

Crime Laboratory Division History

The Missouri State Highway Patrol Crime Laboratory opened in May 1936, in Jefferson City, only five years after the inception of the agency itself. Very early in the history of the Patrol, forensic science was recognized as an essential element of the criminal investigation process. The Patrol's laboratory was one of the first crime laboratories in the country. The lab was first located in two rooms within the Broadway State Office Building. In 1963, the laboratory moved into 4,000 square feet of space in the basement of the new General Headquarters building on Elm Street in Jefferson City. It moved again in October 1979, this time into 11,000 square feet of the Annex Building, on the General Headquarters campus. Over the years the General Headquarters lab has acquired additional space within the annex building and has added on to the building, expanding the size of the lab.

The facility at GHQ was originally constructed to accommodate a staff of 15 personnel and an annual caseload of 2,500 cases. Today, the lab houses 64 criminalists and technicians with an annual caseload of over 6,000 cases and 14,000 Combined DNA Index (CODIS) samples. Over the years, the laboratory has expanded into a system of strategically located crime labs by the addition of six satellite laboratories in St. Joseph, Park Hills, Cape Girardeau, Willow Springs, Springfield, and Carthage, and has an annual caseload of over 25,000 cases.

The Crime Laboratory Division (CLD) is accredited by the ANSI National Accreditation Board (ANAB). It was first accredited in 1984 and was the 23rd laboratory in the nation to earn this distinction. The accreditation community has since changed their focus toward international accrediting criteria commonly referred to as ISO accreditation. CLD achieved this international accredited status in 2011. The accreditation process now involves internal annual reviews, biennial external DNA audits, annual focused surveillance visits by the accrediting authority, and a comprehensive external inspection of the entire laboratory operation every four years by ANAB assessors. The purpose of the accreditation process is to demonstrate that the laboratory is complying with required accreditation standards and criteria, thus ensuring that examinations are being conducted by qualified examiners within a highly functional quality management system.

The General Headquarters Laboratory

At the start of its operation, the Patrol Crime Laboratory was manned by uniformed officers of the Patrol. This continued until the first two civilian chemists were hired in 1962. The first chemist hired, Afton Ware, preceded Frank Durham, the second chemist hired, by only one month. For the first 20 years, the chemists were "generalists". They performed blood alcohol, chemical, drug, microscopic, and trace evidence testing. Other non-chemistry analyses such as firearms functioning, toolmarks, and fingerprints were still analyzed by trained uniformed officers at that time.

"Essentially, it was on-the-job training. Afton and I visited the St. Louis City Lab and the St. Louis County Coroner's Lab. They gave us some of their procedures. And, we had

books in the laboratory library that helped us,” said retired Criminalist Supervisor Frank Durham of his training during a 2006 interview.

In the late 1960s, firearms, toolmarks, and fingerprint examinations began to transition to civilian examiners. In 1968, Tom Buel, who had been the Patrol’s civilian photographer since 1965, added firearms, toolmarks, and footwear to his duties. In 1975, he began a two-year apprenticeship program in questioned documents, which was taught by the Crime Lab’s director, Captain Kenneth Miller. In 1974, Don Lock was hired to perform latent print examinations and, along with Tom Buel and August Nilges, began analyzing questioned documents. Lock had previously worked in the Patrol’s Criminal Records Division classifying and identifying inked prints. In 1987, he became the supervisor of both the Questioned Documents and Latent Print sections of the laboratory.

In the early 1980s, chemists became more specialized because increasing workloads and advances in technology made it impractical to be a generalist. During that time, the Serology Section of the laboratory, which was using polymorphic enzyme comparisons and blood typing, started making advances that would lead to the development of the present DNA casework section.

“They can do so much more now than we could do then. ... there were times we could not say there was definitely a match. Now, with DNA, they can make positive matches. The instrumentation is much more involved. Initially, a lot of the chemical procedures were very tedious and took a long time. It isn’t easy now, but it’s different,” said Durham (2006).

Today, the General Headquarters laboratory is a full-service crime laboratory that provides services in firearms and toolmarks, latent prints, trace evidence, DNA casework, DNA databasing (CODIS), drug chemistry, impressions, and toxicology.

