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1.7 Evidence Examination, Collection and Documentation

Determination of probative evidence will be decided based on a number of factors including the type of case, the evidence collected, the number of victims and perpetrators, etc.

1.7.1 Aseptic Technique and Contamination Control

All items used in the identification, transfer and isolation of samples must be sterile and/or free of contaminate DNA.

Laboratory coats must be worn at all times while in a Biology Unit laboratory examination area. Gloves and a face mask must be worn at all times while handling biological evidence or preparing reagents used in the analysis of biological evidence, or in the immediate vicinity of these activities. Gloves must be changed frequently when looking at different items of evidence. Every effort shall be made to minimize exposure between examination items (evidence items, reagents, plastic ware etc.) and laboratory staff members not actively engaged in biological analysis including minimizing foot traffic, casual conversations, time spent in analytical areas while not conducting analytical examinations, increasing the use of proper personal protective measures and changing gloves between evidence examination and packaging for DNA analysis.

A fresh, sterile pipet tip must be used for each transfer of biological material or chemical to be used for analysis.

All analyses shall be performed on a clean work surface or disposable bench paper. The surface shall be cleaned with a 10% bleach solution (made fresh daily) or EPA registered sanitizer.

Processing of items for body fluid examination and/or subsequent DNA analysis (e.g. cutting of swabs or fabric) shall be completed using disposable utensils. Disposable utensils may include scalpels and tweezers. Instances that require non-disposable scissors, tweezers and other instruments shall be cleaned with a 10% bleach solution (made fresh daily) or EPA registered sanitizer, and rinsed with deionized water in between each sample. Items identified as single use shall be disposed of prior to examining the next item.

The itemization and characterization of the unknown, or evidentiary items, and known samples shall be separated by time and space. Between analysis of the unknown and known samples, the work space and instruments shall be decontaminated with a 10% bleach solution (made fresh daily) or EPA registered sanitizer.

1.7.2 Evidence Conservation

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When examining evidence, a good faith effort will be made to ensure that a suspected stain or sample is not consumed in testing. A portion sufficient for an additional analysis(es) should be maintained for any potential re-testing.

If a sample or stain must be consumed in order to obtain a result, permission to consume the sample must be obtained from the submitting agency or Prosecutor and documented in the case jacket.

If a suspected stain or sample is limited in size, biological testing may not be performed in lieu of DNA analysis, unless specifically requested by the submitting agency or Prosecutor.

1.7.3 Evidence Documentation and Stain Visualization

A thorough record must be maintained on all examinations.

All analyses, results and appropriate controls must be documented.

To enhance observation of possible body fluids or staining that may be present, additional bench lighting shall be used while processing items of evidence. This type of lighting shall include but is not limited to: photo flood lights, magnified ring lights, appropriate flash light or head lamp, as well as Alternate Light Sources (Crimescope or Crime-Lite® 82S).

The texture of fabric or surface can often times indicate an are of possible deposition of blood or other body fluids. Evidence items may be examined for texture changes with gloved hands. Glove changes may need to be changed during these types of examinations to minimize transfer of biological stains within the same evidence item.

Magnification may be a critical tool to assist with location of smaller biological stains. Magnification may be accomplished through the use of stereoscopes and/or magnifying ring lights.

If techniques described above for locating biological stains have not rendered suitable stains for further characterization, chemical techniques such as Luminol, LCV and/or AP Mapping should be considered.

If suitable stains are located using the techniques described above, further steps may be taken as detailed below for characterization of the stain components.

Any samples that are removed for DNA must be documented as to location, appearance, size removed, as well as the size of the original stain as deemed appropriate based on item, stain and value of description.

Abbreviations used within the case notes, that are not present in Appendix I or as outlined in Quality Manual section 1.13, shall be accompanied by an abbreviations key in each case jacket.

1.7.4 Stain Characterization Guide

Once a suspected body fluid stain is located, the extent and type of characterization should be determined based on analyst experience, case facts and submitter request.

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1.7.4.1 BLOOD

If a suspected bloodstain is located on an evidence item that may support a pattern or impression, a bloodstain pattern analyst or impression analyst (Latent Print or Trace) should be consulted before proceeding with further characterization of the suspected stain.

