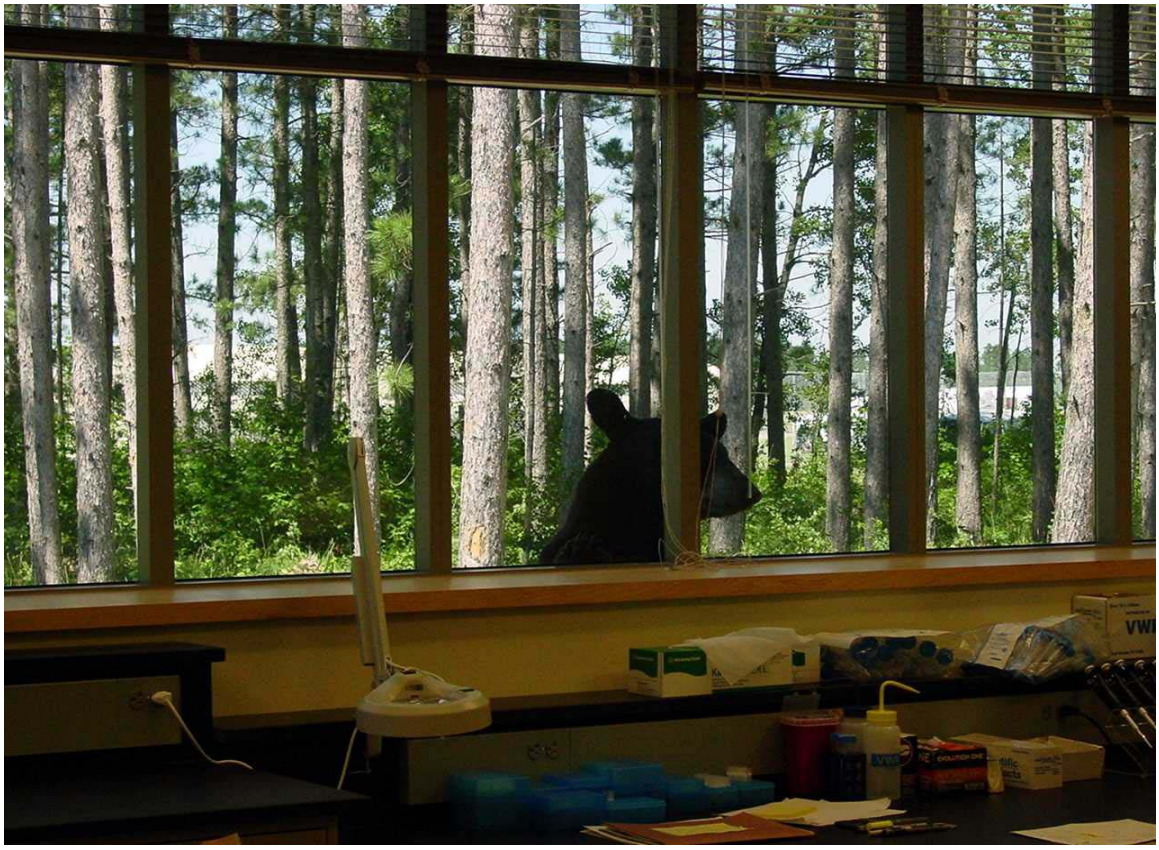
MINNESOTA DEPARTMENT OF PUBLIC SAFETY



BUREAU OF CRIMINAL APPREHENSION

FORENSIC SCIENCE SERVICE

2002 ANNUAL REPORT

~Director's Message~

Last year we had about one-third of our scientists in training; all but three have now gone on-line. Consequently, the backlog and turn-around time is coming down in most areas of the laboratory.

As part of our case management system (called BEAST), we are now able to e-mail encrypted laboratory reports directly to our submitters. Over 150 police and sheriff's departments are now receiving their reports in this manner. The system also has the capability for departments to view any laboratory reports on their completed cases over a secure website. If your department is interested in these features, please contact Tony Petracca at (651) 642-0700.

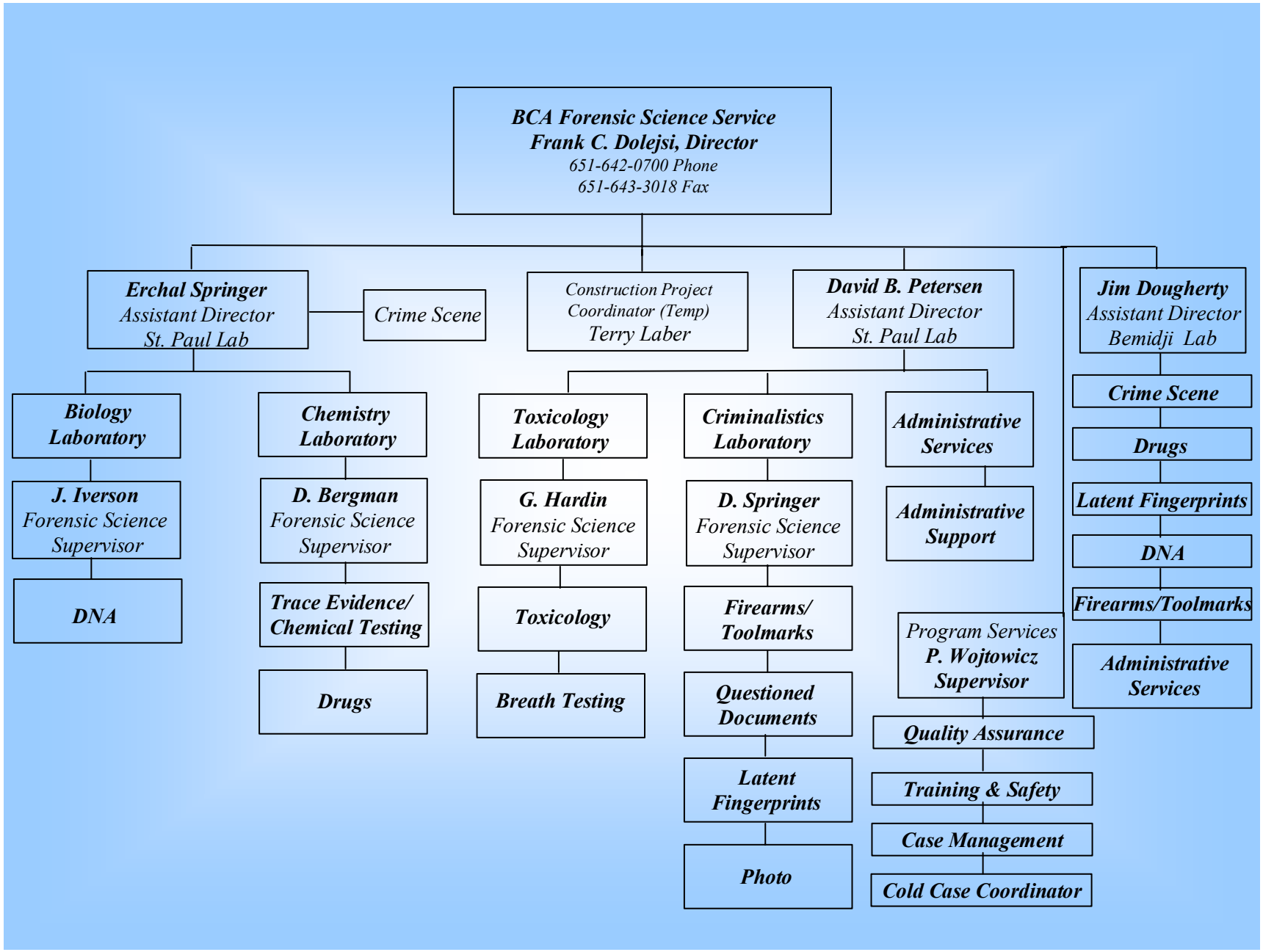
In July of 2002, the DNA offender database was expanded to include all felons. The legislation only provided funds to collect the samples and unless extended by the 2003 legislature, will expire at the end of June 2003. To assist law enforcement and corrections agencies, the BCA developed a new system using swabs to collect DNA, replacing more expensive blood drawing. The BCA has applied for federal NIJ funds to run these new offenders' DNA, estimated to be about 21,000 offenders.