Expanding the Lab System

There have been three distinct phases of expansion of CLD. The first phase occurred in the 1970s at Macon (Troop B), Willow Springs (Troop G), and St. Joseph (Troop H).

The first satellite laboratory opened in February 1975 in the basement of the Troop G Headquarters. In September 1997, crime lab staff moved into a new laboratory facility built on the grounds of Troop G Headquarters.

The Troop H Satellite Laboratory, located on the grounds of Troop H Headquarters, and the Troop B Satellite Laboratory, located on the grounds of Troop B Headquarters, both opened in February 1977. In 1988, additions to each original laboratory structure nearly doubled the space of each laboratory.

The second phase of expansion occurred in the early 1990s. The Troop C Satellite Laboratory was opened in January 1992. The laboratory was originally operated as the Jefferson County Regional Crime Laboratory under the authority of the Jefferson County Sheriff’s Department. It was located on the campus of Jefferson College in

Hillsboro, MO. When the regional laboratory closed, the previous management requested that the Patrol take over the operation of the laboratory. A new laboratory facility was constructed in April 1999, on the campus of Mineral Area College in Park Hills, MO.

The Troop D Satellite Laboratory opened in January 1993, to serve the Patrol's needs in the southwest Missouri region. Soon afterward, the Springfield Police Department elected to close its regional crime laboratory. A merger occurred between the Springfield Police Department's regional crime lab and the Troop D Satellite Lab, resulting in the Patrol crime lab system taking over the functions of the regional lab.

The third phase of expansion occurred in the mid-2000s. In 2006, the Southeast Missouri Regional Crime Lab in Cape Girardeau became part of CLD. It is located near the campus of Southeast Missouri State University (SEMO). On July 1, 2006, the seven employees of the SEMO Regional Crime Laboratory officially became employees of the Patrol.

The SEMO laboratory was originally founded under the leadership of Dr. Robert C. Briner in 1970, through funding received from a federal grant program. It operated under the administrative auspices of Southeast Missouri State University. For over 30 years, the SEMO lab was funded by federal and state grants, as well as through local agency fees for service. Relying on these uncertain funding sources made it increasingly difficult for the SEMO Regional Crime Laboratory to maintain the services needed by the local law enforcement community. Through the efforts of Senator Rob Mayer, Senator Jason Crowell, and Representative Scott Lipke, funding was provided to merge the SEMO Crime Laboratory into CLD. Governor Matt Blunt approved the merger and signed the budget, establishing the funding to make this merger possible.

In 2007, the Missouri Southern State University (MSSU) Regional Crime Lab, located on the campus of MSSU in Joplin, became part of CLD. The MSSU Regional Crime Laboratory was founded under the leadership of Dr. Phillip Whittle in the 1970s through funding received from a federal grant program. The laboratory served many law enforcement agencies in southwest Missouri and adjacent parts of Oklahoma, Arkansas, and Kansas.

For over 30 years, the MSSU Regional Crime Laboratory was funded by federal and state grants, as well as through local agency fees for service. As was the case with the SEMO Regional Crime Laboratory, relying on these uncertain funding sources made it increasingly difficult for the MSSU Regional Crime Laboratory to maintain the services that the local law enforcement community needed. Through the efforts of Senator Gary Nodler, funding was provided to merge the MSSU Regional Crime Laboratory into CLD. Governor Matt Blunt approved the merger and signed the budget, establishing the funding to make this merger possible.

On June 1, 2007, the seven employees of the MSSU Regional Crime Laboratory officially became employees of the Patrol. In 2009, the Missouri Southern State University reallocated the rooms occupied by the crime laboratory. In response to losing

this facility, a new laboratory was built in Carthage at the local Troop D Service Center. The new 6,000-square-foot facility opened for business in September 2010.

