genetic genealogy. As of July 2024, Othram is the only United States-based forensic laboratory to defend their work in a jury trial. An asterisk indicates that Dr. Mittelman took the stand.

Year	***Defendant***	***Court***	***Expertise***	***Verdict***
2024	Clayton Bernard Foreman	Jefferson County, Texas	SNP Testing, Forensic Genetic Genealogy*	Guilty
2021	Glen Samuel McCurley, Jr.	Tarrant County, Texas	SNP Testing, Forensic Genetic Genealogy	Guilty

REBUTTAL EXPERT DISCLOSURE: RYLENE NOWLIN
EXHIBIT S-11

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosures, and in addition to previously disclosed testimony, the State may call Rylene Nowlin as expert witnesses to respond, rebut and testify as follows:

Deoxyribonucleic acid (DNA) is genetic material contained in cells that may be utilized for human identification. DNA analysis includes the utilization of Polymerase Chain Reaction (PCR) to generate Short Tandem Repeats (STR) profiles. DNA may be present on an item in the form of biological materials such as blood, semen, and saliva or may be left on an item when it is worn (wearer DNA) or handled (touch or transfer DNA). DNA can be collected by swabbing an item or by taking a cutting directly from an item. Reference DNA samples can be collected directly from individuals. DNA can be used to identify individuals, link individuals to crime scenes, link individuals to each other, link crime scenes, as well as exclude individuals from DNA profiles that we obtain.

Interpreting DNA data and making comparisons requires the development of DNA profiles. There are four steps to developing a DNA profile:

1. Extraction: add chemicals to break open all the cells to release the DNA.
2. Quantification: amount of DNA is measured within each sample.
3. Amplification: copy the specific locations of DNA using polymerase chain reaction.
4. Developing a DNA profile: visualize the DNA profile, which looks like peaks on a graph.

A single source DNA profile refers to DNA from only one person. A mixture refers to DNA from two or more individuals. DNA can be deposited on or transferred to an item through

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transfer of body fluids to an item, wearing an item, and/or handling an item. Primary or direct transfer refers to DNA transferring directly between individuals or between an individual and an object. Indirect or secondary transfer refers to the transfer of DNA from one person or object to another person or object through an intermediary.

The amount of DNA transferred to an item varies and can be impacted by the nature of the transfer. Transfer of a body fluid typically involves a higher amount of DNA transfer than handling an item. Biological factors can influence the primary or direct transfer of DNA. This can include the shedder status of the individual(s), personal hygiene and rate of perspiration. The composition of the item can influence the primary or direct transfer of DNA. For example, the transfer of DNA is more likely when the item is absorbent rather than non-absorbent. The length of the contact can influence the primary or direct transfer of DNA. The longer a person is in contact with an item the more likely DNA transfer will occur. The nature of contact can influence the primary or direct transfer of DNA. A person who manipulates an item is more likely to transfer DNA to the item than a person who casually touches an item. The persistence of DNA on an item can also vary depending on several factors, including the amount of DNA initially transferred, the composition of the item, exposure of the item post transfer to various environmental conditions (heat, precipitation, UV radiation, etc.), and whether the item is cleaned.

All these factors can also influence the indirect or secondary transfer of DNA. In addition, secondary transfer can be influenced by the time between the direct transfer and the potential secondary transfer. Shorter time typically results in less loss of DNA prior to the potential secondary transfer.

If the intermediary in secondary transfer is a person, the persistence of DNA may also be affected by the activities of the person. For example, hand washing may eliminate transferred DNA. In general, a higher quantity of DNA is transferred through direct transfer as compared to indirect transfer. With secondary transfer it is possible to see a mixture of DNA (DNA from both individuals involved in the transfer).

Many complicated factors can influence the likelihood of transfer of DNA and the persistence of the transferred DNA after deposition. Current DNA technology cannot conclusively answer the question of when DNA was deposited on an item or by what mechanism (i.e. direct or indirect transfer). It is possible the DNA detected on M2022-4843 Item 1.1 resulted from secondary transfer; however, based on Nowlin's training and experience it is her opinion given the quantity of DNA detected on M2022-4843 Item 1.1 (0.168ng/µl) and given the DNA profile obtained is single source it is more likely the result of a direct transfer.

Nowlin testified in this case at a hearing on January 23, 2025. (*See* Tr. p.37, L.13 – p.84, L.5.) The State incorporates her testimony at the hearing as part of this disclosure.

REBUTTAL EXPERT DISCLOSURE: DR. VEENA SINGH
EXHIBIT S-12

Anticipated Rebuttal Testimony

In response to Defendant's expert disclosures filed on January 23, 2025, and in addition to previously disclosed testimony, the State may call Dr. Veena Singh to testify regarding the following:

All victims would have died within minutes. Singh is unable to determine what each individual victim was experiencing at the time of this altercation, but in general, wounds such as this would be painful due to the extensive involvement of tissues containing sensory nerve endings.

