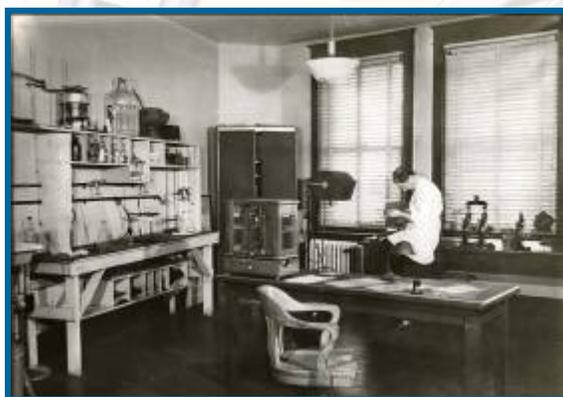


# MINNESOTA DEPARTMENT OF PUBLIC SAFETY

## Bureau of Criminal Apprehension Forensic Science Service

Saint Paul and Bemidji Laboratories

Celebrating 60 Years of Service to Minnesota



THEN  
1947



NOW  
2007

## 2007 Annual Report

*Seeking truth through science.*

*Espouse Science is Neutral*

*Honesty & Integrity*

*Laboratory Excellence*

*Accountability*



# MINNESOTA BCA FORENSIC SCIENCE SERVICE 2007 ANNUAL REPORT



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## Message from Frank C. Dolejsi, Director

### 🕒 **Forensic Science Service Mission, Vision and Values**

**Mission Statement:** “The BCA Forensic Science Service provides quality forensic science services for the Criminal Justice community and fosters partnerships that promote research, education, and overall forensic science laboratory improvement.”

**Vision:** “*Seeking truth through science.*”

**Values:** “Espouse ‘*Science is Neutral*’”, “Honesty and Integrity”, “Laboratory Excellence”, “Accountability.”

### 🕒 **Quality:**

Our commitment to Quality is demonstrated through our Quality Assurance Program. The laboratory system quality manager is Debra Springer; she can be contacted at 651-793-2895 or [debra.a.springer@state.mn.us](mailto:debra.a.springer@state.mn.us). Both the Saint Paul and Bemidji Laboratories are accredited under the American Society of Crime Laboratory Directors/ Laboratory Accreditation Board (ASCLD/LAB) Legacy Program. Visit: <http://www.asclcd-lab.org/> for more information.

### 🕒 **Turn around time:**

Our stated goal is a 30 day turn around time on all cases. Priority is given to homicides, sexual assaults, and other crimes against persons. The average turn around time doesn’t tell the entire story. For example over 95% of alcohol cases are completed in two weeks. With DNA cases 12% are completed in less than 7 days, with 23% completed in less than 30 days. *The bottom line is that we do work with our clients in high profile cases to meet their special needs.*

### 🕒 **Outputs:**

The BCA Forensic Science Laboratories examined over 12,000 cases in Saint Paul and 1,500 cases in Bemidji during 2007. The crime scene team processed 74 crime scenes related to homicides and officer involved shootings.

### 🕒 **Outcomes:**

There were 388 investigations aided through the Combined DNA Index System (CODIS), a database of convicted felons. BCA scientists provided expert witness testimony in 400 court proceedings.

### 🕒 **Professional:**

Along with an outstanding staff of scientists at the BCA, we strive to improve not only our laboratory but our profession. In 2007 I was elected Chair of ASCLD/LAB (a crime laboratory accreditation body) and serve on the Boards of the National Forensic Science Technology Center (NFSTC) and the American Society of Crime Laboratory Directors (ASCLD). Ann Gross and Cathy Knutson serve on the Scientific Working Group of DNA Analysis Methods (SWGDM). Susan Gross serves on Scientific Working Group on Materials Analysis (SWGDMAT). Glenn Langenburg serves on Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST). Terry Laber serves on Scientific Working Group on Bloodstain Pattern Analysis (SWGSTAIN). These scientific working groups set technical guidelines related to their scientific specialties. Jim Iverson serves on the Combined DNA Index System (CODIS) FBI advisory group. Ann Gross serves on the Board of the American Board of Criminalistics (ABC), a forensic scientist certifying body. Susan Gross is on the Board of the Midwestern Association of Forensic Scientists (MAFS) and serves as the newsletter editor of this professional scientific organization. Patrick Warrick is the Minnesota regional representative to the International Association of Identification (IAI).

#### ⌚ **Grants and Projects:**

In order to improve our service the BCA laboratory embarked in a number of projects supported by grants from the Midwest Forensics Resource Center (MFRC) and the National Institute of Justice, as well as other sources.

- **Latent Fingerprints, ACE-V - Glenn Langenburg**

In 2007, research funded through the Midwest Forensics Resource Center (MFRC) was completed on a project investigating the potential for bias effects during latent print examinations. The title of the project was "Testing for Potential Contextual Bias Effects During the Verification Stage of the ACE-V Methodology When Conducting Fingerprint Comparisons". A draft of the results has been submitted for professional publication. In summary, experts and non-experts were given fingerprint comparisons of various levels of difficulty. Participants were not aware that they were participating in a bias experiment. Before comparing the images, participants were separated into three groups: a control group (no bias effect), a low bias group (a report was provided to each participant suggesting an opinion for each comparison trial), and a high bias group (a prominent, internationally recognized expert strongly tried to influence his group by stating his conclusions for each comparison trial). In general, a bias effect was observed. Non-experts were more strongly influenced by the bias than the experts. In particular, non-experts were more influenced by the prominent expert who was providing strong bias suggestions. Experts were also influenced by the bias, but in a very different way. Experts tended to become more conservative and less willing to provide definitive opinions in the bias groups. This stemmed directly from a feeling of being "pressured" and aware of strong suggestion.

- **Blood-Spatter Interpretation, High Speed Video - Terry Laber**

Over 500 individual high speed digital video clips were made of common bloodletting mechanisms such as single blood drop formation, impact spatter, gunshot spatter, expiration, cast-off, projected and contact blood staining. These video sequences were evaluated to better understand the basic dynamics of blood letting events. A set of high speed video sequences has been chosen for distribution to the forensic science community. It is hoped that the outcome will be a significant contribution to the strengthening of the science underpinning Bloodstain Pattern Analysis (BPA).

- **Drugs, Portable Raman Analyzer - Susan Gross**

In 2007, the Drug Chemistry Section was awarded a grant for \$38,000 from MFRC to evaluate a portable Raman unit. The FirstDefender Raman is a portable system that can identify controlled substances. It has the ability to scan through most glass and transparent plastics, thus reducing the operator's exposure to the unidentified substance. This unit was evaluated in the laboratory and a library was created of over 250 substances. The unit will soon be evaluated in the field by BCA agents and other law enforcement personal. Evaluating this system will also increase the possibility of putting additional Raman units in the field.

- **Coverdell Grants – Frank Dolejsi/Jim Dougherty**

The Paul Coverdell Forensic Science Improvement Grants Program offers funding to state and local government agencies to improve the quality and timeliness of forensic science services. The Coverdell grant for 2006 - 2007 was shared between the BCA Laboratory System and the Hennepin County Forensic Laboratory, which make up the three ASCLD-LAB accredited laboratories in the state.

The BCA portion of the Coverdell grant was used to pay for a Forensic Scientist in the Trace section of the Laboratory and a temporary IT support position. Funds from this grant were also used to pay overtime for forensic scientists in sections other than DNA. During the grant period, the average turn-around-time for cases in the Trace section was reduced by 30 days.

- **Auto Theft Grant – Jim Dougherty**

The BCA Laboratory is again participating in the Auto Theft Prevention Grant aimed at reducing auto thefts in the State of Minnesota through education of the public and by providing law enforcement with the tools that will lead to more successful prosecution of auto theft cases. The grant will run through June 30, 2009.

The Laboratory utilizes the grant to fund two Latent Print Technician positions, one in Saint Paul and one in the Bemidji Laboratory. One duty of the Technicians is to process unprocessed latent print evidence submitted to the Laboratory in auto theft cases as well as other property crimes. Utilizing Technicians in this manner frees up time for Latent Print Examiners to perform comparison examinations and identify potential suspects in auto theft cases.

The other major part of the program is to offer Auto Theft Processing Classes which provide instruction to law enforcement agencies in processing recovered vehicles for latent print evidence. The classes are taught by Steve Hagenah, the Latent Print Technician assigned to the Bemidji Laboratory. Classes consist of one full day of instruction, are provided free of charge, and are held at any law enforcement facility willing to host the event. The host agency can choose to invite officers from nearby law enforcement agencies to attend. Each student attending the class receives a latent print processing kit and instructions on various processing techniques, including a segment on photography. Students may also receive POST credits for participating in the Auto Theft Classes. Agencies interested in hosting a class can contact Steve Hagenah at 218-755-6600. The classes will be offered through June 30, 2009.