During 2002, the FBI's DRUGFIRE database was replaced by ATFS NIBIN (National Integrated Ballistics Information Network). This was a cooperative effort between the FBI and ATF. Units were installed at the BCA in St. Paul and Bemidji, as well as the Minneapolis Bureau of Investigation Lab and the Hennepin County Sheriff's Crime Lab. Like DRUGFIRE, the system allows us to link cases based on cartridge cases entered into this database.

The new BCA building in St. Paul will be at 1430 Maryland Avenue East. We anticipate moving in some time after August 4, 2003. The new building will provide an environment to improve laboratory efficiency as well as provide room to grow in the future. It will be "better than sliced bread."

Frank Dolejsi
BCA Laboratory Director

On the cover:
Our Bemidji Regional Office undergoes a "laboratory inspection".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Crime Scene
Drugs
Latent Fingerprints
DNA
Firearms/Toolmarks
Administrative Services

FORENSIC SCIENCE SERVICE

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FORENSIC SCIENCE SERVICE

The BCA Forensic Science Service provides identification and comparisons of physical evidence for law enforcement agencies in Minnesota. Staff scientists with various scientific specialties 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. The Laboratory's "Crime Scene Service" is available to process crime scenes for physical evidence in death investigations.

Specific scientific expertise is provided in the Laboratory sections. The following describes the types of examinations that can be made by each section:

BIOLOGY/DNA SECTION

The Biology section conducts 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. Bloodspatter interpretation on clothing and at crime scenes can also be requested.

BREATH TESTING SECTION

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

CRIME SCENE RESPONSE

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

DNA PROFILING SECTION

The DNA Profiling section determines the DNA profiles of convicted sex offenders, stores these profiles in a database, and compares these database profiles with DNA profiles obtained from evidence in criminal cases where no suspect has been identified.

DRUG CHEMISTRY SECTION

The Drug Chemistry section analyzes and identifies suspected controlled substances. This includes clandestinely manufactured products, as well as, legitimately manufactured pharmaceutical products. The section also identifies controlled substances found in various psychoactive plant materials.

FIREARMS AND TOOLMARKS SECTION

The Firearms and Toolmarks section conducts many types of examinations: whether a questioned bullet or cartridge case was fired from a suspect firearm, the caliber and type of firearm possibly used to produce fired bullets and cartridge cases when no firearm has yet been recovered, the proximity of the firearm to the target material, whether a firearm is functional, and whether submitted ammunition is a commercial load or reload. This sectional also maintains a DRUGFIRE database to use firearms evidence to link crime scenes.

The Firearms and Toolmarks section can also provide examinations in the following areas: whether a toolmark matches a recovered tool, the type of tool which may have been used to produce a toolmark, and whether a lock is in working order or how it has been compromised. The restoration of serial numbers on various materials and items is also done.

LATENT PRINT SECTION

The Latent Print section compares unknown latent prints with elimination and suspect prints for identification purposes, uses the Midwest Automated Fingerprint Identification network (MAFIN) to find a source for unknown latent prints and develops latent prints for agencies who lack the necessary facilities.

PHOTOGRAPHY SECTION

The Photography section develops and prints crime scene photographs, photographs of evidence, photographs of a sensitive nature submitted by law enforcement agencies, and photographs for training purposes.

PROGRAM SERVICES SECTION

The Program Services Section provides support to all Forensic Science Service sections in the areas of Quality Assurance, Safety & Training, and the Laboratory Information Management System (LIMS). Quality Assurance programs are employed to monitor, document, and evaluate the quality of all Laboratory services. Training programs enable employees to develop new skills, maintain proficiency, and promote professional development. Safety programs furnish employees with a safe working environment and comply with occupational regulations. The LIMS is a tool for case management and a source for statistical information on Laboratory casework and employee professional activities.

QUESTIONED DOCUMENTS SECTION

The Documents section continues to offer examination services in such areas as signature, handwriting, and hand printing identification, typewriter identification, indented writing, inks, papers, mechanical impressions, photocopier identification, alterations and obliterations, reconstruction of documents that have been burned or damaged and the identification of counterfeit documents.

TOXICOLOGY SECTION

The Toxicology section analyzes blood, urine, and other biological samples for alcohol and other drugs.

TRACE EVIDENCE SECTION

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. Examinations can also include shoeprints and tire tracks, as well as physical matches of broken or torn objects. Chemical Testing examinations determine the presence of accelerants in fire debris and explosives in explosion debris.

CASES/KITS RECEIVED	1996	1997	1998	1999	2000	2001	2002
Homicide & Attempted Homicide	131	124	105	122	97	95	103
Controlled Substances	2,101	2,528	2,621	2,360	3,126	3,437	3,326
Criminal Sexual Conduct	446	510	515	515	503	554	691
Burglary/Robbery	569	422	524	447	464	341	455
Fire Investigation	211	178	140	185	166	132	178
Fraud/Forgery	152	172	130	152	124	78	87
DWI	8,235	9,244	8,147	7,702	7,466	5,633	5,200
All Other Criminal	1,263	1,220	1,405	1,560	1,629	1,529	1,518
Proficiency Testing	78	70	83	78	69	90	95
TOTALS	**13,166**	**14,468**	**13,670**	**13,670**	**13,391**	**11,889**	**11,653**

BIOLOGY/DNA

2002 was a very exciting year for the Biology/DNA section of the laboratory. The start of the year saw the beginning of our first full year as two laboratories. The St. Paul Biology section completed 1,423 cases in 2002 and the Bemidji Biology section completed 169 cases. The average turn around time is below two months. Sharing cases and information has been significantly helped by the email and shared computer drive access as well as by the teleconferencing capabilities of the laboratory. We are able to discuss interesting cases, share ideas, and continue to grow as a complete section.

This year, significant steps were taken towards the implementation of Y-STR work with the validation of YPLEX-5 and YPLEX-6, two STR DNA amplification kits that focus on the Y chromosome, which exists only in men. Two interns helped considerably to get this project started. We were able to send one scientist to the annual International Y-STR conference, held in Portugal this year, to discuss relevant topics of Y-STR validation and upcoming casework. An intern has continued with our section as a student worker, helping create Y-PLEX population databases as well as handle the increasing number of convicted offender samples submitted to our laboratory.