Singh will testify a Ka-Bar style knife is consistent with the injuries sustained by the victims. In response to defense claims that not all of the sharp force injuries observed could have been inflicted by a Ka-Bar style knife, Singh will testify the dimensions of the skin wound(s) can't be used to exclude a knife based on knife size. This is because the skin contains elastic tissue which will stretch around a weapon and recoil or retract when the weapon is withdrawn; the elasticity of the skin often causes the skin wound to be smaller than the size of the weapon used.

Singh will testify regarding serrations and striations with regard to the wounds sustained by the victims. Singh will testify that defense experts appear to be conflating serrations and striations. The "fine striations" described in association with certain wounds are not the same as indicators of a serrated blade. The striations seen in the first photo below can be caused by any blade whether serrated or non-serrated, due to irregularities or imperfections on the blade edge. A serrated blade leaves more prominent, evenly spaced

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abrasions, as can be seen in the second photo below (photograph from another case included for demonstrative purposes).



Regarding the number of weapons used, Singh will testify that the blunt force injuries do not necessarily mean another weapon was used; blunt force injuries can be inflicted by a body part (hand, elbow, knee, etc) and also by causing someone to impact an object in the environment (wall, table, bedframe, etc).

REBUTTAL EXPERT DISCLOSURE: PAULETTE SUTTON
EXHIBIT S-13

Anticipated Rebuttal Testimony

On January 23, 2025, Defense filed expert disclosures for Matt Noedel and Brent Turvey regarding crime scene analysis. The following anticipated testimony is in response to Noedel's Scene Reconstruction dated January 22, 2025 (Defendant's Exhibit D6-B), and Turvey's Crime Scene Analysis dated January 22, 2025 (Defendant's Exhibit D16-B). In addition to previously disclosed testimony, the State may call Paulette Sutton to testify regarding the following:

Anticipated Rebuttal Testimony to Matt Noedel

Noedel Claim: Drip trails, when present, can represent movement of a bleeding person – or movement of an object with wet blood of sufficient volume to continue to drip after blood acquisition (i.e. a bloody weapon can create a drip trail from the weapon being carried away from a blood source). (Defendant's Bates Page 3289).

Sutton's Response: Sutton will testify drip trails can certainly indicate movement of an object with enough wet blood to create drips, but this type of drip trail is typically characterized by a small number of drips due to the lack of a replenishing blood supply. In comparison, a bleeding individual can create a longer, more continuous drip trail. The comment made in Sutton's report was intended only to address whether or not a continuous drip trail indicative of a bleeding individual was observed.

Noedel Claims: Regarding Marker 42 in image DSC_4585 and DSC_4587, this stain (as depicted in the Sutton report image 4587) is an altered bloodstain. The appearance depicted in this image represents what was left of the stain after the initial



sampling conducted by Detective Talbott.

Original images of this stain show it to be small spatter (black and white numbered placard #42 of Talbott). The sample was then collected (likely with excessive water applied to the swab) altering the original appearance of the stain. Days later when the ISPFS laboratory processed the scene, a yellow sticker "42" was placed and the after-collection appearance photographed (see figure 26).

This stain was never DNA tested and therefore it cannot be attributed as originating from any specific individual. The misidentification of this sample may be associated with the renumbering system employed by Detective Payne. (Defendant's Bates Page 3289)

Sutton's Response: Sutton will testify her description of Stain 42 was based on its appearance in Image 4587. Noedel had the advantage of seeing Stain 42 in situ. If the original stain was in fact collected using excess water, Sutton agrees with Noedel's opinion of it being an altered spatter stain.

Regarding the DNA profile of Stain 42, Sutton was unaware of the change in numbering system as it correlated to the description of the agency number in the ISPFS worksheets described by Noedel (Defendant's Bates Page 3289): "The misidentification of this sample may be associated with the renumbering system employed by Detective Payne."

After further investigation, Sutton removed any DNA results for Stain 42 as it appears not to have been tested.

Noedel Claim: Sutton's Report (Page 16) states "ISP_5149 depicts the underside of the shelf above the headboard of the bed. Spatters associated with impact are noted on

the underside of this shelf. These spatters represent the termination of the spatters associated with impact seen on the wall above the head of the bed. This part of the assessment should also consider cast off from a bloody object being swung upward and toward the northeast corner. (Defendant's Bates Page 3291)

Suttons' Response: Sutton will testify that a cast-off pattern may be intermingled with the impact spatters on the underside of the shelf above Mogen's bed, but it is her opinion that a simple call of impact spatter is more conservative.

Noedel Claim: Sutton's Report (Page 30) states, "Xana Kernodle was injured in proximity to this table," As a single drop deposited (with potential dilution), it cannot be determined when this drop arrived or what specific mechanism generated it. The Sutton report incorrectly reported that "stain "F" revealed the DNA of Xana Kernodle; however, no record of this stain having been tested for source DNA was located in the provided data. No additional or accompanying bloodstains, patterns or transfers from Kernodle are demonstrated in this area so there is no data to suggest Kernodle was injured at or near this table. (Defendant's Bates Page 3291).

