

LAB REPORT

*Nebraska State Patrol
Crime Laboratory*



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EVIDENCE RECEIPT HOURS

MONDAY - FRIDAY

9AM - 4PM

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The Mission of the Crime Laboratory Division is to provide quality and timely forensic science services to the State of Nebraska. To fulfill the mission of the laboratory, the following objectives are supported and understood by the staff of the NSP Crime Laboratory:

To provide timely, effective and and impartial forensic services to aid in the investigation of crimes; To provide relevant, professional and impartial testimony in judicial proceedings; To disseminate scientific information and educate the criminal justice community regarding forensic science matters; To provide traceable and accurate results that are pertinent to the needs of the criminal justice community.

ABOUT US

OUTREACH COMMITTEE

The Crime Lab has created an Outreach Committee to help better serve our criminal justice community. One of our first steps is bringing back the newsletter for a more consistent way of communicating with our customers. We are also working to develop a more consistent approach for presentations to our legal partners, law enforcement, and students. A long term goal, due to the ongoing construction, is to establish a consistent tour for our customers and for students interested in working as a Forensic Scientist one day!



This newsletter is for your benefit. If you would like to see more information on a specific topic, please email the newsletter editor at NSP.CrimeLab@nebraska.gov.

LAB EXPANSION

Update

The Crime Lab is about halfway through the facility expansion project with just under a year to go. The first wing of the expansion, covering Controlled Substances and Toxicology, should be ready for move-in around the first of the year. The second wing, covering Biology and Latent Prints, is scheduled to be finished in mid to late winter. The administrative and evidence receiving area, the final wing, is planned for completion in early to mid spring. The remainder of the project will be renovations within the existing facility to allow for the expansion of Firearms/Toolmarks as well as reworking areas of Biology and Controlled Substances. Thank you for your patience and understanding as we work through logistical challenges associated with the project.

Lab Capabilities

In each section's page below, you can find a description of the purpose and/or capabilities within that discipline. Some of these have changed since the last newsletter in 2018, so please take time to familiarize yourself with the provided information.



STATISTICS

In addition to casework, analysts are often involved in activities such as testimony, attending or providing training, community outreach, instrument maintenance, method validations, and other quality assurance practices.

TURN-AROUND TIMES

41**CONTROLLED SUBSTANCES
NUMBER OF DAYS****175****FIREARMS/TOOLMARKS
NUMBER OF DAYS****59****BIOLOGY - VIOLENT CRIMES
NUMBER OF DAYS****252****LATENT PRINTS
NUMBER OF DAYS****98****BIOLOGY - NON-VIOLENT CRIMES
NUMBER OF DAYS****34****TOXICOLOGY
NUMBER OF DAYS**

Turn-around times may be impacted by requests for examinations that need to be completed by other sections first.

QUALITY ASSURANCE & CASE MANAGEMENT

Quality Assurance:

The Quality Assurance Section manages all aspects of the laboratory's Quality Assurance System to ensure analyses, reports and testimony provided for law enforcement agencies are accurate, impartial, and relevant. Areas of the Quality Assurance System include document control, case file review, performance monitoring (proficiency testing), testimony monitoring, auditing, risk evaluation, and corrective action activities. The section is responsible for ensuring the laboratory maintains its international accreditation status.

Case Management:

The Case Management Section of the laboratory provides numerous services to both internal and external customers. Primarily, Forensic Technicians assigned to the section are responsible for receiving and releasing evidence from law enforcement agencies throughout the state of Nebraska. Evidence is submitted in person by agency representatives or through postal delivery. Every submitted item of evidence is assigned a unique laboratory number, barcoded, and tracked while in the possession of the Crime Laboratory. Staff in the section transfer thousands of evidence items annually to and from the secure evidence location as they are requested by the laboratory analysts.

The Forensic Technicians also manage the case records/reports related to the analyses on the evidence submitted. Staff members distribute completed case reports to appropriate criminal justice entities and through review and archiving, ensure case files are complete, tracked and available if needed for court or other purposes.

The third main function of the Case Management section is to provide administrative support. From routing incoming phone calls and greeting numerous visitors to responding to document requests from attorneys, the Case Management staff provides vital services to ensure the NSP Crime Laboratory functions at the highest possible level.