If a suspected bloodstain is located on an evidence item using visual, lighting, magnification or chemical techniques, additional characterization should be conducted. At a minimum a chemical presumptive test (PT, TMB, HSTX) shall be conducted. If the chemical presumptive test indicates an inconclusive or positive result, additional immunological presumptive tests (HT) may be conducted at the discretion of the analyst.

If multiple items of evidence are submitted and blood testing requested, it is at the discretion of the analyst as to the number of items to test based upon the FSD Evidence Submission guidelines and the requests of the submitting law enforcement agency.

1.7.4.2 SEMEN

If a suspected seminal stain is located on an evidence item using visual, lighting or magnification methods chemical presumptive testing shall be performed (AP). If the chemical presumptive test indicates inconclusive or positive result, a microscopic examination shall be conducted. If the microscopic examination is negative, additional immunological presumptive tests (PSA) may be conducted at the discretion of the analyst.

If cleaning or washing of the item of evidence is suspected or considered a possibility, the testing for sperm cells is still possible. The location tested should be done at areas of intimacy, and the number of sperm cells will be of importance. It should be noted that sperm transfer of laundered items has been previously documented.

Based on the statement of facts provided on the FSD-007 (RFLE) or the nature of the offense, the items providing the most intimate association between the suspect(s), victim and the crime shall be examined first. The number of items examined should be kept to a minimum if body fluids of interest have been detected on previous items. However, there may be extenuating circumstances, such as multiple assailants or consenting partners, to the case that may lend to more items being tested in order to possibly provide needed investigative information.

It should be noted that sexual assault cases may have stains of mixed sources such as blood/semen. Often, the blood component of a mixed semen/blood stain may mask the analyst's ability to detect the semen component either through use of alternate light sources or acid phosphatase screening. If case facts suggest the potential for a mixed semen and blood stain, additional testing such

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as a microscopic examination to visualize sperm cells should be conducted. Discretion may be exercised depending on the density of the blood staining- dilute blood staining may not interfere with the ability to interpret an acid phosphatase reaction.

1.7.4.3 SALIVA

Analysis for the presence of saliva is not required on evidence items where it can be reasonably assumed (cigarette butts and bottle openings). A careful evaluation of the case facts and the importance of establishing saliva as the body fluid source should be completed prior to pursuing saliva analysis.

Caution should be exercised when determining the presence of saliva in a stain that is mixed with other body fluids such as blood and/or semen. It has been established that neat body fluid stains other than saliva may provide a positive result using immunological testing specific to saliva.

1.7.4.4 HAIRS and FIBERS

1.7.4.4.1

Evidence submitted for biological examination may also support evidence that is amenable to other forensic discipline examinations (i.e. latent prints, trace evidence, questioned documents, etc.). If there are any questions about collection and/or preservation, please consult with analysts from other disciplines prior to conducting any biological examination. In some instances, it may be appropriate to submit the evidence to another discipline prior to biology.

1.7.4.4.2

When handling items for collection of hairs and fibers, great care must be taken to prevent cross contamination and/or loss. When evidence is examined for biological substances, hairs/fibers may be collected from the item and/or left on the item for possible future recovery and examination. If manipulation of the hair/fiber is necessary, care must be taken to reduce the effects of static such that the hair/fiber does not become lost. Appropriate methods to reduce static may include the use of humidifiers, moistening the tool (forceps/weigh boat) with a moist towel and/or a tungsten system to reduce static. Use of "sticky notes" is also an acceptable tool to manipulate hairs/fibers. Use separate gloves, laboratory coats and surfaces for evidence from different sources. The victim's evidence and suspect's evidence should be examined in separate rooms. If this is not possible, then the separation of the evidence in time (such as different days) and space (such as another area of the room) will be necessary. Document in case file notes.

With the aid of oblique lighting, recover hairs/fibers and/or trace evidence from items being examined for biological fluids using one or more of the following methods: forceps, post-it notes, low tack adhesive tape, gentle scraping and/or careful shaking over clean paper.

Note: Low tack adhesive tape should be placed onto a clear plastic sheet for storage. A post-it note may be folded onto itself. These should both be stored inside clean packaging in order to alleviate inadvertent contribution from other items.

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Package and appropriately label recovered hairs/fibers. Items collected from different sources, such as victim and suspect, shall be stored inside separate packaging. If deemed necessary, turn over to the appropriate discipline for analysis. Otherwise, return to the submitting agency repackaged with the original evidence.