Sutton's Response: Sutton will testify the incorrect DNA profile originally attributed to Stain F has been corrected and an amended report is being disclosed. The conclusion stating that the finding of Kernodle's blood on the table in the living room was the basis for Sutton's conclusion that Kernodle had suffered an injury at or near this table.

Sutton's original reporting of DNA from Stain F as being blood from Xana Kernodle was the result of her mistaken belief that the description of a stain as being collected from a "2nd floor study table" (ISPFS 22_Wilt) was an alternative description of what Sutton referred to as the beer pong table in the living room. This error has been

corrected, and the conclusion drawn as result of this error has been deleted.

Noedel Claim: Sutton Report (page 56) states, "The appearance of the stains indicated by the yellow oval in DSC_4562 is consistent with diluted blood. Diluted blood is created when blood is mixed with another liquid. The mouth and nose injuries of Xana Kernodle as noted in the autopsy report are potential sources of diluted blood." As occurred with the stain on the 3rd floor door (item #42), this stain was also diluted through the collection process after it had been documented by Detective Talbott (see figure 27). The original deposit was not diluted and therefore does not fit with a source from any mouth or nose injury to Kernodle. The dilution of this stain is an artificial remnant of sampling. (Defendant's Bates Page 3291)

Sutton's Response: Sutton will testify that as to what occurred with the stain on the 3rd floor door (item #42); Sutton's description of this stain was based on its appearance in Image DSC_4562. Noedel had the advantage of seeing this stain in situ. If it is confirmed that the original stain was collected using excess water, Sutton agrees with Noedel's opinion of it being an altered spatter stain.

Regarding the conclusion that the mouth and nose injuries of Xana Kernodle as noted in the autopsy report are potential sources of diluted blood, this statement does not imply a substitute for DNA testing. It is only stated as a "potential source" and was not intended to exclude other mechanisms. Other evidence demonstrated that only Kernodle and the perpetrator were moving about her bedroom. This statement was meant simply to caution the reader that in this particular instance an innocuous explanation for diluted blood should be considered in comparison to the dilution of blood discovered in the adjacent living room. Sutton will testify that potential mechanisms other than blood

originating from the mouth and nose of the victim(s) should be considered and never intended to imply otherwise.

Noedel Claim: Sutton's Report state (page 58), "The appearance of these spatters is consistent with diluted blood (see DSC_4892 CROPPED). The mouth and nose injuries of Xana Kernodle as noted in the autopsy report are potential sources of diluted blood." "These spatter stains originated from an impact to a source of exposed blood located approximately 3 feet and 7 inches above the floor as indicated by the scale in image DSC_4892 CROPPED." This pattern of diluted blood (sample #29) is consistent in color and appearance to the diluted blood seen on the pony (half) wall and adjacent areas. Without source testing, this spatter cannot be assigned as originating from Kernodle nor can it be associated with injuries to Kernodle without DNA source testing. (Defendant's Bates Page 3292)

Sutton's Response: Sutton will testify the pattern of diluted blood (sample #29) may indeed have been created by the same source as the diluted blood seen on the half wall and adjacent areas in the living room. As is stated in Sutton's original report though, the mouth and nose injuries of Xana Kernodle should also be considered.

Noedel Claim: Sutton's Report (page 61) states, "The appearance of these stains indicates that the blood has been diluted with another liquid altering their appearance. The mouth and nose injuries of Xana Kernodle as noted in the autopsy report are potential sources of diluted blood." The proximity (height and location) of this deposit is similar to the deposit at position #29. This is a pattern similar to what was deposited onto the pony (half) wall and that already diluted blood was deposited onto the door at this location. Without further testing of sample #29 or area "Q", no specific assignment of source or

mechanism can be identified. (Defendant's Bates Page 3292)

Sutton's Response: Sutton will testify her statement that the diluted blood is potentially attributable to the mouth and nose injuries of Xana Kernodle was not meant to imply a substitute for DNA testing. This statement was meant simply to caution the reader that an innocuous explanation for diluted blood should be considered. Sutton will testify that potential mechanisms other than blood originating from the mouth and nose of the victim(s) should be considered and never intended to imply otherwise.

Noedel Claim: Noedel report (page 40; Bates 003287) regarding the findings of secondary transfer in the vehicle or residence of Mr. Kohberger. Noedel states "The comprehensive search of Bryan Kohberger's vehicle did not locate any blood or specific evidence in connection with the events that took place at 1122 King Road."

Sutton's Response: There is evidence that the assailant did have blood on their person and/or on objects in their possession and that secondary transfers of blood inside of the residence did occur.

A prediction of the amount of secondary transfer of blood that would be "highly likely" does not agree with the relatively small number and quantity of blood in secondary transfers which were found within the scene. Even during the activity associated with an assault when the perpetrator was focused on the assault instead of exercising caution not to create secondary transfers, only a limited amount of blood was transferred outside of the bedrooms.