In 2008, a new lab facility was constructed in Springfield, which involved the rehabilitation of a 1920s era warehouse in an area of Springfield undergoing revitalization. The laboratory was built using a combination of state, local, and federal funds. While the previous Troop D laboratory only performed solid dosage drug analyses and blood alcohol determinations, the new 30,000 square foot facility became a full-service crime lab offering all forensic disciplines, including drug chemistry, toxicology, trace evidence, latent prints, firearms, toolmarks, impressions, and DNA.

The new Troop E Satellite Laboratory achieved accreditation through the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) in 2008 and gained approval from the FBI to participate in the CODIS DNA database shortly thereafter.

In June 2016, an evidence intake kiosk was opened inside Troop A Headquarters in Lee's Summit. This facility did not provide forensic testing services, but facilitated evidence transfers with law enforcement agencies. In August 2021, an evidence locker system was made available to law enforcement agencies. This evidence locker system enabled law enforcement personnel to submit evidence securely, efficiently, and effectively to the laboratory system without encumbering on-site resources of laboratory personnel. In May of 2025, a new evidence locker system was added to the new Troop A Headquarters in Lee's Summit.

In fall 2019, an evidence locker system was installed at the Troop G Satellite Laboratory in Willow Springs. In January 2021, an evidence locker system was installed at the Troop D Satellite Laboratory in Springfield. In June 2021, the Troop B Satellite Laboratory transitioned from a forensic testing laboratory to an evidence intake kiosk, and an evidence locker system was installed inside Troop B Headquarters. An evidence locker system was installed at the Troop D Carthage Laboratory in 2025.

Today, CLD consists of seven forensic testing laboratories and two evidence intake kiosks. The division employs 136 full-time employees divided among those nine facilities.

Developing DNA Analysis Capabilities

One of the most transforming changes made at CLD was the development and implementation of human DNA analysis in criminal casework and human DNA profiling to provide statistics-based investigative leads to criminal investigators.

Colonel C.E. Fisher attended a meeting in 1988, where a new testing procedure that "typed" a person's DNA was discussed. Col. Fisher returned to Jefferson City and discussed with Laboratory Director Lieutenant Frank W. Burkhead the pros and cons of DNA typing. They agreed the CLD should be on the cutting edge of technology and that the timing was right for implementation of this new technology in Missouri.

Soon after this discussion, the FBI Laboratory began soliciting applicants for their Visiting Scientist Program at their research lab at the FBI Academy in Quantico, VA. This program was instituted so state and local forensic scientists from the United States could work together with FBI researchers to develop a national system for analyzing human DNA. All participants would be taught the same techniques and procedures for typing human DNA. Since all the labs in the country would be using the same techniques, their results would be compatible and could be incorporated (eventually) into a national DNA database. The FBI benefited by developing a consistent analytical system and by utilizing the labor of the scientists from the participating labs to develop a national DNA population database that could be used to calculate the rarity of a DNA type. In April 1988, Lt. Burkhead received one of the applications and discussed with Tom Grant, the supervisor of the CLD's Serology Section, the possibility of applying. Grant submitted the application and in July 1988, the FBI sent a letter confirming that he had been chosen as one of the first visiting scientists. His participation included four months of resident service at the research lab in Quantico.

For four months, Grant helped work on the population database and was trained to perform Restriction Fragment Length Polymorphism (RFLP) DNA analysis. His new knowledge helped equip the DNA Section of the laboratory. Lt. Burkhead committed lab funds to purchase the necessary equipment to set up a DNA testing laboratory.

When Grant returned to Missouri in February 1989, the GHQ laboratory was equipped and ready to begin validation of DNA analysis methods. Staff training started and progressed rapidly. On October 1, 1990, the first DNA case was started in CLD. The techniques continued to develop over the years and, in 1999, Polymerase Chain Reaction using Short Tandem Repeats was instituted with casework samples and is the technique still in use today. Over the past 20 years, much has changed in the field of DNA analysis—new techniques, faster turnaround times, and more discriminating results. The DNA Section staff has expanded from three employees in one lab to 40 employees in three labs across the state.

The FBI Visiting Scientist Program may have been the initial link to catapult the crime lab into more advanced DNA sequencing, but over 30 years later the DNA section continues to be on the cutting edge of technology.