- **Minneapolis PD DNA Collaborative Project – Staci Bennett**

In 2007, the Nuclear DNA Section entered into a cooperative agreement with Minneapolis where two scientists are being funded by the city and will work only Minneapolis cases. The goal is for better turn around on all Minneapolis Police Department cases ranging from violent crime to property crime. The scientists should be fully trained and working cases by the end of 2008.

- **Safe Neighborhoods Grant – Jim Dougherty**

The Laboratory in Bemidji received funds from Project Safe Neighborhoods (PSN) Grant for the previous three years. The purpose of this grant was to aid law enforcement in the investigation of firearms related crimes. The Laboratory utilized the grant to fund a part time NIBIN Technician position. NIBIN (National Integrated Ballistics Information Network) is a database of images of bullets and cartridges cases. During the first half of 2007, the NIBIN Tech entered a total of 175 exhibits into the NIBIN database. The Lab's use of the PSN grant ended in September 2007.

- **COPS Methamphetamine Initiative – Susan Gross**

The BCA Agents received funds through a grant called the COPS Methamphetamine Initiative which is funded by the US Department of Justice through the Community Oriented Policing Services Office. The COPS Methamphetamine Initiative grant provides direct funding to establish and enhance a variety of problem-solving strategies that encourage community policing efforts that combat the use and distribution of methamphetamine. With these funds, the drug chemistry section was able to purchase an instrument, a High Performance Liquid Chromatograph (HPLC), which will be used for quantitating methamphetamine. Also with these funds, the section was able to hire a retired chemist to assist in the drug backlog.

- **Teleconference Peer Review – Jim Dougherty**

The Teleconference Peer Review project is a collaborative effort between the BCA Lab in Bemidji, the DCI Crime Lab in Pierre, South Dakota, and the Midwest Forensics Resource Center (MFRC) in Ames, Iowa. The MFRC is an organization whose purpose is to support forensic laboratories by providing research, education, and training opportunities as well as provide a link between the forensic community and university researchers. This project was chosen as one of the Technical Innovations in Management and Infrastructure (TIMI) projects sponsored by the MFRC each year.

This project deals with the ability to perform technical reviews and identification verifications in small laboratory settings. Technical review refers to the process of having a second qualified individual reviewing the notes and data of a scientist before the results of a forensic examination are reported. Identification verification is the process of a second qualified scientist performing an independent assessment of identifications made in Firearms and Latent Print examinations. The three specific goals of the project are as follows: 1) to identify and test components needed for remote peer review and peer verification, 2) to develop a prototype process and define a procedure for remote peer review, and 3) to develop a prototype process and define a procedure for remote peer verification process.

At this point in the project, the MFRC has identified components and have installed the comparison microscopes in the Firearms sections of the Bemidji and South Dakota laboratories. This setup allows an individual from the South Dakota Laboratory to receive a high resolution digital image of an exhibit (such as a bullet or cartridge casing) placed on the comparison scope in Bemidji and visa versa. A similar process using teleconferencing equipment has been in use between the Saint Paul and Bemidji laboratories for years. The potential advantages of the MFRC components are that they

provide images at higher resolution to video and the cost of the equipment is lower. The set-up is still being evaluated.

- **DNA Capacity Enhancement and Casework DNA Backlog - Jim Iverson**

The Biology Section of the BCA currently is participating in four grants offered by the National Institute of Justice. The 2006 DNA Capacity Enhancement grant is designed to help forensic DNA labs increase throughput capacity in order to maximize the number of samples that can be analyzed. The 2006 DNA Backlog Reduction grant provides funding for overtime and temporary workers in order to help to alleviate the backlog of DNA cases. The 2007 Missing Persons grant provides funding to assist in the processing of backlogged missing persons cases. And the 2007 Capacity Enhancement/Backlog Reduction grant is a combination of the two 2006 grants. Overall, we have over \$1.5 million dollars in Federal funding for these 4 grants.

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Bemidji Laboratory General Number	218-755-6600	<a href="mailto:bca.lab@state.mn.us">bca.lab@state.mn.us</a>

## New Faces of 2007



Tonya Lindbery  
Bemidji Lab – Latent Prints



**Saint Paul Lab** (left to right) Kate Lentz-Lockhart (DNA), Erica Henderson (Firearms), Ann Engebretson (Drug Chemistry), Becky Willis (Drug Chemistry), Sara Goldstrand (Drug Chemistry), Rachel Slater (DNA), and Scott Henderson (Latent Prints).



Michelle Pearlson  
Bemidji Lab - DNA

## The BCA Laboratory Celebrates 60 Years of Service to Minnesota



488 North Wabasha Street



1246 University Avenue

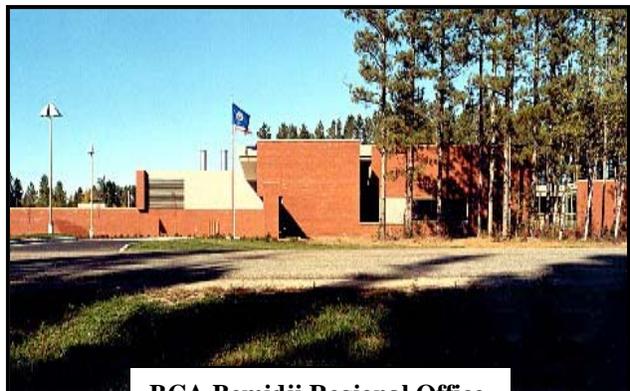


1246 University Avenue (*Remodeled*)

The Bureau of Criminal Apprehension Forensic Science Laboratory became operational on January 1<sup>st</sup>, 1947 in the Shubert Building at 488 North Wabasha Street in Saint Paul. The entire laboratory occupied 350 square feet. It began as a one-person laboratory offering chemical analysis and microscopy. As the laboratory began to grow, it moved its location to University Avenue in 1962. In 1969, it became a division of the Department of Public Safety. Renovations took place at the University Avenue location from 1978-1980. In 1990, the BCA became one of the nation's first forensic laboratories to offer DNA analysis. Shortly thereafter, the BCA was the first laboratory in the country to identify a suspect based solely on DNA. With the increasing demand for forensic services a 26,000 square foot regional laboratory located in Bemidji was opened in 2001. In 2003, the Saint Paul headquarters moved to its present location on Maryland Avenue. The Saint Paul headquarters is a state of the art facility housing the BCA's Forensic Science, Investigative, CriMNet, and Criminal Justice Information Services. The building is 224,000 square feet with almost 106,000 square feet occupied by the laboratory. In 2004, the laboratory became one of four laboratories in the nation selected by the FBI to serve as a regional mitochondrial DNA laboratory. Today both Saint Paul and Bemidji laboratories continue their efforts to be leaders in developing and employing the latest in forensic technology with a combined staff of almost 100.



**BCA Headquarters – Saint Paul**  
1430 Maryland Avenue East



**BCA Bemidji Regional Office**  
3700 North Norris Court NW

## General Laboratory Information

The nationally accredited BCA Forensic Science Service Laboratories located in Saint Paul and Bemidji provides identification and comparisons of physical evidence for law enforcement agencies in Minnesota. Scientists within various scientific disciplines prepare written reports and provide expert testimony to the courts on the findings and interpretation of their examinations. In conjunction with the BCA Training Unit, the scientists in the Laboratory provide specialized training to law enforcement agencies.

CASES RECEIVED	2001	2002	2003	2004	2005	2006	2007
Homicide and Attempted Homicide	95	103	71	107	115	86	197
Death Investigation	156	188	180	182	170	196	204
Controlled Substance	3,441	3,326	3,432	3,905	4,295	3,823	3,494
Criminal Sexual Conduct	551	689	718	695	735	731	989
Burglary/Robbery	337	455	612	570	776	925	956
Fire Investigations	132	178	159	164	151	230	234
Fraud/Forgery	78	87	94	84	96	63	39
DWI	5,633	5,200	5,168	5,029	5,257	5,220	5,304
All Other Criminal	1,365	1,553	1,565	1,747	2,293	2,374	2,297
Proficiency Testing	80	77	80	81	79	86	123
<b>TOTALS</b>	<b>11,868</b>	<b>11,856</b>	<b>12,079</b>	<b>12,564</b>	<b>13,967</b>	<b>13,734</b>	<b>13,837</b>

*Combined totals of specific case types received from both BCA Lab locations.*

Specific scientific expertise is provided within the four Laboratory sections (Biology, Chemistry, Criminalistics, and Toxicology). The following describes the types of examinations that can be done in each section:



## BIOLOGY



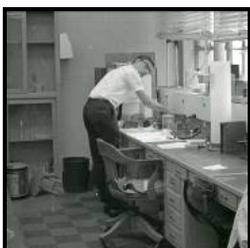
**The biology section is composed of three disciplines; Mitochondrial DNA, Nuclear DNA, and the Offender DNA Database Section.** (*Biology Pictures: Scientists Bart Epstein—1968 (left) and Angie Yoch (right).*)

The **Mitochondrial DNA (mtDNA)** scientists accept cases from law enforcement agencies around the country. As a general rule, cases are accepted for testing if other DNA testing options have been exhausted or are unavailable. The BCA is one of four regional laboratories collaborating with the Federal Bureau of Investigations (FBI) which perform mitochondrial DNA (mtDNA) testing for criminal cases.