While spatter was widely distributed in both bedrooms involved, the amount of spatter in the surrounding areas where a perpetrator would be located as to create a void (i.e. an absence of blood in an otherwise continuous bloodstain or bloodstain pattern). If a

perpetrator had been "covered in blood", it seems a void would be identifiable.

There was no visible footwear transfers associated with any of the possible exits from the scene. Even though it can be established that the perpetrator left the scene, they did so without leaving visible footwear transfer stains.



ISP_4871

Lack of large amount of bloodstaining on wall Opposite bed Madison Mogen Bedroom



ISP_4876
Lack of large amount of bloodstaining on wall at foot of bed Madison Mogen Bedroom



ISP_4873
Lack of visible footwear transfers leaving Mogen bedroom



ISP_4709
Lack of large amount of bloodstaining on wall of Xana Kernodle's room



ISP_4715
Lack of visible footwear transfers leaving Kernodle bedroom

The significance of the lack of secondary transfer in a vehicle purportedly used

when leaving the scene must take into consideration what is applicable to the particular scene in question. One must consider first that there was a limited amount of secondary transfer within the scene itself which is attributable to someone other than Mogen, Goncalves, Kernodle, or Chapin. Secondly, one must consider how much, if any, wet blood would still be exposed when the secondary contact was made. An assailant can easily remove protective clothing and shoe covers or place unstained coverings over stained clothing or shoes before they contact their vehicle or residence. Cleaning or wiping off excess blood before making contact with secondary surfaces is also possible.

Regarding secondary footwear transfers, there are no visible footwear transfers associated with any of the possible exits from the scene. Even though it can be established that the perpetrator left the scene, they did so without leaving visible footwear transfer stains. Even if secondary transfers are in fact created, there is also the possibility that the vehicle or residence has been cleaned before a documented search of the vehicle occurred.

Noedel Claim: "Secondary transfers of blood are common when a particularly bloody scene is encountered. Because these transfers are known to occur regularly, such secondary transfers of blood are purposefully sought during crime scene processing and evaluation."

Sutton's Response: The significance of the resultant findings when examining secondary surfaces such as the vehicle or residence of an accused must be interpreted considering all available information. As stated in the textbook "Principles of Bloodstain Pattern Analysis" (page 120), the authors wrote:

> The lack of bloodstains on an accused person should be viewed as an issue of further inquiry. Often the lack of bloodstains on an accused person or his or her clothing will relate to the types and

> location of the deceased's injuries or actions taken by the accused during or subsequent to the violent act. Therefore, the analyst should exercise caution as to what the size of the stains or the quantity of spatter is expected to be present at a scene or on a suspect's clothing.

Noedel Claim: (page 14; Defendant's Bates Page 3261) Noedel describes re-numbering of samples: "one must add "6" from the Payne item number to get the Talbott on-scene "placard" number (i.e. Payne item 17 is Talbot scene placard 23). ISPFS personnel used yellow stickers but their numbers matched the original numbers that Detective Talbott had used. As a result, if Payne prelogged a sample into the ISPFS system as Sample 48, it would actually represent Sample 42 as depicted in the scene images taken by ISPFS personnel (48– 6). The ISPFS then assigned Lab # 77 to this stain, and it was shown to be linked to Kaylee Goncalves.

Sutton's Response: I was not initially aware of this situation with the scene placards vs. the numbers depicted in the ISPFS laboratory worksheets.

Anticipated Rebuttal Testimony to Brent Turvey

Turvey Claim: Turvey comments on lack of blood detected in Kohberger's vehicle (Defendant's Bates Page 4038). Despite an extensive and exhaustive forensic examination of the Defendant's vehicle for bloody clothing, blood transfer, and other evidence related to these crimes — down to the metal — none was found. This has essentially excluded the Defendant's vehicle as being related to the commission of these crimes. The failure to be absolutely clear and forthcoming about this evident fact would be evidence of bias.

Sutton's Response: The failure to detect blood in the Defendant's vehicle does not exclude the vehicle from being related to the commission of these crimes. There can be a myriad of reasons blood was not transferred to or detected in the Defendant's vehicle. The significance of the lack of secondary transfer in a vehicle purportedly used when leaving the scene must take into consideration what is applicable to the particular scene in question. One must consider first that there was a limited amount of secondary transfer within the scene itself which is attributable to someone other than Mogen, Goncalves, Kernodle, or Chapin. Secondly, one must consider how much, if any, wet blood would still be exposed when the secondary contact was made. An assailant can easily remove protective clothing and shoe covers or place unstained coverings over stained clothing or shoes before they contact their vehicle or residence. Cleaning or wiping off excess blood before making contact with secondary surfaces is also possible.

Regarding secondary footwear transfers, there are no visible footwear transfers associated with any of the possible exits from the scene. Even though it can be established that the perpetrator left the scene, they did so without leaving visible footwear transfer

stains. Even if secondary transfers are in fact created, there is also the possibility that the vehicle or residence has been cleaned before a documented search of the vehicle occurred.

These findings need to be understood in the context of all available information. See attached Exhibit S-13(a) "Absence of Evidence is Not Evidence of Absence" by Paul Erwin Kish and Herbert Leon MacDonell.