Laboratory Specialization

In the mid-1980s, forensic chemists performed all chemistry examinations, forensic serologists performed enzyme typing on stains, and forensic analysts performed latent print, and firearm/toolmark analyses. It soon became apparent that the chemistry and serology disciplines had become too specialized for chemists and serologists to remain proficient in all examinations. In 1986, the Trace Evidence Section and Toxicology Sections were formed. The Trace Evidence Section was formed to analyze hairs, fibers, glass, paint, light bulb filaments, gunshot residue, soil, fire debris, paint, and unknown substances for identification. The Toxicology Section was formed to analyze body fluids for the presence of ethyl alcohol and drugs. The remaining chemists who had primarily analyzed solid dosage drugs formed the Chemistry Section. The result was a full-

service laboratory with six basic forensic disciplines: Chemistry, Toxicology, Trace Evidence, Serology (later DNA), Firearms/Toolmarks, and Latent Prints. The analysis of questioned documents was phased out in 2003.

The DNA Database

In 1991, Senate Bill 578 was passed requiring the collection and processing of DNA samples from convicted felons of certain violent crimes and to record them in a state and national database. The DNA Profiling Section of the laboratory was established to collect and analyze these DNA samples and enter resultant DNA profiles into the state and national DNA database: Combined DNA Index System (CODIS). CODIS allows profiles from known sources to be compared to the DNA profiles from evidence collected at crime scenes in Missouri and nationwide.

The passage of Senate Bill 1000 during the 2004 legislative session (effective January 1, 2005) had a tremendous impact on law enforcement's ability to solve crimes using the CODIS database. This legislation expanded Missouri's offender DNA database law to require collection of DNA from all convicted felons. It has long been known that a large percentage of serious crimes are committed by persons previously convicted of lesser felony offenses. The large increase in DNA profiles from offenders resulted in a tremendous increase in CODIS "hits". For 2004, a total of 41 CODIS "hits" occurred. In 2005, the first year under the "all felon" law, "hits" increased to 175. The law increased annual DNA submissions to CLD from an estimated 2,200 offender samples per year to over 28,000 per year. Additionally, 100,000 DNA samples were required to be collected immediately from prior offenders eligible for past felony convictions. A seven-year plan was instituted to eliminate this backlog of samples and stay current with the new samples arriving. The employees of the DNA Profiling Section were able to eliminate the entire backlog in just two years. Because of their dedication and efficiency, the section was presented with the 2006 Governor's Award for Quality and Productivity in a ceremony at Missouri's Capitol.

In the 2009 legislative session, the database law was expanded again with the passage of HB 152 requiring the collection of individuals arrested for qualifying crimes, as well as those required to register as sex offenders. Prior to the initial legislative expansion in 2005, CLD analyzed a total of 27,211 convicted offender DNA samples. Since the expansion to our current statutory collection requirements (RSMO 650.055), the offender database has grown to over 467,000 profiles.

This offender database is searched against the forensic database, which contains DNA profiles from crime scene evidence and unidentified remains. Seven government laboratories contribute to Missouri's forensic database and those newly entered DNA profiles are searched daily. The power of CODIS resides in its ability to identify perpetrators of unsolved crimes. The database also has the potential to identify repeat offenders, and in doing so, helps reduce or prevent the occurrence of serial crimes. The high degree of certainty that DNA analysis provides has caused it to become one of the most important criminal justice tools ever utilized. DNA is equally effective in

exonerating as it is in convicting the guilty. At the close of 2025, the Missouri DNA Profiling Program had assisted just over 25,000 investigations.

The DNA Profiling Analysis Fund (RSMO 488.5050) was established in 2004 to cover the expenses associated with the database expansion to “all felons”. The law required that a court fee of \$30 be assessed on every felony conviction and \$15 on every misdemeanor conviction in the state. In 2006, the law was revised to require an increased fee of \$60 for higher severity drug offences. The Fund is currently set to expire on August 28, 2029.

A Case Study: Governor Carnahan’s Plane Crash

On October 16, 2000, a Cessna airplane piloted by Randy Carnahan, son of Governor Mel Carnahan, crashed on a heavily wooded hillside south of St. Louis near Hillsboro, MO. Gov. Carnahan and his aide, Chris Sifford, were the other occupants of the plane. All three men were killed in the crash.