The **Nuclear DNA** scientists conduct several types of serological examinations on evidentiary materials, including the identification of blood, semen, saliva, and other body fluids. DNA testing is then performed in order to determine possible sources of the body fluids identified. This

involves comparing the DNA types obtained from the questioned stains with the DNA types obtained from known blood and/or saliva samples from victims and suspects. Blood spatter interpretation on clothing and at crime scenes can also be requested.

In the **Offender DNA Database Section** DNA profiles of convicted felons are developed and stored in a DNA computer database known as the Combined DNA Index System (CODIS). DNA profiles developed from evidence in criminal cases are also entered into the database. Searches are made to compare casework DNA profiles with past casework and offender profiles.



## CHEMISTRY



**The Chemistry section is composed of three disciplines: Chemical Testing, Drug Chemistry, and Trace Evidence.** (*Chemistry Pictures: Scientist Don Melander in 1971 and today*).

**Chemical Testing** primarily examines fire debris for ignitable liquids. This group also identifies other non-narcotic chemicals for the criminal justice system. Chemical testing has been involved in the detection and identification of lachrymators (tear gas), economic poisons, and sexual lubricants.

The **Drug Chemistry** section analyzes items of evidence for the presence of controlled substances. Evidence is usually submitted as powders, rock-like material, drug paraphernalia, plant material, tablets and/or capsules (clandestinely or legitimately manufactured), and liquids.

The **Trace Evidence** section makes comparisons to determine if there is a similarity between known and unknown samples of glass, paint, fibers, wood, soil, and other materials. Other examinations include the comparisons of shoeprints and tire tracks, as well as physical matches of broken or torn objects. Select individuals collaborate with the mtDNA lab by performing hair examinations.



## CRIMINALISTICS



**Criminalistics is comprised of four areas: Crime Scene Response, Firearms and Toolmarks, Latent Prints, and Questioned Documents.** (*Criminalistics Pictures: Scientists Jim Rhoads—1968 (left) and Stephanie Eckerman (right)*).

The Laboratory's **Crime Scene Response** teams provide on-site death investigation processing services to all Minnesota law enforcement agencies.

The **Firearms and Toolmarks** section conducts many types of firearm and toolmark examinations. Listed below are the various firearm examinations offered at the BCA:

- Determine whether a questioned bullet or cartridge case was fired from a suspect firearm.
- Determine the caliber and type of firearm possibly used to produce fired bullets and cartridge cases when no firearm has yet been recovered.
- Determine the proximity of the firearm to the target material.
- Functionality of a firearm.
- Determine whether submitted ammunition is a commercial load or reload.

The section maintains a NIBIN database which links firearms evidence from different crime scenes.

The section also works with toolmarks to determine whether an evidentiary toolmark matches a recovered tool, the type of tool that may have been used to produce a toolmark, and whether a lock is in working order or how it may have been compromised. Serial number restorations on various item types are also performed.

The **Latent Print** section compares unknown latent prints with elimination and suspect prints for identification purposes. They utilize the Midwest Automated Fingerprint Identification Network (MAFIN) and Automated Fingerprint Identification System (AFIS) as a source for unknown latent prints. They also develop latent prints for law enforcement agencies that lack the necessary facilities.

The **Questioned Documents** section offers examination services in such areas as signatures, handwriting and hand printing, typewriters, indented writing, ink, paper, mechanical impressions, photocopiers, alterations and obliterations, counterfeit documents, and the reconstruction of documents that have been shredded, burned, or damaged.



## TOXICOLOGY



**The Toxicology section is comprised of two areas: Breath Testing and Toxicology.** (*Toxicology Pictures: Scientists George Roche—1948 (left) and Brent Nelson (right).*)

The **Breath Testing** section trains law enforcement personnel in breath-alcohol testing procedures. The section also evaluates and maintains breath-alcohol instruments.

The **Toxicology** section analyzes blood, urine, and other biological samples for the presence of alcohol and/or other drugs.

## **Support Services**

The primary focus of the Support Services group is to provide the BCA Laboratory with assistance in the day-to-day support activities which affect all scientific sections of the Laboratory and the criminal justice community. From the time a case enters the Lab until the evidence is returned, Support Services serves in an interactive role in assisting with the process. This role requires teamwork and coordination. Support Services bridges the gap between the Lab and law enforcement agencies throughout the state. Areas that make up this group include: Evidence Intake, Office Administrative support, Quality Assurance, Laboratory Information Management Systems (LIMS), Safety and Training, Purchasing, Photography, and our newest addition, Criminal Intelligence.

### **Evidence Intake**



The Laboratory Evidence Intake staff (*Julie Trebesch pictured to the left*) is comprised of seven Forensic Evidence Specialists; two in Bemidji and five in Saint Paul. They assist the Laboratory in providing effective evidence intake coverage. Our Forensic Evidence Specialists take in the evidence through our Laboratory Information Management System (LIMS) and direct it to the appropriate analytical sections. They also serve as a liaison between sections and agencies in answering questions that assist investigators with case analysis. This is a very important role in that it helps maintain communication between the analysts and the investigators and affects the overall quality of analysis.

### **Office Administrative**

The Office Administrative Support team (*Nancy Dougherty pictured to the right*) organizes and maintains Laboratory records and directs important information from phone messages and faxes. This is a key element in that many subpoenas and important messages are constantly transmitted to Laboratory personnel.



### **Quality Assurance (QA)**

Quality within the Laboratory has always been of vital importance. The quality assurance section of the Laboratory evaluates and maintains every aspect of quality service. QA works closely with all sections of the laboratory ensuring that the highest quality standards are followed. This is accomplished by maintaining methods and standard operating procedures, conducting audits, performing QA reviews and working closely with Supervisors.

Work conducted by the Minnesota BCA Forensic Science Service is of the highest quality possible to meet the needs of the criminal justice community. Laboratory QA programs are designed to provide a quality system to demonstrate that results are accurate, impartial and relevant. The Laboratory quality system is designed to meet or exceed the requirements for laboratory accreditation established by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). The Bemidji Laboratory and the Saint Paul Laboratory both maintain separate accreditations by ASCLD/LAB. The laboratory quality system functions to evaluate laboratory methods and procedures, case files, staff training and

technical competency, proficiency, and to document these evaluations through laboratory internal quality auditing, quality assurance reporting, and quality assurance reviews.

Laboratory internal quality control audits are one aspect of laboratory Quality Assurance. The audits are conducted yearly for both Laboratories. The Laboratory has many members who have had formal training in Quality Assurance auditing given through ASCLD/LAB, the FBI, or through the College of American Pathologists. In 2007, these expert auditors were utilized within the laboratory to complete the annual internal quality control audits of each of the Laboratory sections and Support Services. By having this large pool of talent, coordinated by QA, the Laboratory was able to expedite the work and maintain independence of the auditors. This is only one example of Laboratory Quality Assurance coordination of resources to maintain quality.

In 2008, the Laboratory will begin preparing for the ASCLD/LAB International accreditation process.

### **Laboratory Information Management Systems (LIMS)**



The Laboratory computer evidence tracking system allows for quick and accurate organization of Laboratory case information and records (*Tony Petracca (LIMS Administrator) pictured to the left*). This system is constantly evaluated, improved, and maintained. The LIMS incorporates auto e-mailing of reports to law enforcement agencies and access to report information by departments through secure access to the BCA Lab report website at: <https://BCALAB.dps.state.mn.us/BCALAB>

This decreases Laboratory turn-around time and allows departments to access reports via their own computers. Currently, about three hundred Minnesota law enforcement agencies have access to this site.

Several changes have been incorporated into this site for 2007. In addition to reports, evidence submission receipts can now be viewed. Cases can now be retrieved by Laboratory case number, the submitting agency's case number, or the name of a person involved in the case. Also, now agencies included in the report distribution can view all the reports for a case. Previously, access to reports was limited to the agency submitting the evidence.

Departments that have not taken advantage of the BCA lab website can contact the BCA laboratory for assistance.

### **Safety and Training**

The Safety program for 2007 continued to be involved in the areas of bio-hazardous wastes, chemical safety, respiratory protection, and safety audits. The Training program focused on areas of the maintenance of discipline training program forms, courtroom testimony, crime scene, right-to-know, evidence handling, and general lab operations.

Other areas of involvement include:

Citizen's Academy – this academy educates business leaders in the community and shares the capabilities of the BCA to enhance community confidence.

Forensic Partnership Program – This program links Regional Coroner’s offices with the BCA in an effort to educate death investigators throughout Minnesota. Death Investigators receive training from all aspects including crime scene, forensic analysis, and pathology.

Internship Coordination – The Laboratory was partner to eight interns in 2007. They assisted in projects in the areas of biology, trace, and latent prints. The coordination of this program involves overseeing the entire application and interview process.