Turvey Claim: Turvey comments on lack of blood at the sliding door at floor 2 (Defendant's Bates Page 4039). On the second floor, there is a sliding glass door which was found to be open by law enforcement. It has been inferred that this is the location where the suspect(s) may have entered or at least exited. There is no physical evidence to support this as, again, there would need to be the requisite bloody transfer. If an intruder left the house through this door, having left it open upon entry, there would need to be bloody footwear patterns on the floors from bloody shoes or feet both leading up to and out of that sliding glass door.

Sutton's Response: Sutton will testify if the sliding glass door was in an open position when the intruder entered or if it was left in an open position after the intruder entered the residence, there would be no need for the intruder to touch the door when exiting. Therefore, there would be no need for the intruder or any bloodstains on the intruder's person or in their possession to make contact with the sliding glass door. The assailant could have removed bloody gloves or removed bloodstains before leaving. The extent of secondary transfer inside the crime scene by someone other than the decedents is minimal.

There are three (3) possible exits from the crime scene, and there are no visible footwear transfer stains or secondary transfer stains at any of the exits. It can be

established that the perpetrator had to have used one of the available exits to leave the crime scene, but no secondary footwear transfer stains or secondary transfer stains were created. This seems to negate Dr. Turvey's conclusion that lack of secondary transfer stains would preclude the sliding glass door being the avenue of exit.

Turvey Claim: Dr. Turvey indicates that Goncalves and Mogen were posed (Defendant's Bates Page 4045) The evidence suggests that after both victims were killed or unresponsive, they were posed in their shared bed. Kaylee was moved from a position with her head on her pillow to partially atop of Madison. Then the comforter was placed over them both. (Underlining added)

Sutton's Response: Sutton will testify posing is a possibility but not a determination that can be made to the exclusion of other explanations for their positioning. As Dr. Turvey states (quoted below), posing requires an intentional act:

> "This refers to intentionally arranging the scene for effect. In the present case, the bodies of Kaylee and Madison were posed together after the lethal attacks suffered by both, and then they covered together with a comforter
> …
>
> Kaylee was moved from a position with her head on her pillow to partially atop of Madison" (Bates 004045)

There are discrete transfers on the pillow consistent with contact being made by Goncalves' bloodied head, but these discrete transfers could be the result of several mechanisms: (1) purposeful movement before she was rendered unresponsive; (2) movement of her head caused by blows or in response to blows by the assailant; (3) movement during the struggle; (4) intentionally or inadvertently moved by the assailant.

As for the comforter being placed over them, the spatter on the bottom sheet was

limited to approximately chest level. With a limited distribution of spatter on the bottom sheet, it is difficult to determine with certainty that the comforter has been moved.

Turvey Claim: Dr. Turvey makes several statements regarding the extent of blood that would be on the perpetrator. The extensive and close up nature of the attacks on Kaylee and Madison, along with the blood spatter evident in the room and the moving of Kaylee's body, are evidence that the suspects upper bodies (face, hair, hands, arms, and chest area) would have been covered in blood. (Underling added) (Defendant's Bates Page 4041).

All available physical and blood evidence suggests that these were the first victims; that they were specifically sought out on the 3rd floor; and that the suspects then moved downstairs to the 2nd floor where at least one of the suspects was observed by Xana Kernodle. This would have been covered in blood. (underling added) [Bates 004041]

The extensive and close up nature of the attacks on Xana and Ethan, along with the blood spatter and blood smears evident in the room, are evidence that the suspects entire bodies (face, hair, hands, arms, chest area, legs, and feet / footwear) would have been covered in blood. (underling added) (Defendant's Bates Page 4044)

Sutton's Reponse: The term "covered in blood" is not scientifically quantifiable. There is certainly evidence that the assailant in this case had some degree of bloodstains on the person or on object(s) in their possession, and that secondary blood transfers resulted by subsequent movement through the scene. The number and quantity of bloodstains that were secondarily transferred in the scene was relatively small. Even during the violent activity associated with an assault, only a small number and quantity of

blood was transferred outside of the bedrooms. While spatter was widely distributed in both bedrooms involved, the amount of spatter in the surrounding areas where a perpetrator would be located as to create a void. If a perpetrator had been "covered in blood", it seems a void would be identifiable.

Dr. Turvey himself points out that there is a lack of bloody footwear patterns at "the scene in general":

> Precautionary Acts: The precautionary acts in this case include the execution of living witnesses; the clean-up of bloody hands, feet / footware and clothing before leaving; and the disposal of said clothing along with the weapons used. Direct evidence of this clean-up can be found in at least some of the dilute blood transfer which was located in different areas of the home. Indirect evidence includes the absence of bloody transfer from feet and hands, despite the movement of suspects within the homes, the necessary opening of doors, and the absence of bloody footwear patterns at the scene in general. All of this would have required an extensive amount of time at the scene to clean, perhaps hours, which is inconsistent with the State's theory that these crimes were committed within a time interval less than 15-20 minutes, subsequent to 4am. (Defendant's Bates Page 4045) (Underlining added).