Processing convicted offender samples has increased significantly this past year. Hundreds of samples are being submitted daily.

We have increased our staff by one person to help collect convicted offender samples for processing by our database subsection. The number of convicted offender samples submitted more than doubled in 2002—from 3501 to 8213—as the new all-felons statute came into effect in July. An NIJ grant was written to outsource convicted offender database work in order to eliminate our current backlog in that area. Our hope is that in the new building in the years to come we will have the space and personnel to profile all convicted offender samples that are submitted.

Six forensic database "hits" and 16 convicted offender database "hits" were obtained in 2002 at the state level. Ten Minnesota forensic matches were obtained with other states' offenders, while three other state forensic samples matched Minnesota convicted offender samples in 2002. In addition, four forensic samples at the national level matched with Minnesota forensic samples. These database hits let to a total of 45 investigations aided, many of them cold-case investigative leads. One convicted offender sample, collected due to a robbery offense, helped solve a three-year-old non-suspect homicide in Hubbard County.

Buccal swab collection packets are being used to collect convicted offender samples. This change allows law enforcement to safely collect samples without transferring offenders to hospitals to draw samples.

DNA testing connected a "stranger" sexual assault that occurred in June 2002 to a brutal sexual assault that occurred in 1993. In July 2002 the suspect was apprehended and is currently awaiting trial. That success, as well as others, prompted the unit to apply for an NIJ grant to help underwrite the expense of re-examining old cases with the new STR technology. Our hope is that the grant will be implemented in the second quarter of 2003. In 2002 alone, four DNA database hits occurred with old cases that had been retested with STR technology.

Post-conviction DNA testing, requested by the Ramsey County Attorney's Office, vindicated an original suspect while matching a convicted offender sample. The original suspect is serving a prison sentence for an unrelated murder. No new charges can be brought against the person whose convicted offender sample matched the forensic sample due to the expiration of the statute of limitations.

Although we haven't increased the number of casework scientists in the section, we have significantly decreased the turn-around time for cases submitted for serological examination and DNA testing. We also altered our partnership with the Hennepin County Crime Laboratory Biology Section, helping them get their STR casework protocols implemented and enabling them to perform their own STR casework. We continue to support them as they learn and flourish and are excited to have them become a fully functional DNA laboratory.

Following many Frye-Mack hearings in counties such as Hennepin, Ramsey, and Washington, the Minnesota Supreme Court heard arguments on the reliability of PCR-STR DNA testing and our ability as a laboratory to follow the standards presented by the DNA Advisory Board (DAB). Defense attorneys challenged the validity of the multiplex STR kits used in the laboratory. Scientists from our section listened to the proceedings on November 5, 2002. On February 24, 2003, the Minnesota Supreme Court ruled that PCR-STR testing is generally accepted in the relevant scientific community. Many cases had been postponed in anticipation of this decision and; therefore, few of the scientists testified in court in 2002.

An intern for the section works on a research project on DNA extractions. Interns continue to be of great assistance in the research of new and faster techniques for DNA testing so that we can continue to be on the cutting edge of DNA work in the field of forensic science.

At the conclusion of 2002, we look back on many highlights. We are confident that 2003 will bring even more successes and accomplishments of which to be proud. As always, we continue to serve our clients by striving for the scientific truth in the most rapid, yet exhaustive, way possible.

BREATH TESTING

In 2002, Intoxilyzer 5000 instruments were responsible for 26,457 complete breath tests statewide. The average result obtained was 0.15 with values as high as 0.42. The number of Intoxilyzer locations increased to 190 in 2002 with the addition of new tests sites in Pelican Rapids, Elk River, Zumbrota, and Lindstrom. The Breath Testing Section supports each testing location with instrument maintenance, logistical support, and computerized tracking of all tests performed. Expert testimony about technical issues related to breath-alcohol testing is also provided. In 2002 the Breath Testing Section received approximately 400 requests from prosecutors for court testimony.

Education continues to be a major focus of the Breath Testing Section. In the past year, 9 week long Intoxilyzer Basic Courses were completed which resulted in the certification of 275 new Intoxilyzer operators. Recertification of 1186 existing operators also took place during 41 classes held in St Paul, Bemidji, and Rochester.

Increasing emphasis on alcohol offenses statewide has lead to many new requests for presentations about alcohol and alcohol testing. To address these requests, we have provided speakers and seminars for groups like the Minnesota County Attorneys Association, Hennepin County DWI prosecutors, and Continuing Legal Education providers. We also participate in the orientation of newly appointed judges by giving them a brief presentation on alcohol testing.

We have also invested in the education of our own staff. In 2002, we sent a staff member to a school conducted by a Preliminary Breath Tester (PBT) manufacturer to enhance our PBT repair capabilities. Additionally, we have begun cross training some of the Breath Section staff into the toxicology lab to provide increased scheduling flexibility and further their expertise.

Intoxilyzer 5000

Every year the Breath Testing Section encounters a fresh crop of novel defenses and sad stories of impairment, bordering on the absurd. This past year has been no exception. In 2002, we have seen drinking drivers attempt to attribute their breath alcohol readings to the following substances: cough drops, cold remedies, mouthwash, gum, tobacco, leather dye, brake cleaning fluid, pop, beef jerky, pizza dough, bread, and prescription medications. We also had a case where the subject claimed his mouth became contaminated with alcohol when he provided mouth-to-mouth resuscitation to an injured friend.

On a lighter note, our favorite story of impairment concerned an individual found sitting in his car, tapping on his window, asking for help getting out because he claimed to have accidentally locked himself inside his car.

We are hopeful that the approval of new rules governing breath testing in Minnesota will occur this year. These new rules will allow us to implement a series of program upgrades, which have been stalled by the limitations imposed by the old rules. We are looking forward to our move to the new BCA building. The larger classrooms will provide a better learning environment and increase the efficiency of our teaching.

CRIME SCENE TEAM

The BCA Forensic Laboratory Crime Scene Team from the St. Paul Laboratory responded to forty-eight requests for assistance in the year 2002. Of these, eight were homicides, four were attempted homicides, six assaults, seventeen death investigations, one burglary, five hit and run, three criminal sexual conducts, one robbery, two kidnappings and one other criminal investigation. Three of these responses were officer-involved shootings and eighteen scenes involved processing a vehicle.

2002 was a year of planning and change in the crime scene program at the BCA. The preparations for the 2004 crime scene processing accreditation by the American Society of Crime Laboratory Directors Laboratory Accreditation Board included the review and reorganization of the current standard operating procedures and methods manual used for processing crime scenes. The Forensic Science Supervisors, Assistant Laboratory Directors, and the Director will review, approve, and authorize the manual and changes. This has been a joint project of the St. Paul and Bemidji laboratories. Extensive training for both active crime scene members and potential new members began in 2002 and is almost completed.

Training of the forensic science crime scene members started on May 9, 2002. The crime scene team members received training in Clandestine Grave digging. Three mock graves were prepared in the fall of 2001 and in May 2002, teams were each given an area to search for potential gravesites. Sites were searched using cemetery probes and the grave perimeters were marked using stakes and strings. The grave was slowly uncovered and the evidence was properly documented, packaged, and marked.