BIOLOGY-CASEWORK

The Biology-Casework Section can identify blood, semen, and saliva through use of presumptive and/or confirmatory testing. Most often with Sexual Assault Kits (SAKs), the analysts will utilize the Y-screen method to identify the presence of male DNA on samples; semen testing is not routinely performed on SAKs. The Y-screen method has been proven to be more effective in both accuracy and efficiency, providing you higher quality results in a more timely manner. However, if your case depends on the presence or absence of a body fluid that was not tested (e.g., semen in an SAK), please give the Biology Unit a call to discuss options.

Another tool the analysts have in-house is the M-Vac. This works like a carpet cleaner to collect trace DNA from items of evidence that are less conducive to swabbing either due to their large surface area or the texture of the item. This collection method is primarily reserved for cold cases and/or items of evidence that are difficult to swab.

While the analysts typically do not examine hairs/fibers for a variety of reasons, the NSP Crime lab can perform DNA testing on the roots of apparent hairs. Analysts are trained to identify whether or not a root is present on the apparent hair and can also use their training and experience to identify which apparent hairs are or are not suitable for the DNA testing performed at the lab.

For DNA testing, the PCR-STR (Polymerase Chain Reaction – Short Tandem Repeat) method is utilized. This type of testing makes millions of copies of small sections of the DNA so it can be visualized with software. Once it can be visualized, analysts will determine the number of people detected that contributed DNA to the item of evidence and whether or not it is suitable for comparison. If it is suitable, comparisons will be made to known reference samples utilizing a statistical analysis.

In cases—most often sexual assaults—in which there is a large amount of female DNA compared to the male DNA, Y-STR (Y-Chromosome Short Tandem Repeat) testing can be done. This method focuses only on the male DNA in a sample. One of the limitations to this testing is that the lab is currently not uploading Y-STR DNA profiles into the Combined DNA Index System (CODIS), so comparisons cannot be made without reference samples.

Lastly, while the Biology Unit cannot currently perform paternity testing analysis, the analysts can run reference samples through the DNA process and provide you with the DNA profiles of the individuals. The analysts will then provide you contact information to another lab that can perform paternity or kinship analysis. This will save your agency money on processing costs at the other labs.

CONTROLLED SUBSTANCES

The Controlled Substances Section tests for the presence of controlled substances in multiple forms through the use of presumptive and confirmatory testing.

What we can test:

- Powders and solids
- Residues (pipes, foil, straws)
- Liquids (syringe flushes, tampered drinks, liquid pharmaceuticals)
- Plant material suspected to be marijuana, psilocybin mushrooms, khat, or kratom
- Food products or edibles suspected to contain psilocybin (NOT THC)
- Paper suspected to contain synthetic cannabinoids, LSD, or another controlled substance
- Clandestine tablets and capsules
- Pharmaceutical tablets and capsules (if imprint shows tablet/capsule to be a controlled substance)

In addition to the general analysis of controlled substances, the section has the capability to perform quantitative (purity) analysis of methamphetamine as well as performing 1% THC Decision Limit analysis to determine if plant material is above 0.3% delta-9 THC and therefore considered marijuana. Both of these types of analysis take approximately 2 to 3 times longer than general controlled substance analysis.

There are numerous instruments utilized in the controlled substances section to detect and confirm controlled substances. Those instruments are Gas Chromatograph (GC), Gas Chromatograph/Mass Spectrometer (GC/MS), Fourier Transform Infrared Spectrophotometer (FTIR), Ultraviolet-Visible Spectrophotometer (UV-Vis), and light microscopes.

In addition to analysis of samples submitted, the controlled substance spends a considerable amount of time testifying in court. The section's caseload represents roughly 60% of the total cases received by the lab annually, resulting in an equally high number of subpoenas and testimony being provided by the analysts. We receive subpoenas from all 93 Nebraska counties, and routinely provide testimony in Federal trials in both Lincoln and Omaha.

BIOLOGY-DATABANK

The Biology Databank Section is responsible for the processing of DNA samples from qualifying convicted offenders in accordance with the Nebraska DNA Identification Information Act and the Sex Offender Registration Act. The Biology Databank Section does not currently have a backlog and the average turn-around time for offender DNA sample processing is 10 days.