If hairs/fibers are to remain on the item for possible future recovery, protect the trace evidence from loss or other deleterious effects by examining the item for biological substances on clean paper, wrap the item in the same paper and place it in the original packaging (when possible).

Document findings and handling (i.e. hairs/fibers recovered, hairs/fibers observed/not recovered, etc.), including the method(s) used for recovery, in your notes.

1.7.4.5 FECAL AND URINE STAINS

1.7.4.5.1 Urine

Urine may not be visible. The ability to detect creatinine is case- and condition-specific. If urine is diluted within another liquid, the dilution may inhibit or prevent detection. Detection of creatinine from residue within a cup may still be reasonable depending on the amount of urine that was originally present prior to evaporation. The ability to detect DNA based on the observation of creatinine is limited and should be considered before submission for DNA. A cell search may assist with the determination in pursuing DNA analysis.

1.7.4.5.2 Feces

A considerable amount of fecal material may be needed to detect urobilinogen with the test available. It is possible to get a DNA profile from a swab of the external surface of the fecal material (if submitted intact) or if blood or mucus is visible. Toilet paper submitted for the presence of fecal matter may be a viable source of DNA. Careful consideration of the condition of the sample should be exercised in determining whether DNA analysis is appropriate.

1.7.4.6 CONTACT

1.7.4.6.1

Evidence submitted for biological examination may also support evidence that is amenable to other forensic discipline examinations (i.e. latent prints, trace evidence, questioned documents, etc.). If there are any questions about collection and/or preservation, please consult with analysts from other disciplines prior to conducting any biological examination. In some instances, it may be appropriate to submit the evidence to another discipline prior to biology.

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1.7.4.6.2

Determining whether to collect potential cellular material from an evidentiary item and the specific areas on the item to target for collection requires careful consideration of the following factors:

- How closely associated is the item to the crime committed?
- Have other items in the case already established the case facts?
- How many potential donors/handlers might be present on the item?
- How was the item used or handled, and for how long?
- What areas on the item have the highest possibility of cells being present?
- Would collection of potential cellular material from the areas of interest compromise evidence of interest to other units in the laboratory?

1.7.5 Examination of Evidence Collection Kits (Criminal Sexual Conduct Kit)

If the victim is female and the assailant is male or unknown, the Lansing and Northville Laboratory Biology Unit Sexual Assault teams shall proceed to section 1.10 of this procedure manual for a male DNA screening method for sexual assault kits. For all remaining sexual assault kits, any Michigan State Police laboratory equipped for Body Fluid Identification testing shall continue with section 1.7.4

Standardized evidence collection kits are utilized by qualified medical providers for the collection and documentation of potential evidence related to criminal sexual conduct. A medical history form (FSD-97) and/or investigative information may be provided to the forensic scientist at the time of testing. This information is valuable, giving the forensic scientist direction on the types of analytical tests to conduct that have investigative value and at the same time utilizing available resources in a thoughtful and efficient manner. Although each and every case may be unique, the provided information may be used by the forensic scientist to direct their testing. However, the forensic scientist must consider many factors including but not limited to:

- victim age and gender
- alleged assault activities
- victim awareness
- number of assailants
- gender of assailants
- time elapsed from alleged assault to evidence collection
- law enforcement request

The following procedure is meant to act as a guide to assist the forensic scientist with their testing. If a medical history form and/or investigative information is not available at the time of testing, all items must

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be screened for the presence of probative biological fluids. If a medical history form and/or investigative information indicates multiple assailants or a recent consenting partner, all items must be screened for the presence of probative biological fluids unless documented information is available supporting limited testing.

See Appendix 2A: Evidence Collection Kit (Criminal Sexual Conduct Kit) Flowchart for suggested case processing.

Test orifice swabs consistent with the alleged assault for the presence of seminal fluid. Other biological fluid(s) may be tested for as deemed probative per the case details.

Stain and examine slides contained within the kit consistent with the alleged assault for the presence of spermatozoa. Prepare slides for those samples where spermatozoa confirmation is needed and slides are not already available.

If the examination of the orifice swabs and slides do not result in viable DNA samples, test other items in the kit for the presence of seminal fluid, spermatozoa or other biological fluid(s) that are consistent with the alleged assault.