On May 29, 2002, training was presented on the basic approach and documentation of a crime scene. The presentation also consisted of the "Master Tool Approach" to a crime scene; what is missing, what is added, and what is altered or contaminated. The presentation was very informative.

On June 3 and 4, 2002, specialized hands-on training using the EDM instrument was given by the Special Operations Investigations Section of the BCA. The EDM instrument is used for obtaining the exact measurements to assist in sketching a crime scene and to document forensic evidence in crime scene sketches.

On June 6, 2002, training given by the Biology/DNA section of the laboratory consisted of lectures and hands-on training on detecting blood by using phenolphthalein, luminol, coomassie blue, and leucocrystal violet. Proper methods used to collect blood at a crime scene were also demonstrated and practiced by team members.

On June 19 and 20, 2002, the Latent Print Section gave a presentation and hands-on training exercise on processing non-porous items for the presence of latent prints. Other techniques learned by team members included super glue fuming, dusting, and documenting and lifting latent prints from items of evidence. The proper use of blood reagents to develop latent prints left in blood on items of evidence at a crime scene was also presented.

On June 26, 2002, the Firearms Section of the laboratory gave a presentation and a hands-on training exercise on using Mikrosil material for lifting tool marks, and firearms training which consisted of how to handle a loaded firearm to render it safe, and the proper packaging and marking of firearms. A variety of different firearms were used. Team members also were instructed on the collection, marking, and packing of firearms evidence.

On July 10, 2002, the Trace Section presented a lecture and provided a hands-on training exercise in the proper collection and packaging of trace evidence, shoeprint casting, paint collection, and fabric impression lifting.

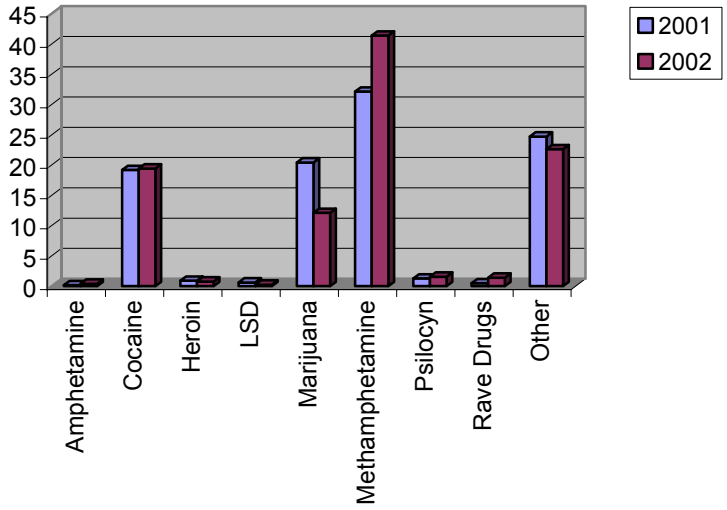
On September 5 and 6, 2002, ten crime scene team members attended the Medical Examiners Education Conference on “Blunt Force Trauma”.

Goals for the year 2003 include a written test and a mock crime scene practical for all current and potential crime scene team members. A proficiency-testing program will be implemented for team members. Advanced training for potential new crime scene leaders is also a goal for 2003. The finalization of the new crime scene manual is scheduled for this spring. The completion of these goals will allow us to achieve crime scene accreditation and continue to provide quality service in the future.

DRUG CHEMISTRY

The Saint Paul Drug Chemistry section reported 4,104 cases in 2002, which resulted in a 27% increase from the 3,010 reported in 2001. Table 1 compares 2001 and 2002 for drug case items submitted. Methamphetamines lead the submissions once again with 41%, a 9% increase from 2001. Marijuana items decreased from 20% to 12%, which is a result from only analyzing marijuana with a court date. Cocaine items increased slightly to 19.5%. Rave drug items tripled from 2001 to 2002. Other increases were noted within the amphetamine and psilocyn submissions, while there was a drop in the heroin and lysergic acid diethylamide (LSD) submissions.

Table 1: % Drug Case Items (2001 vs. 2002)



In 2002, the Saint Paul Drug section received an off-white brick containing an impression of an arrow (Figure 1). It was also noted that all four edges of the block had raised 'dots' in sets of three approximately 3/4 of an inch apart (Figure 2). The dimensions of the brick were approximately 8 7/8 inches long by 5 inches wide by 1 3/4 inches thick. The total weight was 1,004.6 grams. The arrow was approximately 6 inches long. GC-MS and FTIR analysis of the brick indicated the presence of approximately 70% Cocaine HCl. Submissions of this size, with imprinted logos are uncommon for the laboratory.

Figure 1: Arrow impression on one side of the brick.

Figure 2: Raised 'dots' on the edge of the brick.

Other unique submissions received in the Saint Paul Drug section for 2002 included the seeds pictured below in Figures 3 and 4 and the unusually small microdots pictured in Figures 5 and 6. The seeds were Baby Woodrose seeds from *Argyreia nervosa*, a flower native to Hawaii, Haiti, and Asia. The seeds contained Lysergic Acid Amide (LSA). The unusually small microdots contained Lysergic Acid Diethylamide (LSD).

Figure 3: Close-up of Baby Woodrose seed.

Figure 4: Baby Woodrose seeds.

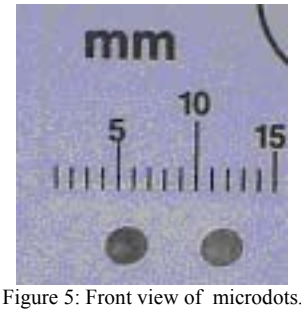


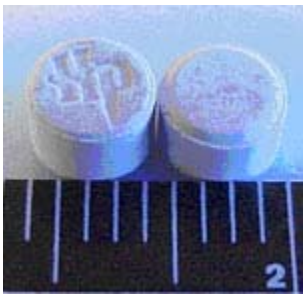
Figure 5: Front view of microdots.

Figure 6: Front and side view of microdots.

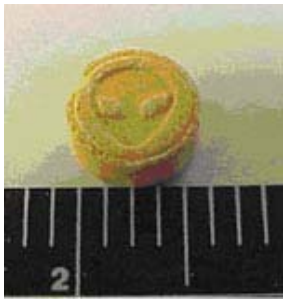
Rave drug submissions tripled from 2001 to 2002. Club drugs submitted to the Saint Paul section have contained 3,4-methylenedioxymethamphetamine (MDMA/Ecstasy), 3,4-methylenedioxyamphetamine (MDA), and ketamine. These "feel good" drugs are often given a familiar logo to aid the marketability to their main targets; teens and young adults.

Figure 7: "XTC" 3,4-MDA.

Figure 8: Pictures of rave drugs submitted to the Saint Paul Drug section in 2002.



A) Harry Potter 3,4-MDMA.



B) Alien 3,4-MDMA.

C) Heart 3,4-MDMA.

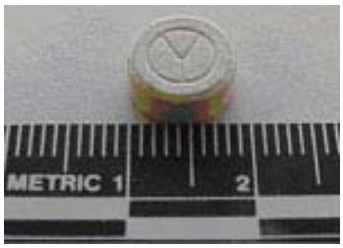
D) Pink CU 3,4-MDMA, Ketamine, and Methamphetamine.