See: <http://www.dps.state.mn.us/bca/Lab/Documents/Page-03.html> for information about application to the program.

### **Purchasing, Ordering, Inventory, and Grant Coordinator**

One of the most important behind the scenes areas within the laboratory involves purchasing and ordering. The Support Services dedicated personnel for this task. The laboratory continuously has to evaluate supplies and purchase equipment to keep the laboratory operating efficiently. This section serves the Laboratory by insuring that all supplies and purchasing paperwork are maintained. Without them many key supplies and equipment would not be here in a timely fashion. This area of the laboratory also maintains and coordinates the inventory of all analytical instrumentation and equipment used in the laboratory. Grant coordination in Support Services monitors the use of Federal grant funds appropriately.

### **Photography**

The photography section develops film and accepts digital media submitted by BCA Agents, scientists, and other agencies for investigation and court. Usually CD’s and 8"x12" index prints are supplied. Enlargements or prints are made as needed. New equipment has improved the quality and reduced the processing time for enlargements. The photography section also develops film and provides CD's for the Minnesota State Patrol from troopers throughout the state. In addition, over 400 annual requests for Patrol work are made for insurance companies, lawyers, and county attorneys. BCA and DPS events are also photographed and/or processed.

Film (or disposable cameras) found at scenes are received as evidence. Images taken by local law enforcement are usually submitted through the BCA agent involved with the case. Work for cases that do not have a BCA case need prior approval. Departments using digital formats can submit the original media or CD’s with the images. Both 35mm and 120mm film can be developed.

For photos of fingerprints, shoeprints, and tire tracks, include a scale in the photo, keep the camera over the center of the image (so it is straight rather than at angle), and fill the frame. A carpenter's square makes an ideal scale because if both the edges are kept parallel to the edges of the frame in the camera, it will be straight and avoid distortion. If side lighting is needed to show detail, the flash should be at least two feet from the edge of the image area. This will produce the best quality comparison images.

### **Criminal Intelligence**

The Criminal Intelligence Analyst (CIA) position was created due to new Predatory Arrestee Legislation. The primary purpose of the statute was to receive DNA samples from all felony predatory arrestees. When the samples are received, they are split, read for sample quality and validity, and entered in the CODNA program, as arrestee samples. The CIA’s track the progress

of various criminal proceedings of the arrestees, tracking if they are found guilty, not guilty, or if the charges are dismissed. If the arrestees are convicted, the samples will be entered as a Convicted Offender and also submitted into the CODIS database.

However, on October 10, 2006 the MN Court of Appeals ruled that MN Statute 299C.105 was unconstitutional. This statute required the collection of DNA samples from "individuals charged and having a probable cause determination" for certain predatory crimes. As a result of this ruling, the BCA will no longer be analyzing samples submitted under the Statute 299C.105.

## BIOLOGY

### Mitochondrial DNA

The Mitochondrial DNA Section had a very successful 2007. As part of the FBI's Regional Mitochondrial DNA Program (RmtDNAP) the BCA Lab received 197 cases over the year. 70 of these cases were submitted from 20 different states. 56 cases were submitted as part of a special FBI project, and the remaining cases came from agencies within Minnesota. At the BCA, the RmtDNAP funds 2 Trace/Microscopy scientists who perform microscopic hair comparisons, 3 mitochondrial DNA scientists who perform DNA extractions and sequencing, and 3 mitochondrial DNA examiners who perform the sequence analysis, write reports, and testify to the results.



Extraction and Amplification Room



ABI Prism 3100 Genetic Analyzer

Mitochondrial DNA (mtDNA) is found in a cellular organelle called a mitochondrion. Mitochondria are responsible for producing most of the energy that the cell needs to function. There are many more copies of mtDNA within a cell than nuclear DNA, so mtDNA testing is possible on incredibly small sample sizes. We utilize mtDNA testing on hair shafts, teeth and bones. Because mtDNA is inherited along the maternal line of a family, mtDNA is a great tool for helping to solve missing persons cases because we can use a sample from a maternal relative in order to compare sequences from unidentified human remains. There is a tremendous effort being made on a country-wide scale to collect DNA from everyone who is missing a relative in order to help identify thousands of missing persons.

## Nuclear DNA

The nuclear DNA section had a very productive year in 2007. We issued 3000 reports and have made great strides in eliminating our property crime backlog. Our turn around time has been reduced to approximately 30 days for violent crimes and is improving daily on the property crimes. Our continued goal is to turn all cases around in under 30 days. With the additional staff currently being hired, we will have 17 full time scientists in the Saint Paul Lab.

We have been fortunate to join Minneapolis in a cooperative agreement and have two scientists designated for their city's cases only. These scientists will perform serology and DNA testing as well as testify to their findings.

Automation has finally made its way into our laboratory, allowing us to separate evidentiary samples from known samples. We will be going on line with our Tecan EVO robot this spring. We are also partnering with one of our vendors to work on a new technique that will allow us to automate DNA testing of property crimes. We have also recently purchased a new genetic analyzer allowing for 4 times the throughput of our older method. This new technology will greatly affect our testing methods, allowing us to ensure separation of samples as well as speed up the process.



Setting up DNA samples  
on the genetic analyzer.



Performing Serology screening.

We continue to research new methods to assist us in the screening of body fluids as well as ensure we are getting the best DNA results possible. Our scientists are always looking for new technologies so we can be as much like CSI as possible! This month we will be looking into fluorescent technology and how it can assist the searching for sperm in CSC cases...more to come!



### **Offender DNA Database Section**

The Offender DNA Database Section has experienced continued success this past year. In 2007, the BCA Lab was able to assist 377 criminal investigations using information obtained from the Combined DNA Index System (CODIS). 2007 brought the end of the backlog of offender samples. Samples are now being uploaded to the National DNA Index System (NDIS) in less than 30 days from the date of receipt. It is anticipated that the Offender group will soon begin to assist the Nuclear DNA/Casework group with the processing of reference samples submitted in criminal cases. This will help to streamline the processing of cases.

The BCA has been profiling DNA collected from convicted offenders since 1990. Over the years, laws have continued to change regarding the DNA profiling of criminal offenders. In 2002, a law was enacted requiring DNA testing of all people convicted of any felony. In 2005 the law was expanded to require the collection of DNA from all people charged with a felony and convicted of that offense or any other offense arising from the same set of circumstances. We continue to struggle with the 2006 Court of Appeals decision to declare the collection of DNA from arrestees as unconstitutional. It is our goal to make sure that DNA is collected from each of the individuals that were subsequently convicted of the crimes for which they were charged.



Tecan Robot



Thermal Cycler

# CHEMISTRY

## Chemical Testing

In 2007, the chemical testing section handled a total of 202 cases. The number of items per case remained steady at 2.8. Turn around time for the year has crept to approximately 35 days for fire debris samples.



Fire in Kitchen



After The Fire

This summer our intern was Rachel Epp from the University of Wisconsin in Madison. Rachel was a dynamo taking on two projects. She developed methods for the Ion Chromatograph to detect cations or anions. Some instrumentation problems were encountered, but she was able to troubleshoot the system and get it back and running in no time.

The other project that she worked on was a continuation of the Solid Phase Micro-Extraction (SPME) method that has been a perennial concern. SPME is a solvent-less extraction technique. This would eliminate the use of solvents, such as carbon disulfide and pentane, which have health and environmental concerns. SPME could be used as a screening method, thus cutting down or eliminating solvent consumption in the laboratory. Her work helped to advance the project and it should be a viable method within a year.

## Earliest Fire Detection – Touch!



In December, the lab hosted the Minnesota International Association of Arson Investigators' for their quarterly meeting. The capabilities of the lab were discussed and tours of the building were available. Approximately 50 arson investigators attended. After the main meeting, a committee meeting for Arson Awareness held its meeting to discuss the preliminary results of the survey given to visitors at the State Fair earlier in the year. The final results are expected soon.

## Drug Chemistry

The Drug Chemistry section experienced some personnel changes in 2007. We welcomed three new scientists in Saint Paul. One came with experience and started case work after a short training period. The other two were hired as forensic science trainees and are projected to be online by the end of 2008. With the new scientists, the Drug Chemistry section is composed of fourteen total scientists; eight full-time, two in training, and one seasonal located in Saint Paul and two full-time and one finishing training in Bemidji.



In addition to the new scientists, the Drug Chemistry section added a new instrument with the purchase of an HPLC (High Performance Liquid Chromatograph) in its Saint Paul location. The instrument is being validated and plans are to start utilizing it for casework in 2008. In particular, the HPLC will be used to determine the purity of methamphetamine for federal prosecutions. The HPLC (*pictured to the left*) will allow for a quick and efficient method to quantitate methamphetamine.