Turvey Claim: Dr. Turvey refers to indicators of more than one assailant. It is not reasonable to think that Ethan would have remained in his bed after waking up or being awake while Xana was being attacked in front of him. This evidence and context begin to suggest the existence of a second attacker. (Underlining added) (Defendant's Bates Page 004044)

Number of Suspects: At least two suspects were involved in this attack. This is indicated by the fact that multiple weapons were used against Kaylee; that multiple types of lethal force were used against Kaylee; and that Ethan and Xana appear to have been attacked at the same time. This is inconsistent with the State's theory that these crimes were committed solely by one individual. (Defendant's Bates Page 4045)

Sutton's Response: Sutton will testify there is evidence that Ethan Chapin and Xana Kernodle were in close proximity to each other at some point after the assault began as evidenced by the finding of Kernodle's blood and DNA under the fingernails of Ethan Chapin's right hand and the finding of Chapin's blood and DNA under the fingernails of both of Xana Kernodle's hands. One assailant could contain two people in close proximity to each other, especially if the assailant is armed.

A single perpetrator can certainly use more than one weapon and can use multiple types of lethal force. In addition, there are other factors to consider including, but not limited to: if the assailant is armed; if the assailant ambushed the victims; if the victims were asleep when the attack started and/or; if the victims were under the influence of alcohol or other substances.

Turvey Claim: Dr. Turvey indicates that an excessive amount of time would be required for a perpetrator to clean up after the assault.

Sutton's Response: Sutton will testify that washing or wiping hands takes little time especially if preparations for cleaning are made beforehand. Removal of protective clothing and shoe coverings takes seconds.

Turvey Claim: Turvey reports that the knife sheath was staged for the following reasons:

> 1. The sheath was found precariously placed just slightly under the body of Madison Mogen, and partially covered by the comforter that was placed atop the midsection of her body by the suspects. It could not have fallen accidentally into this location (Defendant's Bates Page 4046)

Sutton's Response: Sutton will testify the sheath could have become trapped under Madison Mogen's body when she moved her left leg out of the bed. (See ISP_4963)

If she were hurriedly moving her left leg, she would not have taken time to move the comforter. In which case, the sheath would be trapped between the comforter and the bed. It would be reasonable for the sheath to be in this location because the evidence indicates that Kaylee Goncalves and Madison Mogen were the first to be killed. Dr. Turvey also concluded that Goncalves and Mogen were the first to be killed.



ISP_4963

The sheath could have been covered by the comforter during the assault; when and if the comforter was moved by someone other than the decedents or even when someone was searching for the sheath. There is no physical evidence to determine which scenario is more likely.

Turvey Claim: A second reason Dr. Turvey feels that the sheath was staged: "2. The sheath was new and unused, as indicated by the absence of damage or wear to the leather." (Defendant's Bates Page 4046)

Sutton's Response: Sutton will testify she is unsure why this proves that staging occurred. It could just as easily mean that the knife sheath was subjected to only light use in the past or that it was purchased for this purpose.

Turvey Claim: A third reason Dr. Turvey feels that the sheath was staged:

> 3. The sheath was face down, and had received only a few areas of minute blood spatter (impact or aspirated) while resting atop a sheet with significant impact spatter all around. The inconsistency of blood spatter dispersion and density indicate transfers occurring at different times, under different conditions, with different levels of intensity. (Defendant's Bates Page 4046)

Sutton's Response: Sutton will testify the difference in the amount of spatter on the sheath versus the amount on the fitted sheet or even the comforter simply proves that the sheath came to rest in this location where it was discovered at a different time during the spatter producing event(s). It does not prove that it was staged in this location.

The sheath could have been at another location when it was spattered and then moved here at a later time. If the perpetrator moved the comforter as Dr. Turvey believes, the sheath could have been moved to this location when the comforter was moved. This could account for a different amount of spatter on the exposed surface of the sheath and the exposed surface of the bed sheet.

Tuvey Claim: A fourth reason Dr. Turvey feels that the sheath was staged:

> 4. The sheath was placed at that location without receiving bloody transfer from the hands or fingers of the suspect that did it. This means it was done after the attacks / posing, but also after the suspect had washed their hands, subsequent to clean-up efforts and the scene (See photos below). (Defendant's Bates Page 4046)

Sutton's Response: Sutton will testify that it is true that there are no bloody transfers visible on the knife sheath, but the significance of this finding does not support

that the placement of the sheath was staged. It could have gotten in this location without having been touched by a perpetrator after the attacks or even after their hands were cleaned or gloves removed. Either scenario would explain the lack of contact staining without staging having occurred.

Guest Editorial

"Absence of Evidence is Not Evidence of Absence"

An individual's freedom, or his incarceration, is becoming increasingly more dependent upon expert testimony. Opinions of such expert witnesses are derived primarily from the examination of physical evidence and are given as conclusions. These opinions often either substantiate or negate an individual's involvement in a violent act as well as identifying links between the crime scene, the victim, and the suspect.