If positive semen evidence is identified from the kit, the hairs do not need to be examined, unless the case details deem it probative.

If hair evaluations are required, examine any pulled hairs or hair combings according to Section 1.9.

1.7.6 Examination of all other Items of Evidence

See Appendix 2B: Biology Evidence Flowchart and Appendix 2C: Weapons Flowchart for suggested case processing.

Examine the evidence for the presence of biological fluids or biological materials as deemed probative per the case details.

If hairs are observed and deemed probative, they may be evaluated for gross physical characteristics according to Section 1.9.

1.7.7 Evidence Collection and Preparation

After completion of Biology screening, any samples that are needed to be retained for DNA analysis shall be placed in the appropriate extraction receptacle for the DNA extraction process. To reduce the potential for residual DNA on the exterior of tubes, a fresh pair of gloves shall be worn during this step.

The amount of sample should not exceed more than ½ of the extraction receptacle capacity.

Large substrates must be cut into smaller pieces.

Cotton swabs must be removed from the applicator stick.

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A good faith effort should be made to include only the amount of sample that will be required to obtain a full DNA profile.

Any samples that were collected and prepared for DNA analysis, but are no longer being carried on through the DNA process (request withdrawn, etc), should be packaged appropriately.

These samples shall then be packaged separate from the original evidence, into suitable outer packaging, sealed and returned to the submitting agency.

A "DNA Evidence and/or Extracts" label will be put on the outer packaging as well as an itemization on the package as to the contents.

All evidence will be returned to the submitting agency following the Quality Manual.

1.7.8 Evidence Collection Techniques

1.7.8.1

Swabbings of evidence should be performed by wetting a sterile swab(s) with deionized water. Depending on the absorbance characteristics of the item, additional swabs can be collected by following up with a dry sterile swab(s) in order to ensure maximum sample recovery (double swab technique). In many instances, swabbings of evidence items for subsequent DNA testing is the preferred method. However, this is left to the analyst's experience based on sample size, substrate and various other factors.

Cuttings of evidence are acceptable, but the analyst should be aware of potential inhibitors to DNA analysis such as indigo dyes as found in denim, leather, soiled items, etc.

Sexual assault smears that have been preserved with fixative may require collection for DNA testing. The slide should be evaluated microscopically for the presence of spermatozoa prior to collection attempts. If a slide includes a cover slip, it may be removed by gently prying with a scalpel. Drops of xylene near the edges of the cover slip may be utilized to soften, or dissolve, the fixative around the edge of the cover slip to ease its removal. Once the cover slip is removed, additional xylene may be applied to the slide surface to loosen, or dissolve the fixative. Once this occurs, the slide may be swabbed with a sterile cotton swab and a portion of the swab subsequently removed for DNA testing. The slide must be re-evaluated microscopically for the presence of spermatozoa following the collection process to ensure a sufficient collection has occurred.

1.7.8.2 References

Pang, B.C., et al, "Double Swab Technique for Collecting Touched Evidence", Journal of Legal Medicine (Tokyo), Vol. 9, No. 4, July 2007, pgs. 181-184.

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Sweet, D, et al, "An Improved Method to Recover Saliva from Human Skin: The Double Swab Technique", Journal of Forensic Sciences, Vol. 42, No. 2, 1997, Pg. 320-322.

1.7.9 Evidence Preparation Techniques

1.7.9.1 Biological Stain Extraction

Remove a portion of the suspected stain and place in an extraction tube.

Add a minimum amount of water that is commensurate with the needs of the test being performed.

Note: Addition of excessive extraction fluid serves only to reduce the concentrations of analytes.

Soak stain.

Note: The soaking time will depend on the observed concentration of the stain. Highly concentrated stains will need a minimal soaking time (i.e. 30 minutes or less) while less concentrated stains will need a longer soaking time (i.e. 30 minutes or longer).

If needed, agitate tube and quick spin. This can be done by hand, vortex or sonic shaker.

Note: Vortexing or sonicating should be performed at low speeds.

Remove the portion of the substrate and place into the basket portion of extraction tube. Place the basket into the extraction tube.

Centrifuge the extraction tube at high speed for approximately 5 minutes.

The supernatant can now be used for testing. If microscope slide preparation is necessary, proceed to 1.7.9.2.