E) Smiley Face 3,4-MDMA and 3,4-MDA.

F) Airplane 3,4-MDA.

G) Mercedes 3,4-MDMA.

H) Dollar Sign 3,4-MDMA



I) Peace Sign 3,4-MDMA.

Our primary goal is to reduce the turn-around time on drug cases to less than one month, while continuing to service our customers in a professional and meticulous manner. We also eagerly await the move to our new location scheduled for the late summer of 2003.

FIREARMS AND TOOLMARKS

The Firearms and Toolmarks Section conducts tests on bullets, cartridge cases, and firearms to identify firearms used in crimes; restores serial numbers on firearms and vehicles; and identifies tools used to make unknown toolmarks. A comparison microscope is used for many of the examinations in the section.

Two section members completed their training in 2002, bringing the total number of trained firearms examiners in the St. Paul Laboratory to three. Currently, there is one trainee in the section. A fourth trained firearms examiner is assigned to the Bemidji Laboratory, which services the northern region of the state.

In 2002 the Firearms Sections of St Paul and Bemidji had an increase in submitted cases of approximately 5% from 2001. However, in 2002 the two sections completed 63% more cases than the prior year, with an ongoing, significant decrease in the turnaround time.

The majority of cases submitted to the St. Paul Firearms Section in 2002 continued to be DRUGFIRE or IBIS cases. The DRUGFIRE system, which is an FBI-developed program, was replaced in April 2002 by a system sponsored by the BATF (Bureau of Alcohol, Tobacco and Firearms) as part of the NIBIN (National Integrated Ballistic Information Network) program, and is called IBIS (Integrated Ballistics Identification System).

These are computer database programs that capture images of fired cartridge cases and bullets that are recovered from crime scenes or are test-fired from recovered firearms. When new entries are made into the database, the program compares the images and shows the scientist possible matches. The scientist must then acquire the actual evidence and make comparisons to verify whether a match, or “hit”, exists.

These programs have been very successful in Minnesota, with many crimes now being linked which previously would not have been connected. One of the "hits" using IBIS involved a homicide in a west metro suburb with no suspects identified or firearm recovered. A firearm from an unrelated incident in St. Paul was submitted and was test-fired, entered into IBIS, and subsequently matched to the fired evidence in the homicide case.

In 2002, forensic scientists in the Firearms and Toolmarks Sections participated in many training and continuing education activities. Armorer's courses were attended for Glock and Beretta firearms. All members of the Firearms and Toolmarks Sections were able to attend a training program, sponsored by the BATF, for the IBIS system. Two section members also had articles published in the AFTE (Association of Firearms and Toolmark Examiners) Journal.

Scientists in the section taught a Firearms and Toolmarks Evidence Collection course for local law enforcement that was coordinated by the BCA Police Training Section. One scientist graduated from the National Firearms Examiner Academy, which was sponsored by the BATF at their National Laboratory Center outside of Washington, DC. The yearlong academy consisted of pre-course written work, three months of training at the BATF Laboratory in Maryland on the basic examinations performed by firearms examiners, and concluded in 2002 with a two-week program of research presentations and moot court exercises in Alexandria, Virginia.

Several interesting cases were solved in the Firearms and Toolmarks Section in 2002. One of the more significant was the comparison of evidence in the abduction/homicide of Julie Holmquist that occurred four years ago. A firearms examiner was able to identify a fired cartridge case from the crime scene to a firearm recovered from the suspect.

Looking ahead to 2003, the Firearms and Toolmarks Section is looking forward to better serving the law enforcement community through a continued reduction in the turnaround time of cases. And, as always, the section hopes to find time to conduct research related to the firearms and toolmarks field in order to assist other firearms examiners, law enforcement agencies, and the criminal justice community.

LATENT PRINT

2002 opened with a federal judge ruling that the science of fingerprints did not meet the U.S. Supreme Court's Daubert test, thus preventing an FBI latent print expert from testifying that two fingerprints matched. This was the first successful challenge for the defense in the 100-year history of the use of the forensic science of latent print comparisons. The court did take judicial notice that fingerprints are unique and permanent, and after a three-day hearing where the government was allowed to rebut the ruling, the judge reversed himself. As a result of this ruling, there were numerous challenges in criminal cases by the defense throughout 2002. Although they all failed, latent print examiners across the country were thrust into discussions, training in Daubert issues, and extensive preparations for similar challenges in the courts.

There were no such challenges in Minnesota during 2002, but the latent print section has stayed on top of the issue and has ensured that all scientific steps in the examination process are accomplished and properly documented.

Josh Bergeron marking some evidence.

Early in the year, both Scott Ford (St. Paul) and Marty Koolen (Bemidji) completed their training and began contributing their skills to the ever-increasing backlog. While new scientists were being incorporated into the section, 30 years of latent print experience walked out the door in the form of Dennis Hughes, who retired in November. His experience and excellent eye for the fingerprint discipline have been greatly missed.

Three Basic Latent Print classes were held in Duluth, International Falls, and Mankato. Two Advanced Latent Print classes were held at the BCA Lab. Providing this type of training to law enforcement agencies has resulted in the submission of a higher percentage of evidence that has been completely processed and, in addition, the submission of high quality known inked fingerprint and/or major case prints from suspects and elimination individuals. This has helped the laboratory provide a more timely resolution of these cases for the submitting agencies.

Pat Warrick teaching the Basic Latent Print Course in Duluth

The ten-print database maintained by CJIS continues to grow rapidly with the continued addition of live-scan units across the state. As each new card is added, its images are compared against unsolved latent prints in the Unsolved Latent File (ULF) of the MAFIN system. Over 68,000 cards were searched with nearly 350,000 images examined. This activity resulted in 45 hits on previously unsolved cases. In addition, unknown suspect cases entered during 2002 resulted in 54 hits.

The Integrated Automated Fingerprint Identification System, which conducts latent print searches of the FBI database, became fully operational during the year. In July, the first hit was made that identified an unknown deceased male from Morrison County, MN. The decedent had a criminal record in Texas and Arkansas, but not in Minnesota.

Shane Lanning was a student intern in the St. Paul lab and, with the assistance of Josh Bergeron, conducted research regarding the use of titanium dioxide to visualize latent prints deposited in blood on dark, non-porous surfaces. Shane recently completed his studies at the University of Wisconsin, La Crosse.

Chastine Netland was the student intern in the Bemidji lab. Scientists Patrick Warrick and Marty Koolen assisted Chastine in her research, which examined the use of fluorescent fingerprint powders and dye stains.

Scott Ford examining a latent print on a firearm.
All firearms are rendered safe before being submitted for examination

David Peterson was on the planning committee for the International Association for Identification (IAI) Midwest Divisional Educational Conference that was held in Peoria, IL, in March. Nearly 200 law enforcement professionals from around the Midwest attended the conference. David also presented a case study regarding crime scene and latent print disciplines.