The primary responsibility of the Drug Chemistry section is to analyze items of evidence for the presence of controlled substances. The items of evidence are usually submitted as powders, rock-like material, drug paraphernalia, plant material, tablets and/or capsules (clandestinely or legitimately manufactured), and liquids. The Saint Paul Drug Chemistry section received 2,702 cases in 2007 and reported out 2,631 cases. The Bemidji Drug Chemistry section received 1,047 cases in 2007 and reported out 1,003 cases.

Approximately 75% of the caseload for both Saint Paul and Bemidji is methamphetamine and cocaine. Methamphetamine continued to be the most prominent controlled substance reported at both locations. Of the 4,189 items submitted for analysis in Saint Paul, 1,935 items were reported as containing methamphetamine. Of the 1,556 items submitted for analysis in Bemidji, 763 items were reported as containing methamphetamine. Cocaine was once again the second most reported controlled substance at 26.9% in Saint Paul and 22.6% in Bemidji. Both laboratories had a noticeable increase of reported cocaine items over the past two years; a 5.7% increase in Saint Paul and a 7.4% increase in Bemidji.



Methamphetamine

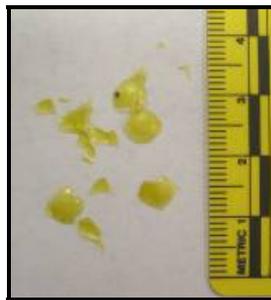


Cocaine



In addition to the methamphetamine and cocaine submissions, the Drug Chemistry section noted increased submissions of psychedelic phenethylamines. Submissions included 2,5-dimethoxy-4-iodophenethylamine (2C-I), 2,5-dimethoxy-4-chloroamphetamine (DOC), and 2,5-dimethoxy-4-iodoamphetamine (DOI). 2C-I (*pictured to the left*) is a short-acting synthetic psychedelic. The drug combines hallucinogenic effects of lysergic acid

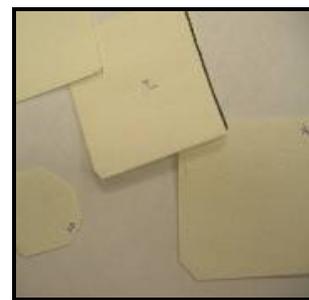
diethylamide (LSD) with empathogenic effects similar to MDMA (ecstasy). DOC and DOI (*pictured below*) are extremely potent, long-acting psychoactives. Both drugs have effects similar to LSD; however, the experience is noted to be longer and more energetic. All three drugs are currently not scheduled in Minnesota; however, if submissions are large enough, they can be prosecuted under the federal analog act.



DOC



DOC



DOI

In 2007, the Drug Chemistry section was given a grant by the Midwest Forensics Resource Center (MFRC) to assess the capabilities of Ahura Scientific's FirstDefender instrument for agents out in the field. The FirstDefender is a portable, rugged instrument that can analyze and identify various substances through the use of Raman spectroscopy. The instrument is able to scan through most glass and transparent plastics, thus reducing the operator's exposure to the unidentified substance. The FirstDefender can be used to supplement color tests currently done onsite and is also able to give approximate purity levels for sales and purchasing purposes.

The project was designed to verify that the FirstDefender was able to correctly identify controlled and non-controlled substances. Standards were added to the instrument's library to increase its identification capabilities. Testing was done on the FirstDefender under various conditions to find optimal operating conditions. Solids, liquids, tablets, and mixtures were scanned to test the sensitivity and accuracy of the instrument. To further examine the abilities of this instrument, the FirstDefender will be given to agents. The agents will use this instrument as a preliminary drug test in the field. These preliminary results will then be compared with confirmed laboratory results.

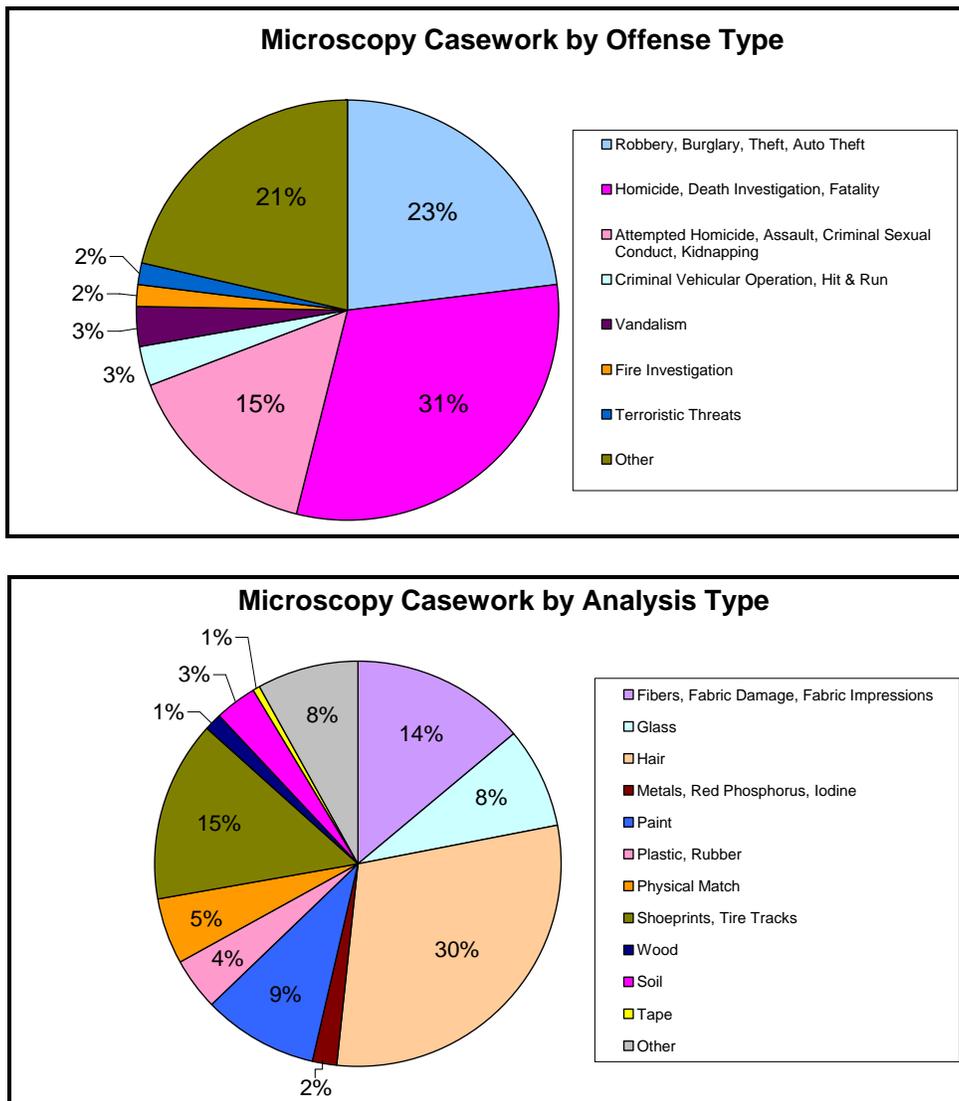


Ahura Scientific's FirstDefender

The Drug Chemistry section has three primary goals for 2008. The first will be to complete training and get all scientists online by the end of the year. The second will be to finish the validation of the HPLC and start using it for casework. The third goal will be to continue the assessment of the FirstDefender by comparing preliminary results made onsite to the laboratory's confirmatory results. All of these goals represent the section's understanding of the significance of timely results for the investigation and prosecution of controlled substances. We are optimistic these goals will be achieved.

### Trace Evidence – Microscopy

**Case Statistics:** The trace evidence section reported 126 microscopy cases in 2007, 29 of which were mito-trace (hair) cases.



**Figure 1.** Pie charts showing types of cases analyzed by the Trace-Microscopy section.

**Staffing:** Four scientists remained in the section after one was lost to resignation. One scientist has returned full-time after retirement to complete casework and conduct training for the newer scientists, two scientists are primarily hair examiners, and one is rapidly completing training in several areas of trace examination. The section supervisor also continues to do casework. An additional scientist will be joining the group in early 2008.

**Training and certification:** One scientist completed training in tape and fiber examinations and is currently training in physical match analysis. One scientist is completing fiber training and another scientist continues to train in shoeprint and tire track examination.

Two scientists attended classes at the Midwest Forensic Resource Center in 2007. One class was in tire track examination and the other class was in chemical imaging techniques.

Three scientists and the section supervisor took pilot examinations offered by the American Board of Criminalistics (ABC) at the NIJ/FBI Trace Evidence Symposium. After completing specialty examinations in Trace Evidence: Hairs & Fibers and Trace Evidence: Paint & Polymers, all four individuals qualified for certification as ABC Fellows.

**Research and presentations:** The section supervisor published original research on glitter examinations in the new online journal *Global Forensic Science Today* and moderated a session at the NIJ/FBI Trace Evidence Symposium. Two scientists assisted with the glitter study as well as completing an additional research project on burnt hair. The hair project was presented in poster form at the NIJ/FBI Trace Evidence Symposium.