1.7.9.2 Slide Preparation

Withdraw the solid sediment from the bottom of the extraction tube.

Smear the solid sediment onto a small area of a clean glass slide.

Note: If sediment appears too concentrated, dilute with a small amount of supernatant.

Heat fix at low temperature.

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The slide is now ready for staining.

1.7.9.3 Known Samples

1.7.9.3.1 Liquid Blood and Blood Cards

Samples to be prepared will be processed one at a time.

If the sample is liquid, rock the blood tube manually or on a rocker to make the sample homogeneous.

Aliquot the liquid blood onto the appropriately labeled bloodstain card.

Allow to air dry.

Remove a portion of a blood card circle and place it into the appropriate receptacle for the DNA extraction process.

1.7.9.3.2 Buccal Swabs

1.7.9.3.2.1 Foam swab

Samples to be prepared will be processed one at a time.

Remove a portion of the tip of the foam swab and place it into the appropriate receptacle for the DNA extraction process.

1.7.9.3.2.2 Toothbrush/Saw-tooth swab

Samples to be prepared will be processed one at a time.

Remove a portion of the "teeth" and place it into the appropriate receptacle for the DNA extraction process.

1.7.9.3.2.3 Cotton swab

Samples to be prepared will be processed one at a time.

Remove approximately ½ of the swab and place it into the appropriate receptacle for the DNA extraction process.

1.7.9.4 Products of Conception (POC)

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The Product of Conception (POC), a known sample from the mother, and a known sample from the suspected father are often necessary for a full evaluation of potential relatedness in criminal paternity cases.

Upon submission, the POC must be stored frozen until you are ready to begin your examination. Keep in mind that certain preservatives used in collection (formaldehyde, formalin, etc.) may inhibit any DNA analysis. The analyst may use discretion on accepting any POC's that were stored in preservative.

Completely thaw the POC. Process immediately after thawing as freeze/thaw cycles will cause sample degradation.

Place the POC into a large weigh boat or other type of container.

If recognizable body parts are observed (the use of a stereomicroscope may be necessary), document accordingly.

Select a larger portion than needed for analysis, and wash with deionized water or TE⁻⁴ in order to remove any potential fluids from the mother.

Collect a small washed sample and retain in the appropriate extraction receptacle for the DNA extraction process.

If no recognizable body parts are observed, three separate samples may be collected in an attempt to obtain a DNA profile. When selecting samples, look for differences in appearance, size, consistency, etc. of the POC. The wash step mentioned above may be utilized if deemed necessary. Collect the sample(s) in the appropriate, separate extraction receptacles for the DNA extraction process. If recognizable body parts are not observed, the analysis may be halted, or a pathologist consulted, at the analyst's discretion.

Freeze the sample until DNA analysis is performed. If transporting to another laboratory, the sample(s) must be maintained frozen.

1.7.9.5 Tissue

Upon submission, the tissue must be stored frozen until you are ready to begin your examination. Keep in mind that certain preservatives used in collection (formaldehyde, formalin, etc.) may inhibit any DNA analysis. The analyst may use discretion on accepting any tissue that was stored in preservative.

The tissue may remain frozen if an acceptable sample can be removed. If not, completely thaw the tissue. Process immediately after thawing as freeze/thaw cycles will cause sample degradation.

Collect the sample(s) in the appropriate receptacle for the DNA extraction process.

Freeze the sample until DNA analysis is performed. If transporting to another laboratory, the sample(s) must be maintained frozen.

1.7.9.6 Hair Roots

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If root material is observed and appears to be appropriate for nuclear DNA analysis, then a photograph of the hair can be taken before and after the removal of the root for documentation purposes.

Remove approximately 1 cm from the root end and place into the appropriate receptacle for the DNA extraction process.

If hairs can reasonably be considered a part of the same event and they have consistent gross physical characteristics, then more than one root may be placed into the same DNA extraction receptacle. This may increase the possibility of achieving a higher concentration of DNA.

1.7.10 Biology Reports

A report shall be generated in accordance with the Forensic Science Division Quality Manual. The report shall contain an itemization of all evidence received and conclusions drawn from the analytical tests conducted.

The report will reflect all items retained for DNA.