Glenn Langenburg was invited to be a guest speaker for the American Board of Forensic Document Examiners Symposium in June regarding the Daubert hearings and challenges to the latent print discipline. He was subsequently invited to present a Daubert workshop to the Midwest Association of Forensic Scientists (MAFS) in September. Glenn also gave a poster presentation at the IAI conference in August, which outlined his pilot study of "A Statistical Analysis of the ACE-V Methodology – the Analysis Stage" in the latent print discipline.

In September, Josh Bergeron and Scott Ford gave a well-received demonstration of the use of titanium dioxide at the Minnesota Division IAI Conference in Owatonna.

Gary Walton devoted a large portion of his time to the coordination of the BCA laboratory Crime Scene program. However, his 30 years of latent print experience continued to be valuable to the section and to the Crime Scene team members he trained during 2002.

QUESTIONED DOCUMENTS

At the beginning of fiscal year 2002, the Questioned Documents section was staffed by two fully trained scientists and a trainee. In December the turnaround time was reduced to approximately three months. In addition to this decrease, the new fiscal year should see a further decrease, as one of the scientists is in the final stages of his training.

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 burned or damaged.

The majority of Questioned Document cases involve handwriting examinations. They may include abductions, threats, and notes, but the majority of the handwriting cases involve forgeries. These cases include checks, credit cards, and other documents involving the increase in occurrence of "Identity Thefts" around the nation. Besides examining the handwriting on the documents for authenticity, the Questioned Document Section must examine documents for tracings and/or simulations (Figure 1, Figure 2 and Figure 3). The ever-increasing capability of new computer software and printers to produce professional looking documents is adding a new dimension in the examination of documents.

Figure 1: Questioned Signature

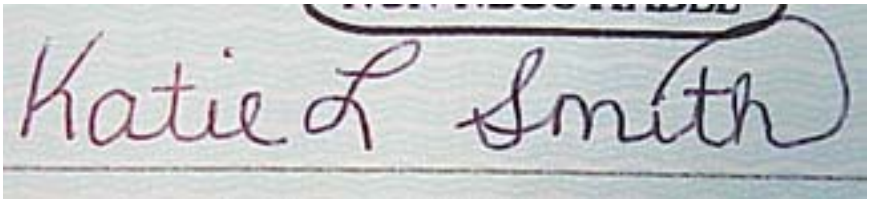


Figure 2: Questioned Signature Using Side Lighting and Filters
Note the two indentations: one from the visible inked "Smith" and the other from the impression made by tracing a model signature of "Smith".

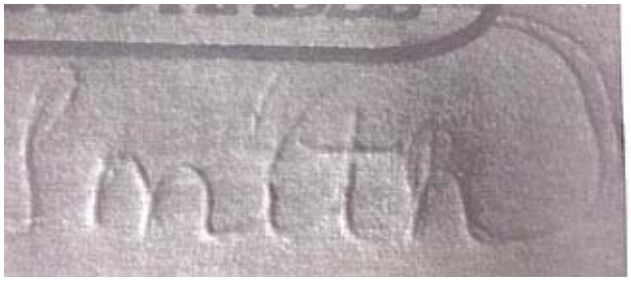
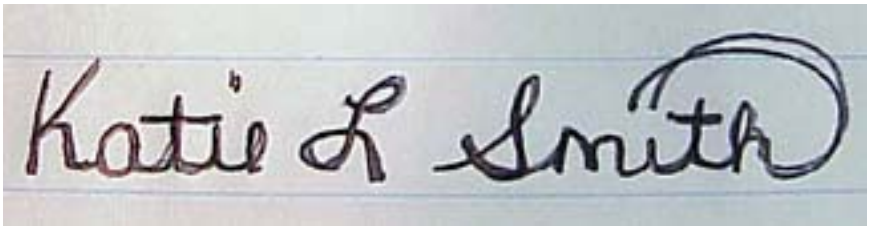


Figure 3: Model Signature Used for Tracing



The cases submitted to the Forensic Document Section continue to represent a wide spectrum of case types that include everything from vandalism to homicide investigations. We would like to remind our customer, that in order for us to conduct a complete examination, we need the following materials:

1. If the original of the questioned and known documents exist, they are the preferred material to examine. If the originals are not available, we can work with photocopies, 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 us to make a determination 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 we must have hand printing from the suspect writer if the questioned material is hand printed, and handwriting if the questioned material is handwritten. It also means that we need the same letter combinations in both the questioned and known 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 give us a call at 651-642-0700 and we can provide them. The requested 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 material, it is very important to include non-requested writing from the suspect writer. This consists of material which was written when the suspect writer had no idea that it would be used for examination purposes. This can help us 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 at our web site listed above, or give us a call and we will send you a copy.

Many investigators, when working with forged checks, focus their efforts on determining whether their suspect writer wrote the payers' signatures 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 continues to remain on the cutting edge of all new technology as the science of forensic document examination progresses into 2003.

PHOTOGRAPHY

In 2002, the Photography Section continued to process and print film submitted from all divisions of the Bureau of Criminal Apprehension and selected case related film from other agencies.

The majority of work in the section involved the timely processing and printing of film submitted from BCA crime scenes. Several requests involved printing enlargements for court and display purposes. Enlargements for court are made 12 ″ by 18″ which facilitates the mounting services provided by the Special Operations Unit of the BCA. Generally, the Photography Section can only provide these services when the BCA is already involved in the case. Photography evidence seized during a select number of sensitive investigations was also processed and printed for the submitting agency.

During the year, the Photography Section was also involved in taking photographs for special BCA events.

PROGRAM SERVICES

The Program Services Section provides laboratory support for both the St. Paul and the Bemidji laboratories in the essential areas of safety, training, the Laboratory Information Management System (LIMS), quality assurance, and laboratory coordination with the investigative Cold Case Unit.

In 2002, Safety and Training Coordinator Mark Nielsen obtained "Keller*Online*" as a laboratory safety management tool. For his winning essay on safety, Mark was awarded a Keller*Online*, "2002 Safety Professional of the Year" award. The basic theme is that "safety is a state of mind" –in that whatever we do in the Laboratory, we do it with safety consciousness.

Mark also developed and implemented Hazardous Waste training within each Laboratory section to train staff in the proper way to deal with hazardous materials disposal, and conducted annual Right-to-Know training. Other support that he provided to laboratory staff included the development of an electronic BCA Chemical Inventory List with direct links to the Material Safety Data Sheets. In addition, the move to the new BCA building will present challenges to the management of laboratory chemicals, equipment, and glassware. Old and out of use chemicals, equipment, and glassware must be disposed of or recycled, and all those currently in use must be safely packed and moved. Mark is actively involved in this process.

LIMS Coordinator Tony Petracca has worked in 2002 to refine the LIMS and add features that enhance laboratory case management and reporting. In the past year, the Firearms Reference Collection has been logged into the LIMS Chemicals and Reagents feature. Tony is also working with Safety and Training Coordinator Mark Nielsen to develop a system for tracking chemicals ordered and received, and those that are no longer in use in the laboratory.

LIMS electronic reporting has been implemented for 150 of the 250 agencies that commonly receive BCA reports. Security for this transmission is achieved through encryption of the e-mail and website reports sent, and software to enable the agencies to read the reports. Agency pre-logging of evidence is a LIMS feature that is being explored on a test basis. The advantage to the agency that would participate in evidence pre-logging is that they would have the potential to do advance documentation of their evidence submitted to the BCA Laboratory.