Bloodstain pattern interpretation is one method utilized when attempting to link a suspect with a violent bloodshedding act. Thus, it is obvious that the presence of bloodstaining on a suspect could link a suspect to a violent act; but how can the absence or lack of bloodstaining affect the probability of one's noninvolvement in a violent act?

The complete absence of bloodstains on a defendant or his clothing is frequently assumed by many to be definitive evidence that the defendant did not directly participate in a violent act. This is a misconception fostered and exploited by those who have insufficient knowledge and experience in bloodstain pattern interpretation, or by those who hope that such an opinion would aid in their client's defense. Explanations for the lack of bloodstaining on an individual who has actively participated in a violent act are innumerable. These include the assailant cleaning-up prior to his being apprehended, removal of his clothing prior to committing the act, or simply not being stained because spattered blood was intercepted by some intermediate target.

A literature search indicates that the absence of bloodstaining on an assailant has been of concern for an extended period of time. The classic work of Eduard Piotrowski [1] in 1895 supports the opinion that an assailant does not always become bloodstained during a violent attack. Piotrowski conducted several experiments where live rabbits

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were bludgeoned or stabbed. He observed that the individual who inflicted the injuries did not always become bloodstained as a result of his active participation. Piotrowski wrote that, "The degree of spattering sustained by the perpetrator cannot be reduced to hard and fast rules, due to the irregularity of drops flying in all directions."

In 1906, Hans Gross [2] concurred with Piotrowski's findings when he reported on cases where very little, if any, bloodspatter was evident on an assailant after taking part in a violent attack. Later, in 1914, Ernst Ziemke [3] reported on a case wherein he stated, "It is thoroughly erroneous to think that the offender must have been heavily blood spoiled when he inflicted severe wounds on a victim by opening his arteries."

The report by Dr. Fritz Reuter, published in 1933 [4], describes conclusions he had made earlier in 1927. He wrote, "There are no common guiding rules on how to identify existing bloodstains on cloth or hands of the accused. Very often the question was asked as to why the accused did not have bloodstains on himself considering the way he injured the victim. This question can only be answered by taking into account all the circumstances of a particular case. Stabbing or even injuring the artery does not mean that the accused must have blood on his hands or clothing."

Walcher [5] also concluded that it is not uncommon for an offender to avoid bloodstaining of his or her clothing, even though a great deal of bloodspatter was present at the crime scene. Dr. Walcher's remarks were made in his 1939 review of the available literature he had at that time.

The literature does not address the question as to why one perpetrator will become heavily bloodstained from a violent act while another individual who commits a similar act receives no staining whatsoever. Gross [2] urged investigators to proceed with extreme caution before they draw conclusions as to the possible significance of the lack of bloodstains.

One could hypothesize numerous theories but never adequately answer the question of why the degree of bloodstaining on an assailant varies. Expert opinions should never be based upon what one would expect to be present, but rather they should be based upon what is physically present. If bloodstains can be seen, and if there are enough

to constitute a geometric pattern, it may be possible for a competent analyst to interpret that pattern.

Literature we have reviewed is in good agreement with our own experiments. With this data and with the experience we have gained from investigating hundreds of criminal cases, we conclude that the absence of bloodstaining on a suspect's clothing should neither exonerate, nor implicate, his involvement in a violent act. The authors have investigated numerous cases where an assailant was not bloodstained at all or had very little bloodstaining on his clothing as compared to the amount of bloodspatter that was present at the crime scene. Although we are frequently asked to testify suggesting there is some significance to the absence of bloodstaining, we reply that we can only interpret the bloodstains that are physically present. No one should speculate as to why a defendant was not bloodstained except in the most unusual cases. We stress this opinion whenever we are asked this question in court.

Exceptions to this rule do occur, however. Such cases are unusual in their physical evidence. For example, in a case in the Southwest, a woman was believed to have shot her husband using a .357 Magnum. The entrance wound in the victim's forehead exhibited classic stellate lacerations. Blood, tissue, brain substance, and bone fragments erupted from the wound and spattered over the bed, the head board, and much of the bedroom. The wife of the victim was wearing a white, long sleeved nightgown which did not have even one small bloodstain. Her children ran into the bedroom which gave her no time nor opportunity to change her clothes. In this case, the absence of any bloodstaining on her nightgown was very good evidence that she could not have fired the fatal shot.

The presence of bloodstaining on an assailant is the only physical evidence a bloodstain pattern examiner should use when drawing conclusions from a defendant's clothing. The lack of bloodstaining on the defendant should only be used as a reason for further investigation. In some instances, assailants have been known to either commit beatings, stabbings, or shootings while nude, clean-up after the crime, change their clothing, or confess to a crime that was actually committed by another individual.