1.7.11 Body Fluid Identification Case Technical Review

Completion of Body Fluid Identification Casework technical reviews shall be documented through the Forensic Advantage case review screen. Approval of the technical review indicates approval of each element, where applicable, as listed below:

- all case notes and worksheets that support the conclusions drawn in the report
- all controls used to verify the function of chemicals and reagents
- the final report to verify that the results and conclusions are supported by the data and that all items are addressed

1.7.12 Biology exam requests that do not require a Biology report

1.7.12.1 Scope

Any case submitted under the following criteria, shall not have a Biology case record report issued:

- Items of evidence where a suspected body fluid is not anticipated (e.g. contact swabs from guns, handles, steering wheels, etc.)
- Items of evidence where a suspected body fluid may be anticipated, but additional body fluid screening is not necessary (e.g. gum, chewing tobacco, glasses, pop cans/bottles, cigarette butts etc.)
- Reference samples for comparison (e.g. buccal swabs, blood cards that have been prepared prior to submission to the laboratory, presumed known reference samples, etc.)

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Note that any case that requires testing for the presence of a bodily fluid(s) requires that a Biology report be issued. Analysis of clothing items (including gloves, masks, shoes, etc.) for the identification of the wearer also requires that a Biology report be issued.

For possible deviations to this procedure, or for evidentiary items that are less common or are infrequently submitted to the laboratory, analysts shall consult with a supervisor and the technical leader to determine whether a report should be issued.

1.7.12.2 Exam assignment

Records that fall into the above categories that are assigned a biology exam in FA shall be reassigned to a "Cut-and-send DNA" exam.

- Open Case Record Details
- Choose "Requested Exams" tab
- Highlight the Biology Exam and select remove
- Select "Add", followed by "Cut-and-send DNA"/appropriate submission #/RFLE and select OK
- Save and close

1.7.12.3 Pre-DNA processing

Appropriate collection and/or cuttings of the above listed items shall be properly documented (reference Body Fluid Identification manual, section 1.7.3.8) in a DNA FA worksheet and placed into the standard DNA extraction tubes.

- Open the case record
- Enter "C/S" into the "Discipline #" field of the case record details tab
- Choose "Worksheet" tab
- Select "Assign Evidence" at the top of the screen and check the appropriate items, including items/containers that will not be examined
- Press save and close
- Highlight the evidence item(s) and select Worksheet : New Worksheet : DNA – New
- Under Kit select Powerplex® Fusion
- Choose the item in the drop down
- Select "other" under the conclusion
- Press OK to pop-up warning
- Type in applicable notes for the item, including quantity, a brief description, cutting size, areas swabbed, the disposition of the item to another unit in the laboratory, DNA identifier, and the pre-DNA processing analyst's name in the available space. Multiple lines of text may be included if necessary.
- Repeat for additional items as necessary. The worksheet shall address each item received to Biology under the corresponding submission, with unexamined items present in the worksheet and clearly marked as unexamined.
- Submit (Do not generate statements at the bottom so the notes do not generate into the report)

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The tubes shall be labeled with the unique identifier and brief item description. The same labels used on the tubes shall be placed on the outside of a standard manila envelope and/or submission paperwork. The DNA submission envelope or paperwork shall be scanned and the file placed into the case record object repository. The tubes shall be placed into the manila envelope or other suitable storage container, sealed and transferred to a DNA laboratory for testing. When pre-DNA processing is complete, the work shall be checked for accuracy by a second individual.

1.7.12.4 Administrative Check

The administrative check shall consist of confirming that the DNA envelope (or DNA label documentation) is present in the case record object repository, documents the correct samples, and exhibits correct identifiers, accurate descriptions, the processing analyst's initials, and the date of preparation. The administrative check also includes a review of the Request for Laboratory Examination (FSD-007) to ensure submission details have been correctly entered into Forensic Advantage (FA), and a review of the FA worksheet to ensure all items under the Biology submission are present and that the appropriate documentation has been included. Documentation of this administrative check will be recorded in FA by utilizing the "Administrative Check" review function.

- Open Case Record Details
- Choose "Actions", followed by "Manage" and "Reviews"
- Select "Actions" in the Review tool bar
- Select "Request New Review"
- In the Details tab, choose "Administrative Check" from the review type dropdown

The case record in FA shall be transferred to the assigned laboratory or DNA staff member. Reference DNA manual, section 2.14.9, for the reporting procedure for DNA analysts.