Using 10-print cards and the newly developed DNA standards, criminalists could positively identify which biological crash materials belonged to each of the three deceased. Working around the clock, the lab could make many of these identifications in time for the funeral arrangements a few days later. DNA results were eventually used by the Federal Aviation Administration to resolve identification issues with some of the tissue samples they subjected to toxicology examinations.

Additional examinations were performed by the Trace Evidence and Drug Chemistry sections to analyze aviation fuel samples for contaminants and analyze an unknown powder found at the site, respectively.

On March 7, 2001, the Missouri House of Representatives, 91st General Assembly passed House Resolutions 761 through 771, recognizing the exemplary work performed by CLD personnel during this time of crisis. It serves as public testament to their competence and professionalism.

A Case Study: The Joplin Tornado

On Sunday May 22, 2011, an EF-5 tornado struck Joplin, MO. It was deemed the deadliest tornado in the United States since 1953, and the eighth deadliest on record. The total death toll was 162. CLD’s DNA sections (including CODIS) and Latent Print sections were tasked with assisting in identifying victims. Criminalists processed 128 morgue samples and 129 family reference samples, for a total of 257 total DNA samples, in four days. Although most identifications of victims were affected by more traditional means such as medical records, dental records, and fingerprints, five total unidentified human remains identifications were affected by the DNA sections.

Additional Significant Events:

- In 2016, CLD hosted the 45th annual meeting of the Midwestern Association of Forensic Scientists (MAFS). This was the first time the Patrol hosted a MAFS

meeting or any meeting of this magnitude on its own. The meeting was attended by a total of 318 scientists from around the country. In addition to the leadership and planning component of the meeting, seven Patrol criminalists presented papers on interesting cases, research, or backlog reduction strategies. Five Patrol criminalists taught workshops and one criminalist took the American Board of Criminalistics biology certification exam.

- In 2016, the Latent Print Section implemented the AFIS upgrade to MorphoBIS. The MorphoBIS database includes the most current algorithm on the market for AFIS databases. Once implemented, the Latent Print Section experienced a 55 percent increase in “hit rate” in the AFIS database. To put this in perspective: in 2015, the Patrol’s lab system experienced a total of 330 latent print “hits” in AFIS. In 2016, the total was 601 latent print “hits” in AFIS.
- From March through May 2017, the GHQ Toxicology Section underwent a comprehensive remodel. During the 2018 legislative session, the laboratory was budgeted for three new, full-time employees for toxicology. Both factors resulted in an overall increase in throughput and decrease in toxicology backlogs.
- In 2018, the laboratory was given permission to spend approximately \$2.9 million to build an addition to the GHQ laboratory. The facility was completed in 2020. It was designated for DNA operations.
- In 2018, the DNA Casework Section purchased a Rapid DNA instrument. Rapid DNA analysis is a term used to describe the fully automated (hands free) process of developing DNA profiles from a single instrument without human intervention. With this instrument, the laboratory could analyze a single source DNA sample in 90 minutes, a process that previously took over 12 hours.
- In 2018, the Toxicology Section purchased the laboratory’s first liquid chromatography-mass spectrometer instrument to be used for toxicology work. The LC-MS/MS instrument allows criminalists to screen, confirm, and quantify drugs in blood and urine with precision beyond the capabilities of previous instrumentation.
- In 2019, CLD was budgeted five additional, full-time employees to create a new DNA Screening Section. This new section focused on screening sexual assault kits to reduce backlogs.
- In 2020, CLD began outsourcing sexual assault kits to a private vendor. Through two separate grants, A SAKI grant in partnership with the Missouri Attorney General’s Office, and a VOCA grant secured internally, CLD outsourced 2,500 sexual assault kits to affect a more expedited throughput of the case outcome.
- In December 2020, a ribbon cutting ceremony celebrated the completion of an 8,000-square-foot addition to the Crime Laboratory. All areas of the DNA Section were moved into this new area. The increased capacity made the laboratory more

effective and efficient in handling cases. On January 1, 2021, the new DNA Sections were operational and began processing samples. The area of the laboratory previously occupied by DNA Casework and Screening sections was then renovated to accommodate other disciplines.