Presentations were given by all scientists to law enforcement and students of all ages. One scientist traveled to present an older high-profile case at the BCA Death Investigation Seminar, another scientist taught a class for the Compleat Scholars Program at the University of Minnesota, another scientist presented at the Forensic Partnership Training Program, and another scientist taught a continuing education class for law enforcement at Century College.

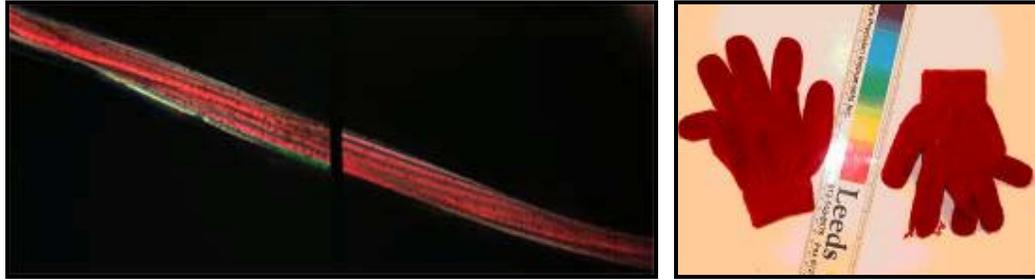
**Intern project:** The summer 2007 intern for the Trace-Micro section was James Dahlke of Carroll College. He investigated the usefulness of pyrolysis gas chromatography (PGC) and scanning electron microscopy (SEM) in the differentiation of automotive clear coats. Building on previous interns' projects, he found that PGC was the most discriminating technique for analyzing this layer of paint. James presented the results of these projects at the Fall Meeting of the Midwestern Association of Forensic Scientists (MAFS).

#### **Instrumentation and software**

Continued demand for comparison microscopy and photomicrographs (especially in hair and fiber cases) led to the purchase of another comparison Olympus polarizing light microscope and Sony camera. An additional polarizing light microscope with fluorescence capability and phototube for taking digital pictures was also purchased.

## Unusual cases

1. Fiber evidence and shoeprint evidence was submitted to the laboratory from three different investigating agencies. Two burglary scenes and a car theft were found through fiber and shoeprint exams to be connected through the gloves and shoes of a single suspect.



**Figure 2.** Left: Microscopic comparison of fibers found at a burglary scene (far left) and from the suspect gloves (near left). Right: The suspect gloves.

2. Paint evidence from a vehicle and paint evidence from a brick wall were submitted to the laboratory in a homicide case. Paint matching the vehicle was found on the brick wall and paint matching the wall was found on the vehicle. The double cross-transfer of paint indicated the vehicle of the suspect was at the scene of the shooting.



**Figure 3.** The larger paint piece (center) is from the suspect vehicle. It was found to match the smaller paint piece (lower right) from the crime scene. Actual size is about the size of a period.

# CRIMINALISTICS

## **Crime Scene Response**

The Saint Paul Crime Scene Teams, consisting of 15 team members and nine team leaders, experienced another busy year, responding to 46 requests for forensic services. This included 32 death investigations, eight of which were homicides. The team was called to seven officer involved shootings, two of which resulted in deaths. A total of 35 vehicles were also processed; some of which were directly connected to the team response and others which were brought to the BCA Laboratory garage. The protocol for crime scene response normally requires the death of an individual; however, vehicles that have been involved in crimes against persons will be processed in the garage. One of the two garage bays was designed specially for forensic processing with several options for lighting and use of specialized equipment. The bay can also be secured for vault level access.

In one noteworthy case, latent prints were developed on items in the vehicle of a homicide victim. When they were entered into a national database, a suspect was developed who was also wanted in several other states for homicide and attempted homicide. He was captured several days later.

One of the worst scenes the team had to contend with this past year was the death of a newborn infant who was stabbed multiple times and tossed into a trash bin. Some of these cases can be emotionally draining for the responders but also rewarding as the evidence collected often significantly aids in the prosecution of the responsible parties.

Sometimes the work must be performed under severe weather conditions; it can be hard to concentrate when working outside in sub-zero temperatures with a biting wind or trying to dig up a grave on a hillside, in the mud, during a rainstorm. The teams are to be commended for their perseverance and diligence, regardless of the circumstances.

## **Firearms and Toolmarks**

The Firearms section managed to work through some difficult personnel matters but was able to maintain a steady output of cases. One experienced examiner took a position elsewhere in the lab while another was on extended leave for half of the year. A NIBIN technician position, filled by a retired BCA Lab employee, Eldon Ukestad, was converted from temporary to permanent status. In addition, Kurt Moline, the lead technical worker, was training a firearms examiner for the Hennepin County Sheriff's Office. That task ended in December and the Hennepin County firearms cases followed the new examiner relieving the BCA lab of some submissions. Needed assistance came in October with the hiring of Erica Henderson, an experienced examiner who relocated from the Florida Department of Law Enforcement. The dust has now settled and output has steadily increased as a result of the diligent work of Kurt, Erica, Eldon and the return of Stephanie Eckerman. Eldon's work has been particularly noteworthy. As a NIBIN technician (National Integrated Ballistics Identification Network), he entered nearly 400 cartridge cases resulting in 41 hits to other cases and/or firearms. This relatively new position has allowed the examiners to concentrate on their comparative exams while Eldon conducts test fires and makes entries to the database. After a change in acceptance policy, the NIBIN hits doubled over the second half of the year. Jennifer Setterstrom, hired as a student worker, has been maintaining the reference collection consisting of over 5,000 firearms. Her help has been greatly appreciated.



Scientist Eldon Ukestad utilizing NIBIN.



Scientist Erica Henderson test firing.

## Latent Prints



The Latent Print Section has maintained a steady output of cases and also added a technician position. Scott Henderson (*pictured to the left*) was hired in October to process the various items submitted for latent print development. Once suitable prints are developed, they are photographed with a digital camera and submitted to an examiner for comparative examination. Scott also relocated from FDLE and, yes, he is matrimonially attached to the aforementioned Erica. Scott has extensive crime scene experience and will soon become a part of our team. Scott works along side six latent print examiners: Glenn Langenburg, Gary Walton, Scott Ford (*pictured below using AFIS*), Marty Koolen, Josh Bergeron, and Dennis Randall with a combined experience level of over 90 years. As the lead technical worker, Glenn has streamlined the receipt and assignment of the cases which has substantially lowered the section's turn around time. Scott Henderson's work has also allowed the examiners to concentrate on their comparative work which also helps to reduce the turn around time.

During 2007, the search continued in earnest for a vendor to upgrade the current Automated Fingerprint Identification System. Marty represented the section while several vendors were examined on paper and on location in other states. In the end, the BCA remained with Motorola and much work was done in the latter part of the year converting the data base, installing new hardware and software, and receiving training on the new system. One of most exciting features of the new technology will be the ability to store and search palm prints, something that has never been done before in Minnesota. With approximately one fifth of all identifications being made with palm prints, this will add another tool to catch those miscreants who may have fallen through the cracks. Another feature, which has already reaped benefits, is the ability to search all impressions on a fingerprint card as well as up to ten fingerprints cards on one suspect based on all prior arrests. Several hits have already been made that would have been missed in the old system. Kudos to Marty for his help in bringing this new system to fruition.



During the transition period between the old and new AFIS, some ability to track entries was temporarily lost. The data available indicated over 700 searches were conducted resulting in 66 hits. These were cases where there were no named suspects or the named suspect did not match any developed latent prints. If a hit is not made, a latent print may be left in the Unsolved Latent File where it is compared daily against all new fingerprint cards added to the system. Over 61,600 searches were examined in the ULF resulting in 36 hits and the identification of previously unknown individuals.

Glenn's work in the latent print discipline also bears a mention. He has been a member of the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) and was invited to present to the National Academy of Science regarding the needs of the forensic sciences. He also traveled to Australia on a federal grant, to present his findings regarding contextual bias. The latent print community has been under scrutiny in the courts these past several years, and Glenn has remained on top of the issues, defending the discipline and keeping the BCA Lab well informed.

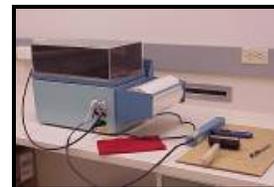
The section also conducted two training classes for law enforcement officers in basic and advanced latent print development techniques.

### **Questioned Documents**

The beginning of the fiscal year 2007, the Questioned Documents section was staffed by two fully trained scientists, Shawn Gallagher and Lisa Hanson. By December the turnaround time was reduced to approximately 2 months. The Questioned Documents section continues to offer examination services in such areas as signatures, handwriting and hand printing, typewriters, indented writing, ink, paper, mechanical impressions, photocopiers, alterations and obliterations, counterfeit documents, and the reconstruction of documents that have been shredded, burned or damaged.

The majority of Forensic Document cases still involve the examination of handwriting. The evidence examined may be from a crime scene, a homicide case, bomb threat case, money-laundering case, or a variety of other cases. However, most of the evidence examined by the Forensic Document Section is involved with some type of forgery and most recently, terroristic threats.