The Databank team performs the following tasks as part of the DNA sample processing of convicted offenders:

- Provides training to DNA collection agencies to ensure high quality samples
- Accessions the offender samples and verifies qualifying offenses
- Performs DNA analysis on the accepted samples
- Enters the DNA profiles into the Combined DNA Index System (CODIS) DNA Database

The Nebraska State Patrol Crime Laboratory is the only laboratory in Nebraska with access to the FBI's CODIS software as well as the National DNA Database. The Supervisor of the Biology Databank Section serves as the CODIS Administrator and is responsible for ensuring the integrity and security of the DNA database for Nebraska. The CODIS software searches DNA profiles from offenders, crime scene evidence, missing persons, unidentified human remains, and relatives of missing persons against each other. These searches may result in State and/or National CODIS Hits that provide investigative leads to law enforcement agencies, making it an invaluable tool. To date, CODIS has aided ~2000 Nebraska investigations by linking serial crimes together and to known offenders.

The Databank team performs the following tasks relating to CODIS:

- Serves as the State CODIS Administrator and Alternate CODIS Administrators
- Ensures compliance with federal and state law, federal quality assurance standards, and laboratory policies/procedures to produce high quality DNA testing results and maintain the security and privacy of the DNA records
- Evaluates CODIS matches and performs hit confirmations as necessary
- Issues CODIS Hit Letters
- Performs routine maintenance on the CODIS Server and DNA database

FIREARMS/TOOLMARKS & FOOTWEAR/TIRE TREAD

The Firearm/Toolmark Section conducts a wide range of examinations related to firearms, tools, footwear, and tires. Comparative analysis is one of the core capabilities of the section, utilizing specialized microscopy equipment, computer software, and other magnification and visual enhancement methods to issue conclusions regarding the potential sources of items left behind at crime scenes. Additional capabilities include photographic and chemical processing to detect and enhance the presence of evidence that is difficult to see, specialized database queries to provide investigative leads, and the use of measurement equipment to classify and assess the physical attributes of recovered evidence items. A more detailed list of examination capabilities follows:

Firearms

- Classification (make/model/caliber/origin, novelty items that mimic or have been modified into firearms, parts/accessories, homemade suppressor features)
- Operability testing (including detection of modifications and/or malfunctions)
- Overall length and barrel length measurements
- Comparison to fired ammunition items
- Gunshot residue analysis (range estimation between muzzle and target)

Ammunition items (cartridges, cartridge cases, projectiles, shotshell components)

- Classification (caliber, brand/style, origin, composition)
- Comparative analysis to other ammunition items or potential source firearms
- Database and other make/model queries to determine potential firearm sources

Tools/Toolmarks

- Classification (brand/style/intended use)
- Intercomparison of toolmarks and comparison to potential source tools
- Fracture/physical fit analysis (e.g., rigid objects made of metal, plastic, wood)

Serial Number Recovery (firearms, tools, other objects of value)

- Application of magnetic and chemical processing to recover defaced characters
- Unmasking/retrieval of hidden serial numbers
- Discovery of factory codes cross-referenced to original serial number
- Deciphering of barcodes, quick response (QR) codes or other encoded source information

Footwear & Tire Impressions

- Intercomparison of impressions and comparison to potential source footwear/tires
- Database and other make/model queries to determine potential footwear/tire sources

LATENT PRINTS

The Latent Print Section processes porous and non-porous items of evidence for presence of friction ridge detail:

- Porous items (e.g., paper, cardboard, raw wood) are most commonly processed with Acetone Ninhydrin, Aqueous Ninhydrin or 1,2 Indanedione, while thermal paper (e.g., receipts) is processed with PDMAC.
- Non-porous items (e.g., glass, plastic, Plexiglas, metal) are processed first by superglue fuming, and then by using fluorescent dyes. The items are also examined under the ALS (Alternate Light Source), Lasers (Green and Blue), RUVIS (Reflective Ultraviolet Imaging System), and/or FSIS (Full Spectrum Imaging System).