- During the pandemic of 2020, CLD developed a “no contact” evidence submission/return system and leveraged evidence lockers where they had them installed. CLD employees predominately remained in the workplace with minimal disruption and minimal infection or quarantine. Telework was implemented for predominately digital disciplines such as Latent Prints. Telework for other more analog disciplines such as Drug Chemistry was more challenging but was used to varying degrees.
- On June 30, 2022, Governor Michael Parson signed House Bill 3020 approving the construction of a new \$104.6 million 140,000-square-foot State Crime Laboratory in Jefferson City near the decommissioned Missouri State Penitentiary. The project was to be part of the One Health Campus on Chestnut Street near the existing State Public Health Laboratory. In addition to the new crime laboratory, the One Health Campus will include a \$78.6 million 87,000 square-foot addition to the State Public Health Laboratory that will include laboratories for the Department of Agriculture, Department of Natural Resources, and Department of Conservation. In total, the One Health Campus will total over \$182 million and house nearly 260,000 square-feet of laboratory space. The Crime Laboratory will move into the new facility in January 2027.
- In 2023, Rapid DNA instruments were installed in the Cape Girardeau and Springfield laboratory lobbies and the Division of Drug and Crime Control office at GHQ. Eight additional instruments were purchased. In early 2024, law enforcement use of Rapid DNA was initiated. One of the first uses resulted in the identification of human remains.
- In 2023, six criminalists were promoted to the new designation of criminalist III (criminalist specialist). This new designation requires the criminalist III to meet specific criteria to be eligible for promotion and is aligned with the future vision of compensation, classification, and career.
- In 2024, CLD transitioned to a new Laboratory Information Management System — Versaterm JusticeTrax® LIMS-plus®. This web-based management system enables the division more flexibility and autonomy, and the opportunity to migrate off the legacy Lotus Notes system. Law enforcement agencies now submit evidence to CLD through a software called Portal. With this new system, CLD no longer sends reports through the mail; reports are now downloadable through Portal.
- In 2026, the DNA Casework and DNA Screening sections implemented STRmix™, a highly validated software used to interpret DNA profiles and perform statistical analyses.

Conclusion

The Missouri State Highway Patrol Crime Laboratory Division has been in existence since 1936. According to a biennial report of the Patrol, the laboratory worked 230 cases in 1937-1938. From those humble origins in 1936, the division has evolved into a nationally respected and internationally accredited crime laboratory system that is a recognized leader in state-of-the-art forensic science services in the 21st century.

Since its creation, CLD has accepted submissions from any Missouri law enforcement agency. Presently, approximately 80 percent of the cases received by CLD are submitted by agencies external to the Patrol, such as municipal police departments, county sheriff's departments, and county coroners. Forensic lab services are provided to these submitting agencies at no charge.

Forensic examination of evidence has become essential for the successful investigation and prosecution of criminal cases. In 2025, the crime laboratory received 21,914 cases and issued over 29,000 reports across all forensic disciplines. The laboratory currently employs a total of 136 full-time employees at seven laboratory locations, including two full-service laboratories and two evidence intake kiosks.

CLD employees are highly trained and dedicated to providing quality forensic science services to all law enforcement agencies in the state. These professionals hold over 175 memberships in over 17 different forensic professional organizations to include MAFS, AAFS, SOFT, CLIC, IAI, and AFTE. In addition to their work in the crime laboratory, Patrol criminalists participate as board members, committee members, and assessors for forensic professional organizations (e.g. Organization of Scientific Area Committees, American Society of Crime Laboratory Directors, ANSI National Accreditation Board, National DNA Index System, Midwestern Association of Forensic Scientists, and Missouri International Association for Identification).

Forensic science has been an integral part of the criminal investigation process for many years, and this relationship has only grown stronger through time. The pride and commitment to quality that defined the laboratory in 1936 still endures today.