The most recent format of the Minnesota Driver's License has complicated the process of some Identification Theft Scams. Even though the section has seen a decrease in these types of cases, there have been cases involving high quality forgeries of the old MN driver's license. Identification Theft cases involve a multitude of examinations; handwriting examination, ink comparison, document authenticity examination, and printing process verification will be performed in order to complete an identity theft case. The task of the examiner is to identify the fraudulent documents that have been produced and to help the investigator find the beginning of the paper trail, if possible. The Forensic Document Lab has the latest innovations for document examinations.



**Figure 1** (*left*) depicts the Imaging Laboratory which includes the VSC 2000 (the Video Spectral Comparator) used to differentiate between inks and for other scientific examinations.

**Figure 2** (*right*) depicts the ESDA or Electrostatic Detection Apparatus. This instrument is used to detect and to lift indented writing images. Indented writing impressions can occur when paper is stacked or padded together and writing occurs on the top sheet(s) which leaves indented writing impressions on the sheet(s) below it.

The cases submitted to the Forensic Document Section continue to represent a wide spectrum of case types from vandalism to homicides. As a reminder to our clients, in order to conduct a complete examination, the following materials are needed:

1. If the original of the questioned and known documents exist, they are the preferred material to examine. If the originals are not available, photocopies can be used provided they are of good quality.
2. If the case involves the forging of another person's writing and signatures, it is important to provide the victim's writing and signatures for elimination purposes. This helps to determine whether the questioned material really is genuine writing or not and whether any attempt has been made to simulate or copy the victim's writing.
3. The writing from the suspect writer must be comparable to the questioned material. This means that the known writing must be hand printed from the suspect writer if the questioned material is hand printed, and handwriting if the questioned material is handwritten. It also means that the same letter combinations and words are needed in the known material as they appear in the questioned material. It is not possible to compare a cursively written "Kate Jackson" to a hand printed entry of "John's TV Repair".
4. A general handwriting exemplar should be submitted from the suspect writer(s) if possible. It includes all the letter forms, both upper and lower case, as well as numbers. If you need handwriting exemplar forms, you may access them at the Bureau of Criminal Apprehension website: <http://www.dps.state.mn.us/bca/lab/documents/Lab-Intro.html> or call 651-793-2900 and they can be provided. The requested known writing should also consist of the same phrases and names as appear in the questioned material, besides what is requested in the exemplar. This material should be dictated to the suspect writer and repeated several times. The suspect writer should never be shown the questioned material and asked to copy it.

In addition to the requested known writing, it is very important to include non-requested known writing from the suspect writer if at all possible. This consists of material which was written when the suspect writer had no idea that it would be used for examination purposes. This is used to determine whether the requested material on the exemplar is natural and fluent writing normally produced by the suspect writer. Suggestions for places to collect non-request writing are also on the web site.

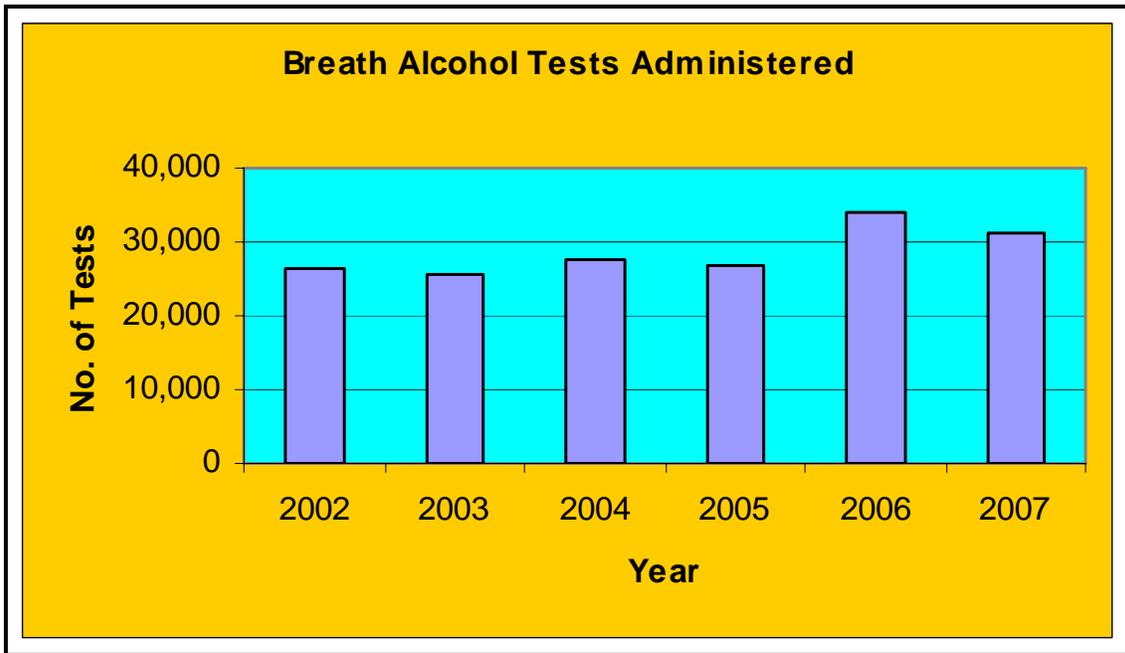
Many investigators, when working with forged checks, often focus their efforts on determining whether the payer's signatures were written by their suspect writer and therefore only collect signature samples. Unfortunately, many forgers make an attempt to disguise the payer's signatures and this makes identification of the forger difficult. However, many times the forger makes little effort to disguise the writing in the date, memo, payee and amount areas. If comparable known writing is received, it is often possible to identify this material as having been produced by the suspect writer.

*The QD section is always working to remain on the cutting edge of all new technology as the science of forensic document examination progresses into 2008.*

# TOXICOLOGY

## Breath Testing

Certified breath test operators completed 31,223 evidentiary breath-alcohol tests using 200 Intoxilyzer 5000EN instruments located throughout Minnesota during 2006, a drop of 8% from 2006. During 2006 the Breath Testing Section received 663 requests to provide expert testimony in court, resulting in 104 appearances and 56 instances where expert testimony was provided. This was an increase of 10% over last year.

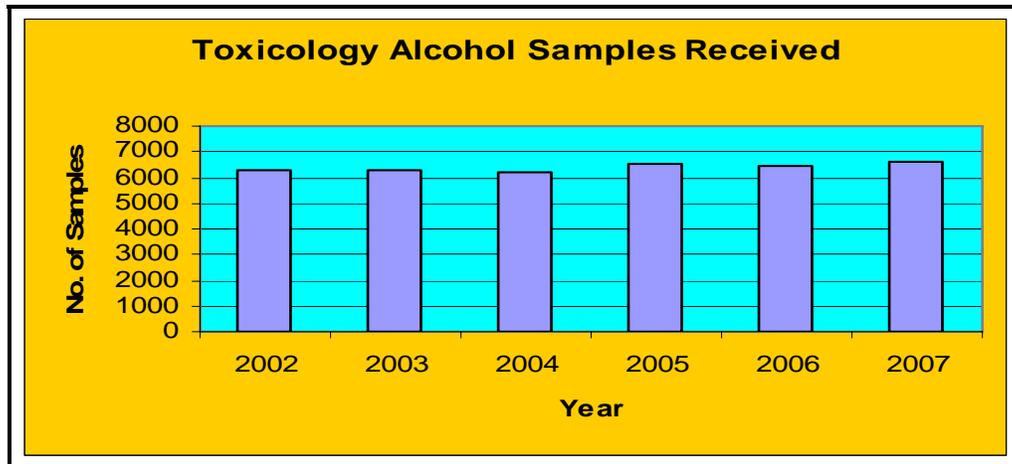


In 2007, 283 new Intoxilyzer operators were certified and 1157 experienced operators were recertified. Newly appointed judges received training on *Alcohol and the Intoxilyzer* last year. We served as instructors for attorney groups and at various area universities and colleges. Breath testing staff also engaged in continuing education by attending annual meetings of the International Association for Chemical Testing and the Intoxilyzer User's Group.

We have added affidavits on current topics and instructions on how to obtain certain breath testing-related documents to our web page under the Breath Testing header at <http://www.bca.state.mn.us/Lab/Documents/Lab-Intro.html>.