A former student submitted a case involving a double homicide where both victims suffered multiple, near contact wounds to the head and upper torso with a .38 caliber handgun. A large amount of bloodstaining was present at the scene. The individual who confessed to the

crime said he was wearing the same outfit that he wore when he allegedly committed the murders, a white jogging suit and sneakers. The short time between the crime and the apprehension of the suspect precluded any clean-up effort. No blood was observed nor was any chemically detected on the suspect or any of his clothing. The question we were asked was, "Did this individual commit the crime?" Obviously, this was a case where the lack of bloodstaining provoked further investigation. However, should no exculpatory evidence be discovered, the absence of evidence is not evidence of absence.

If no plausible explanation is offered for the absence of bloodstaining, unsubstantiated speculation as to why a defendant was not bloodstained is unwarranted. Counsel should be referred to the literature where numerous references state an assailant is not always bloodstained as a result of his/her active participation in a bloodletting event.

Assailants may often take extreme measures to prevent bloodstaining of their clothing and themselves before, during, and after engaging in a violent act. Hofmann [6] referred to a case where a suspect had removed all of his clothing prior to his committing a murder. In a second case he described where a psychiatric patient wrapped himself in an extra linen in order to prevent bloodstaining of his clothes prior to his committing a murder.

The basis of the bloodstain pattern interpretation discipline is the geometric analysis of the static aftermath that results from a violent act. From such an analysis we attempt to reconstruct the prior events that could have happened to produce the patterns that we have observed. There is no basis for opinions on the absence of bloodstaining if they can not be substantiated through the medium of science. In 1938, Professor Orsos [7] made a study in Budapest that demonstrated how the areas of bloodspatter from a blow with an instrument were greatly influenced by the shape of the instrument. For example, his diagrams of a flat surface impacting a victim's head will restrict the upward bloodspatter as compared to a head being struck by an object having a cylindrical geometry. Simply stated, beating someone's head with a 2" x 4" doesn't spatter blood upwards as much as if a baseball bat had been used. It would be erroneous to say an individual could not have participated in a bloodshedding act based solely upon the apparent lack of bloodstains on his or her clothing and/or person. It may be equally erroneous to implicate any individual on an absence of other types of physical evidence.

One must always know the limitations of his/her discipline as well as his/her own personal limitations within that discipline. Each person must be able to determine when he or she is close to exceeding either of these limitations and never go one step beyond.

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REBUTTAL EXPERT DISCLOSURE: KATIE WHITE
EXHIBIT S-14

Anticipated Rebuttal Testimony

In response to the Defendant's expert disclosures, and in addition to previously disclosed testimony, the State may call Katie White (formerly Dace) as an expert witness to respond, rebut and testify as follows:

The Combined DNA Index System (CODIS) is a national collection of DNA profiles maintained by the FBI. It contains convicted offender profiles, arrestee profiles, as well as profiles obtained from evidence, and can be used to identify a suspect, generate potential leads, or link crime scenes together. Upon entry, profiles are automatically searched against the database and generate "hits" when a match occurs.

In Idaho, individuals convicted of felonies and those placed on the sex offender registry must be entered into CODIS. Idaho also allows for the entry of DNA profiles associated with unidentified human remains or living people unable to identify themselves. Idaho also allows for the entry of unidentified profiles generated from evidence associated with a crime, when that profile is believed to be from the putative perpetrator.

The profiles are entered by the reporting analyst and reviewed during technical review. Idaho State Police Forensics Services is required to follow the NDIS Operational Procedures Manual and abide by an MOU between the FBI and the Idaho State police. Each state also has one CODIS Administrator who is responsible for ensuring only approved profiles are entered. White is the State CODIS Administrator for Idaho.

White agrees with the reporting analyst's decision not to enter the unknown profiles from Male B and Male D into CODIS because those DNA samples were not eligible for entry into

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CODIS. DNA profiles believed to be attributable to the putative perpetrator are eligible for entry into CODIS. DNA profiles attributable to victims, nonprobative individuals, and items without an established link to the crime/crime scene are not allowed to be entered.

The laboratory must justify entry of every profile put into CODIS and many factors can influence eligibility. For a large crime scene, not all locations within the scene are always weighted equally in probative value. It is very common to locate nonprobative biological stains within residences due to everyday activities such as consensual sexual activity, small injuries, and lack of cleanliness. Evidence located closer to a point of entry, a disturbed area, or a victim will typically be considered of higher probative value than other areas.

For this case, a knife sheath next to one of the victims produced an unknown male profile. The victims were believed to have been stabbed to death and the sheath's proximity to the victim's body provided the strongest link to a potential perpetrator. The residence where the crime occurred is heavily trafficked by college students and the location of the blood spot on the underside of a handrail (Male B) does not in itself indicate a link to the crime. A gardening style glove located outside the residence in a publicly accessible area produced an additional unknown male profile (Male D). No DNA attributable to the victims was located on this item and a direct link to the crime could not be established. Had DNA from one or more of the victims been located on this item, it likely would have been CODIS eligible.

At the time CODIS eligibility was determined, Male DNA profiles A, B, and D were unidentified, and it was not possible for lab staff to know who would ultimately be linked to any one item. The CODIS eligibility determination was strictly made based on an evaluation of the probative value of each item.