The Latent Print Section also recently added a DCS5 (Digital Capture System 5) workstation which allows for full examination of items of evidence from shortwave UV to Infra-Red light spectrum. Another component of the DCS5 we acquired, called CSU (Cylindrical Surface Unwrapper) allows for capture of impressions located/developed on cylindrical items. The CSU rotates the item of evidence and acquires an impression by capturing an image at every 3 degree rotation, then stitches those images together. This process transforms an impression located on a 3-dimensional item into a 2-dimensional, flattened image with minimal distortion and free of commonly encountered hotspots.

Both RUVIS and FSIS allow for examination of evidence without prior superglue fuming, fingerprint powdering or chemical processing. However, the surface of the items suitable for RUVIS and FSIS examination has to be non-porous, reflective and free of texture. Both devices are non-destructive to the physical appearance of the items of evidence; however, the prolonged exposure to shortwave UV light is damaging to any DNA evidence and therefore cannot be utilized if DNA analysis is also warranted. Both RUVIS and FSIS are extremely beneficial in examining items of high monetary or sentimental value (e.g., electronics, antiques, collectibles, heirlooms).

Any received/developed latent impression(s) deemed to contain sufficient quality and quantity of friction ridge detail suitable for comparison purposes are photographed using a digital SLR or mirrorless camera. Digital images are further processed in Adobe Photoshop CC for the best quality ridge detail.

Any latent impressions determined to be Of Value (OV) for comparison purposes are submitted for search of the Nebraska AFIS database, and/or of the FBI's NGI database. Please contact the Latent Print section with any questions relating to proper collection, packaging, submission, and suitability for latent print examination.

TOXICOLOGY

The Toxicology Section tests for drugs and drug metabolites (chemical alteration of substances within the body which results in the formation of a metabolite that is excreted in the urine) from urine.

The primary submissions to the toxicology section are Driving Under the Influence of Drug (DUI-D) cases. If there is credible suspicion an individual was drugged, the section will also test urine from suspected drug facilitated sexual assault (DFSA) victims. The Nebraska State Patrol Crime Lab (NSPCL) does NOT perform blood alcohol testing; that testing is done by the Nebraska Department of Health Environmental Laboratory located in a different facility and not affiliated with the NSPCL.

What a forensic toxicologist can and cannot determine or testify to regarding identification of substances in urine:

- Can determine if the subject ingested a substance at some point
- Can provide general information regarding the known effects of a particular drug
- Cannot provide a time of ingestion
 - Can offer general information regarding how long a substance can be detected in the urine after ingestion
- Cannot provide information regarding impairment
 - Detection cannot determine whether the individual was impaired by the substance at any time; this is true even when concentration is also determined
 - Prosecution of DUI-D cases should rely on observation of erratic driving and field sobriety or Drug Recognition Expert (DRE) evaluations with detection of the substance used as corroborating information

Because Title 177, Chapter 7 of the Nebraska Administrative Code, which is administered by the Department of Health and Human Services (DHHS), regulates DUI-D testing and specifies urine as the body fluid allowed, it is the only body fluid tested for drugs and drug metabolites at the NSPCL.

In addition to specifying the body fluid for testing, Title 177, Chapter 7 lists requirements for training, permitting, and proficiency testing.

For samples with offense dates prior to August 13, 2025, the Title also lists cutoffs for a few specific drugs. These cutoffs were intended to prevent false positive results when the Title was written years ago and have no correlation to impairment. Changes to the Title, effective August 13, 2025, have removed cutoffs for all substances.

The NSPCL testing complies with all requirements listed in Title 177, Chapter 7.

FUN FACT



Backloggers

Did you know...

THE CRIME LAB HAS ITS VERY OWN SAND VOLLEYBALL TEAM CALLED THE BACKLOGGERS!

THE TEAM IS OPEN TO THE ENTIRE LAB. WE HAVE AT LEAST TEN PLAYERS EACH SESSION AND ADDITIONAL EMPLOYEES THAT COME CHEER US ON!

WE ENJOY THE MENTAL BREAK FROM THE SERIOUS NATURE OF THE JOB AND GETTING TO CONNECT WITH TEAMMATES WE DON'T SEE ON A DAILY BASIS.



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General Lab Questions?

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Want more information on a topic in a future newsletter?

EMAIL THE NEWSLETTER EDITOR: NSP.CRIMELAB@NEBRASKA.GOV

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