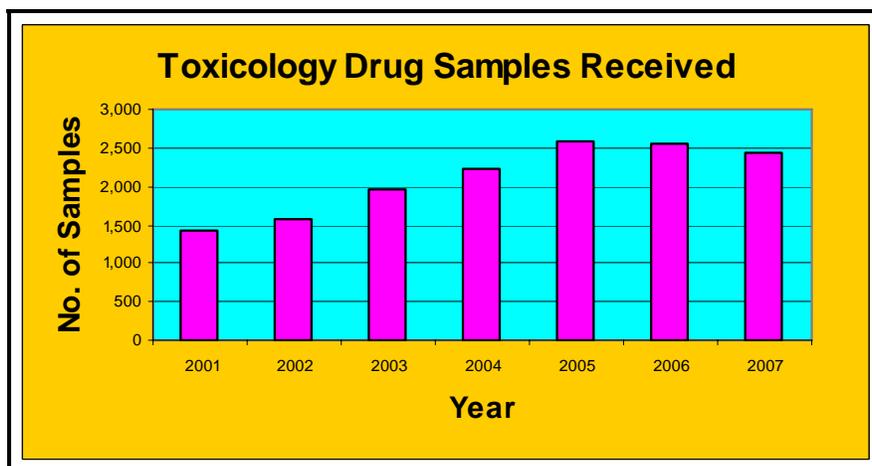
## Toxicology

In 2007, the Toxicology section analyzed 6626 blood and urine samples for alcohol, and 2425 blood and urine samples for drugs. Of these samples, 5262 were from arrests for driving while impaired (DWI), the rest were from felony cases and death investigations.



After alcohol, marijuana was the most common drug found, followed by methamphetamine, benzodiazepines (diazepam, lorazepam, etc.), cocaine, opiates, and other drugs. We continue to see more specimens containing sedative/hypnotics anti-depressants and anti-psychotics which can cause impairment, especially when mixed with alcohol.

Research performed during the summer of 2007 indicated that of 235 urine samples that were received only for legal alcohol testing, 43% contained other drugs that can cause impairment, and 30% contained non-scheduled drugs that can cause impairment.



Newly appointed judges received training on *Alcohol and the Intoxilyzer* last year, and we served as instructors for various attorney groups and at area universities and colleges. During 2007 Toxicology staff engaged in continuing education by attending the annual meetings of the Society of Forensic Toxicologists and the American Academy of Forensic Sciences as well as the Effects of Drugs on Human Performance course presented by the Indiana University Robert F. Borkenstein Center for Studies of Law in Action.

## Bemidji Regional Laboratory

### A Historical Perspective on the Bemidji Regional Office

The 80's and 90's saw an increase in the awareness of and need for forensic testing services. A satellite laboratory was discussed as a possible method to provide for this need. The late 90's brought support in the state legislature for funding a regional lab. The city of Bemidji agreed to donate a tract of land near the Bemidji Airport and to build the facility with a twenty-year lease-to-buy arrangement. In 2000, construction of the building at 3700 North Norris Court Northwest began.

In October 2001 the laboratory began performing forensic analysis at the Norris Court location. The scientists and staff at the facility included both experienced BCA employees that transferred to the Bemidji laboratory and newly hired employees. While the laboratory in Bemidji has a relatively brief history, the future provides opportunities for continued quality forensic services for the law enforcement communities of northern Minnesota.



Images from Google Earth



### **Biology/Nuclear DNA**

The Bemidji Biology Section is expanding to keep pace with the number of cases that are being submitted to the section, 331 in 2007. The case load keeps the staff busy with one fully trained scientist, a second trained in serology and working on DNA training and a third to start in March of 2008. The section is currently remodeling and expanding to make room for future staffing needs. The main goal for 2008 is to utilize the new space and staff to serve our customers with better turn around time on their cases.



Remodeling includes expansion of the office (*left*) and expansion into adjacent laboratory space (*right*).

### **Crime Scene**

The Crime Scene Section responded to 21 requests from law enforcement agencies in northern Minnesota in 2007. Our services were utilized by city, county, state and federal agencies to assist in their investigations. In 2006, Bemidji expanded its Crime Scene Team ranks with the addition of two more scientists who completed the required training and testing to participate in processing scenes. The team is also looking forward to the addition of another team leader to spread the responsibilities of supervising scene processing. Our goals for 2008 include ongoing training including the areas of shooting scene reconstruction and bloodspatter interpretation. The section is also working on updating and improving protocols and preparing for certification under new international standards by ASCLD/LAB *International*.



Urine on the side of a vehicle was located for collection through the use of UV light.

## Drug Chemistry

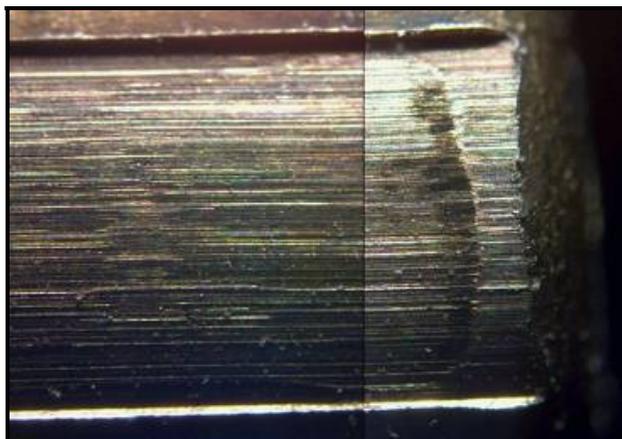
Bemidji's Drug Chemistry Section is staffed with three forensic scientists; two fully trained and a third nearing the end of her training. The section received over 1000 cases last year. As in Saint Paul, methamphetamine continued to be the most frequent submission with cocaine coming in second. For the second year in a row the section noted a near elimination of cases involving clandestine methamphetamine manufacturing facilities, but the decrease in methamphetamine labs did not stem the flow of methamphetamine into the laboratory.



Tablets containing a steroid (*left*) and methamphetamine and MDMA (*right*).

## Firearm and Toolmark

The Firearm and Toolmark Section in Bemidji received 102 cases in 2007. These cases involved comparative examinations of bullets and cartridge cases to firearms, distance determination on gunshots to clothing, toolmark comparisons, function testing of firearms, serial number restorations and more. Many of these cases consisted of evidence, firearms or cartridge cases, submitted for entry into the Minnesota firearms database. The lone firearms examiner in Bemidji had been assisted in entering these database cases by a retired special agent. However, the grant that funded this temporary position expired in the fall. Plans are in place for a student worker in 2008, which should help the section maintain the services our customers expect.

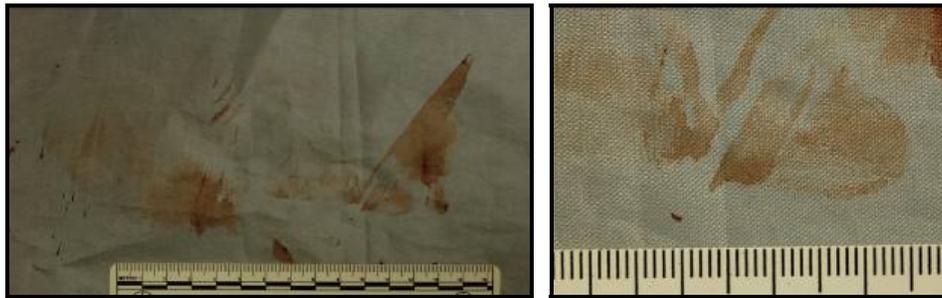


Comparison showing matching stria in land impressions on two bullets.

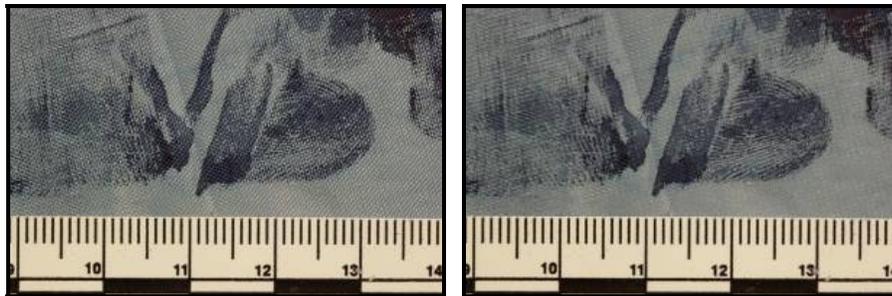
## Latent Print

2007 has brought some changes to the Latent Print Section in Bemidji. A new examiner was hired and is training under the sections lead scientist, Patrick Warrick. The section continues to utilize a technician to assist examiners by processing and documenting items of evidence submitted to the Laboratory. A grant from the Auto Insurance Industry provides funding for this position. It also funds training classes for law enforcement personnel throughout Minnesota on how to efficiently process recovered stolen vehicles and minimize loss of latent print evidence. In addition to handling the case load of 288 cases last year, the section took advantage of continuing educational opportunities. Patrick attended a digital imaging course offered by the FBI, served as a discussion panelist at the International Association for Identification Conference in San Diego and attended a course on tire track examination and comparison offered by the Midwest Forensic Resource Center

In one interesting case, a section of nylon fabric with apparent blood stains was processed for ridge detail using amido black. Prior to processing, ridge detail was not clearly visible; however, the smear across the fabric was consistent with the swipe of a hand.



After applying amido black, ridge detail was obvious, but the weave of the fabric interfered with analysis.



Using Photoshop, the repetitive pattern of the weave was removed and identification of the print was accomplished.