Tony Petracca and the Biology Unit's Combined DNA Index System (CODIS) Administrator Barbara Evans have worked on two projects: (1) Convicted Offender DNA sample kits are now logged into the LIMS, and (2) a pilot project is in operation for a web-based Convicted Offender DNA Pre-Log system. This feature would allow corrections officials to log convicted offender information into the LIMS for samples being sent to the BCA.

Tony has also completed projects for case report formatting and for scanning documents to the electronic LIMS file. The Toxicology section is exploring a project for capturing instrumental results in the LIMS case record. The Crime Scene section will soon have a LIMS utility available for use with the mobile Crime Scene Response Laboratory unit for entering case information and barcoding evidence collected, which can then be uploaded to the Laboratory LIMS.

Cold Case Coordinator Mary Gunn sifts through BCA and agency documents, examines evidence, and coordinates with agency and BCA investigators to develop new leads for unsolved cases. Some of these cases are reviewed at the request of the agency, and some have been BCA-initiated reviews. Mary is currently examining 45 cases, and additional DNA testing is being conducted on some of them. There is also some trace evidence and questioned documents examinations taking place on cold cases. Mary also presented information on cold case evidence before the State Homicide Conference in 2002.

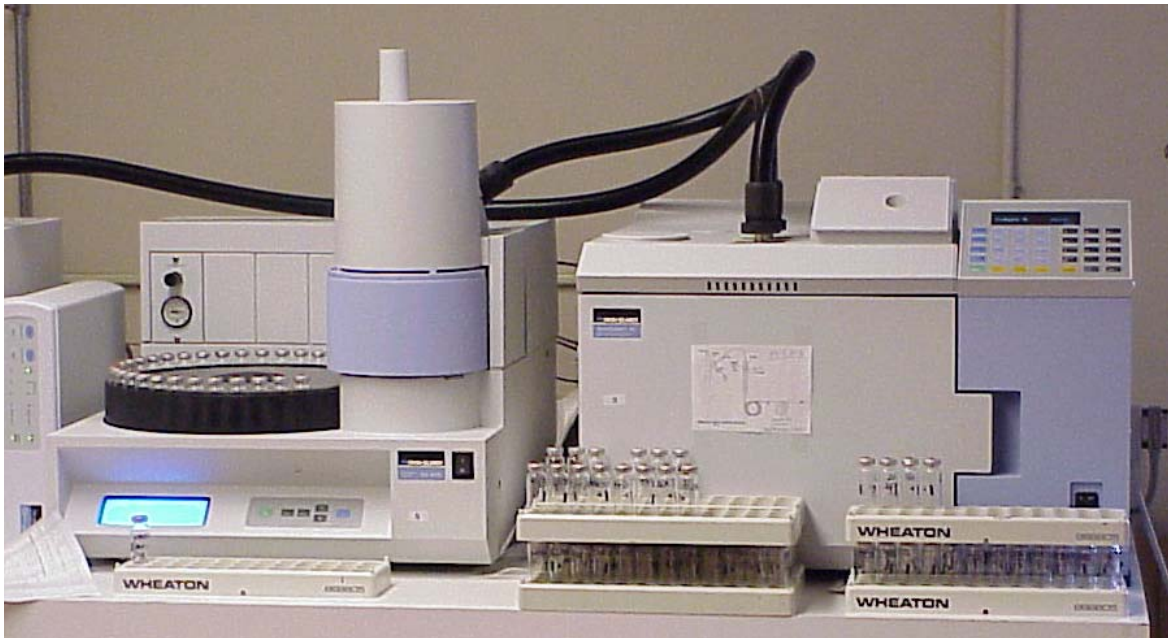
The Laboratory Quality Assurance program continues to evaluate and develop the Laboratory Quality System, which serves to support the validity of Laboratory analyses, results and reports. One means of evaluation developed and implemented in 2002 is the internal audit program coordinated by Quality Assurance Coordinator LaRae McPartlin. The program is designed to assess the quality control activities of the Laboratory sections. An important element of the quality system is maintaining our American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) accreditation.

Other quality assurance activities include administration of the proficiency-testing program, evaluation of court monitoring activities, and the monthly quality assurance reports to laboratory managers. To clarify our laboratory quality assurance activities in support of our quality system, a series of presentations to staff is being offered through monthly all-laboratory staff meetings.

Part of the challenge for 2003 for the Program Services Section is facing the demands and deadlines of the move to the new building. This will involve evaluation and inventory of laboratory equipment, archival needs for documentation, and data processing needs to complete the move and to be adequate for the new building.

TOXICOLOGY

In 2002, 6467 blood and urine samples were analyzed for ethyl alcohol, and 1899 were analyzed for drugs. Since July 2001, the turn-around-time for alcohol cases has dropped from 11.7 days to 6.2 days and for drug cases the turn-around-time has declined from 86 days to 45 days. During this period the caseload has increased by 8% and the range of drugs we test for increased as we added drugs such as MDMA, Ketamine, and GHB.
Marijuana continues to be the most common drug found, followed by Methamphetamine, Cocaine, Opiates, and other drugs.



Headspace Gas Chromatograph used for ethyl alcohol analysis

The most unusual Toxicology case submitted in 2002 involved a urine sample collected from a dog used for drug searches, as the dog's officer was concerned that an alleged drug distributor had fed some drugs to the dog. Fortunately, analysis of the dog's urine failed to reveal the presence of drugs of abuse.

Looking forward to 2003, the Toxicology section plans to acquire a Capillary Zone Electrophoresis (CZE) instrument that has the capability of screening for 500 compounds in a blood or urine sample in 20 minutes. The CZE will enable us to screen for 10 times the number of drugs without sacrificing turn-around-time.

The BCA Laboratory website (www.dps.state.mn.us/bca) is frequently updated with information about the services provided by the Toxicology section. Under the Laboratory web-link click on Drug Analyses Currently Performed to obtain information about what drugs we test for and what Drug Schedule to which they belong.

TRACE EVIDENCE

MICRO

The Trace Evidence-Micro Section is making strides at reducing the caseload backlog. Currently there are three scientists in the Section; two fully trained scientists and one scientist-in-training. One of the fully trained scientists is a former employee brought back to help with casework until June 30, 2003. The scientist-in-training has completed the rigorous modules of fibers, glass, and paint, and can examine cases in those areas. Also, from March to June 2002, a former Trace Evidence scientist who had transferred to another section was brought in to help with casework. Altogether, the Trace Evidence Section processed 103 cases in 2002.

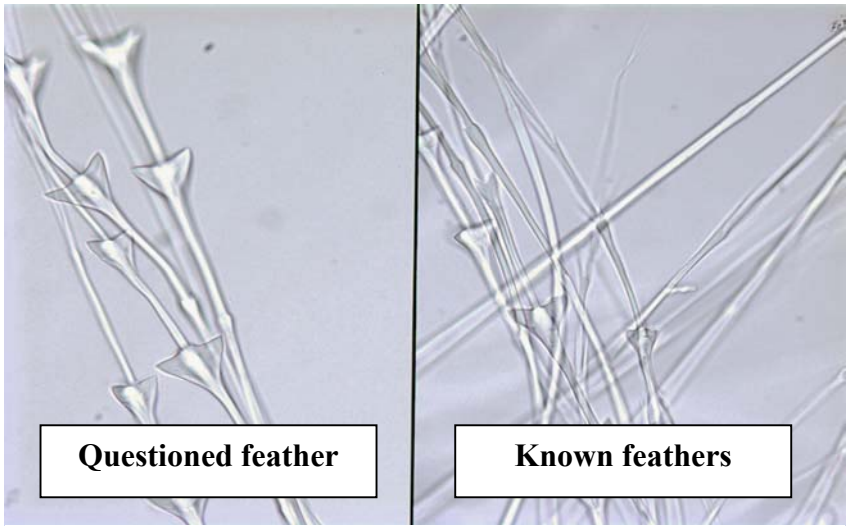
Unlike other sections, there is no Trace Evidence Section at the Bemidji facility, thus the St. Paul facility will be responsible for trace evidence from counties that normally fall under the Bemidji umbrella.

Validation was completed on the GRIM 2 glass analysis instrument. This instrument uses an automated method for measuring the refractive index of glass fragments. This instrument also utilizes a digital camera to measure the temperature at which the glass has the least contrast compared to the surrounding oil. This was formerly performed by looking through a microscope and was extremely fatiguing for the scientist conducting the analysis.

The two full-time scientists from the Trace Evidence-Micro Section attended the Midwestern Association of Forensic Scientists (MAFS) meeting in September. One of the scientists is a MAFS Board Member-at-Large and committee chair for awards. Both scientists attended a hands-on fabric impression workshop.

Both full-time scientists also participated in the crime scene training program. One of the scientists taught a portion of the program, including evidence collection and packaging of such items as glass, paint, fibers, fabric impressions, and footwear impressions.

Some interesting cases this year included a feather comparison from an attempted homicide, and a hit-and-run case that involved numerous physical matches, a corresponding 4-layer paint, and a headlamp filament examination.



Microphotograph of two feathers mounted on the comparison microscope magnified approximately 200X.

Goals for 2003:

In 2003, the primary goal is to continue to reduce the backlog in the section. A scientist has returned from retirement and will be working to reduce that backlog until June 30, 2003. His number one priority is casework.

The second challenge for 2003 will be moving from our current location at 1246 University Avenue to the new building at 1430 Maryland Avenue. Unfortunately, this will have an adverse impact on our casework as equipment will have to be disconnected, moved, reassembled, and calibrated.

The third major goal of the section is for the second scientist to complete training in tape, physical matches, fabric, tire track and shoe sole impressions, hair, lamps, wood, soil, and building materials.

CHEMICAL TESTING

From 2001 to 2002, the number of cases received by the Trace Evidence-Chemical Testing Section increased 23 % from 144 to 177. Over 660 items of fire debris evidence were analyzed, but the number of items per case remained the same as last year with an average of 4 items per case.

Several research projects were completed during this past year in order to answer questions that arose during routine casework. The scope of one project was to establish if the origin of terpenes in fire debris evidence could be attributed to added accelerants like turpentine or from natural sources like pine wood. A comparison study of passive and solvent extraction between Kapak bags and cans was completed. Another project examined the effects of kerosene concentration on charcoal strip adsorption. Finally, the effect of high water concentrations upon the adsorption of gasoline onto charcoal strips was investigated.

Evidence submitted for fire debris analysis frequently contains varying amounts of water. An investigation into how water affects the passive adsorption of gasoline during analysis was conducted. Gasoline in concentrations ranging from 1 microliter to 8 milliliters was added to cans each containing 50 milliliters of water. Each can was processed and analyzed as if it was a typical fire debris item. In each can, gasoline was able to be identified regardless of the amount

of water. It was interesting to note that the gasoline concentrations in the middle of the range looked weathered and suggest that some further investigation could help determine the adsorption process of gasoline. In conclusion, the amount of water present didn't affect the detection and identification of gasoline in the cans.

In conjunction with the State Fire Marshal's Office and the Office of Training and Development, the scientists from the Chemical Testing Section of the BCA Laboratory assisted in conducting two Basic Arson Investigation training sessions in Andover and Hutchinson and participated in setting up two mock house fires. Our role in training is to familiarize the fire investigators in the resources we have to offer and to help them understand our analytical capabilities and reporting of our findings.

BEMIDJI REGIONAL OFFICE

During 2002, the Bemidji Laboratory completed its first full year of operation. When the Laboratory opened its doors for business on October 1, 2001, services were provided in the areas of Firearms and Toolmark examinations, Drug Chemistry, and Latent Prints. However, the Laboratory was not yet fully staffed. In April 2002, after the completion of extensive validation procedures, the DNA section began doing casework. The staff was brought to full strength when a second Latent Print examiner came on-line in August.

The biggest challenges facing the new laboratory were establishing relationships with our clients and letting them know our capabilities. To this end, the Laboratory held a series of classes in which a total of 272 Law Enforcement Officers from various agencies in northern Minnesota took part. The training consisted of a one-day course in which scientists from each section of the Laboratory talked about their section's capabilities and instructed the officers on the best ways to recognize, collect, and package the types of evidence relating to each section. This training was provided through the Police Training unit of the BCA so that the officers could receive POST credits for participation in the course.

Either because of this effort or because our location makes it more convenient to submit evidence, the number of submitted cases grew over the course of the year. In the Firearms section, the average number of cases submitted each month nearly doubled--from 5.3 cases in the first half of the year to 9.2 cases in the second half, for a total of 87 cases for the year. The Latent Print section showed similar growth in submitted cases with a monthly average of 16.5 cases in the first half and 29 cases in the second half, for a total of 273 cases. The DNA section saw nearly a three-fold increase in average monthly submissions, with a 9.5 cases per month average in the first half and 25.6 cases in the second half of 2002, for a total of 211 cases. Only the Drug Chemistry section saw a consistent number of cases submitted over the course of the year, averaging 80 cases per month in both halves, for a total of 962 cases.

The addition of a N.I.B.I.N. (National Integrated Ballistics Identification Network) terminal to the Bemidji Firearms section in the spring of 2003 completed the Laboratory's access to a trio of databases useful in providing leads and developing suspects in cases where there are little or none of both. The DNA section, with access to the CODIS (Combined DNA Indexing System), had two "cold hits" with samples in the database. One related to a DNA sample recovered from a crime scene to a DNA profile obtained from an individual in the Convicted Offender database. The other hit was in the Forensic database, and linked three burglaries in the Duluth area. A number of hits were also made with the MAFIN (Midwest Automated Fingerprint Information Network) from the Bemidji Laboratory.

In February, the Bemidji Regional Office began responding to crime scene requests. Forming the Crime Scene Response teams was truly a cooperative effort, as teams are made up of Laboratory, Special Operations, and CJIS personnel. In order to meet quality standards, the entire Bemidji Staff successfully completed several core-training classes in crime scene collection and documentation techniques. The training was followed by both written and practical examinations. Over the course of the year, the Bemidji Regional Office responded to 25 requests for crime scene assistance.