U.S. Department of Justice
Drug Enforcement Administration

www.dea.gov

Microgram Bulletin

Published by:
The Drug Enforcement Administration
Office of Forensic Sciences
Washington, DC 20537

The U.S. Attorney General has determined that the publication of this periodical is necessary in the transaction of the public business required by the Department of Justice. Information, instructions, and disclaimers are published in the January issues.

VOL. XXXVIII, NO. 8 AUGUST 2005

- INTELLIGENCE ALERT -

"LIQUID METHAMPHETAMINE" SMUGGLED IN A VEHICLE'S WINDSHIELD WASHER AND COOLANT RESERVOIRS IN RIO RICO, ARIZONA

The DEA Southwest Laboratory (Vista, California) recently provided assistance in sampling and analyzing various vehicle fluids, suspected to contain dissolved methamphetamine hydrochloride. The fluids were taken from the windshield wiper reservoir (8 liters of a light yellow liquid (see Photo 1)), coolant reservoir (3.5 liters of a light yellow liquid), and the radiator (6.3 liters of a pinkish liquid) of a vehicle seized by the Santa Cruz County Sheriff's Office in Rio Rico, Arizona (Rio Rico is located just north of Nogales, on Interstate 19). The caps of the two reservoirs also displayed some white crystalline material (see Photo 2, next page), that field-tested positive for methamphetamine

Photo 1

using the Marquis and the nitroprusside tests. Analysis by GC/MS, IR-ATR, and HPLC confirmed 553 mg/mL, 552 mg/mL, and 3.8 mg/mL d-methamphetamine hydrochloride in the windshield wiper reservoir, coolant reservoir, and radiator, respectively. The low concentration in the radiator is suspected to be from a small amount of the fluid in the coolant reservoir being siphoned back into the radiator during the heating and cooling cycles. This is the first submission of "liquid methamphetamine" to the Southwest Laboratory, and also the laboratory's first encounter with this smuggling technique.

Photo 3

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- INTELLIGENCE ALERT -

COCAINE SMUGGLED INSIDE WOODEN DOWELS IN NEW YORK, NEW YORK

The DEA Northeast Laboratory (New York, New York) recently received 14 wooden dowels (approximately 1.5 inches in diameter by 41 inches long) containing a white powder, suspected cocaine (see Photos 3 - 5). The exhibits were included in a shipment of bamboo window blinds, and were seized by U.S. Customs and Border Protection personnel from a cargo shipment (details of seizure not provided). Analysis of the powder (total net mass 8.85 kilograms) by FTIR, GC/FID, and GC/MS confirmed 77 percent cocaine hydrochloride. The Northeast Laboratory routinely receives a variety of exhibits employing different smuggling techniques, including exhibits where controlled substances were hidden within a variety of different objects made of wood; however, this was the laboratory's first encounter with cocaine in false dowels.

Photo 3

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Photo 4

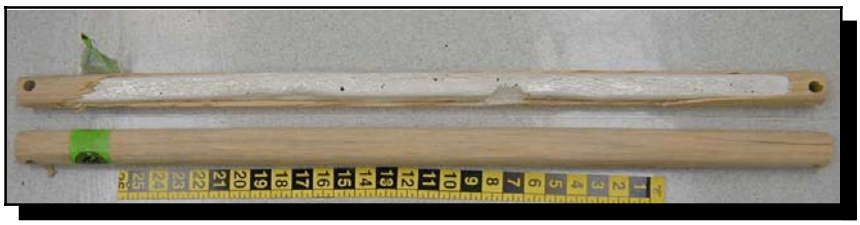

Photo 5

- INTELLIGENCE BRIEF -

SUSPECTED COCAINE NEAR BESSEMER, ALABAMA IDENTIFIED AS PSEUDOEPHEDRINE

Photo 6

The DEA South Central Laboratory (Dallas, Texas) recently received 26 ziplock plastic bags wrapped in green cellophane and containing an off-white powder (total net mass 12.6 kilograms), that field-tested positive for cocaine (see Photo 6). The exhibits were seized by a Bessemer, Alabama police officer pursuant to a traffic stop on I-20 (Bessemer is located southwest of Birmingham). However, analysis of the powder by FTIR, GC/MS, and HPLC indicated not cocaine but rather 91 percent pseudoephedrine hydrochloride. This was the first seizure of bulk pseudoephedrine packaged as a controlled substance to the South Central Laboratory. It is not known why the samples field-tested positive for cocaine.

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- INTELLIGENCE ALERT -

COCAINE IN TWO-LAYER METAL POTS (FROM TRINIDAD) AT MIAMI INTERNATIONAL AIRPORT

Photo 7 (Note 6 inch scale on the paper)

The DEA Southeast Laboratory (Miami, Florida) recently received three metal (presumed aluminum) pots containing a white powder, suspected cocaine (see Photo 7). The pots (about 8 inches in diameter by 3 inches tall) were seized by Immigration and Customs Enforcement personnel at Miami International Airport from a individual arriving from Port-of-Spain, Trinidad. The powder (total net mass 5,791 grams) was concealed between layers in the pots (see Photo 8, next page). Analysis by GC/MS and FTIR confirmed 80 percent cocaine hydrochloride. This was the first submission of this type to the Southeast Laboratory.

Photo 8

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- INTELLIGENCE BRIEF -

LARGEST EVER SEIZURE OF PHENCYCLIDINE IN ORANGE COUNTY (CALIFORNIA) HISTORY

[From the NDIC *Narcotics Digest Weekly* 2005;4(27):1
Unclassified, Reprinted with Permission.]

On June 4, 2005, Orange County Sheriff's Department deputies seized a PCP (phencyclidine) laboratory in Ladera Ranch, an upscale community south of Los Angeles. Sheriff's deputies discovered the laboratory, which was located in a garage of an apartment complex, after nearby citizens reported a chemical smell emanating from the garage. Officers located the apartment unit and the individual using the garage; however, when they attempted to confront the suspect in his apartment, he fled the scene. A foot chase ensued, and the suspect escaped. The suspect remains a fugitive and is wanted on charges of suspicion of manufacturing PCP and possession of PCP for sale. Law enforcement officers seized 8.5 gallons of PCP, chemicals, and a stolen vehicle at the laboratory site. According to authorities, this was the largest seizure of PCP in Orange County history and the only PCP laboratory seized in the county in recent years.

NDIC Comment: Much of the PCP available throughout the United States is produced by criminal groups and street gangs in Southern California, primarily in the Los Angeles area. These established PCP producers attempt to control production of the drug in their area by threatening violence against others who try to become involved. The location of the PCP laboratory in Orange County, which is adjacent to Los Angeles County, could be an indicator that Los Angeles County PCP producers are expanding their area of operations or that other individuals are becoming involved in PCP production.

PCP production is increasing in southern California. According to El Paso Intelligence Center (EPIC) National Clandestine Laboratory Seizure System (NCLSS) data, eight of the nine PCP laboratories seized nationwide in 2003 were located in California - three in Los Angeles County. (The remaining five were seized in Santa Clara County. Santa Clara County is in the San Francisco Bay Area.) In 2004 six PCP laboratories were seized in the United States - all in Los Angeles County. According to law enforcement reporting, PCP production in Southern California as well as distribution throughout the United States has increased in the past few years, largely because PCP producers who had been incarcerated in the late 1980s have now been released from prison.

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- INTELLIGENCE BRIEF -

OKLAHOMA PSEUDOEPHEDRINE CONTROL STATUTE IMPACTS METHAMPHETAMINE LABORATORY SEIZURES AND CLEANUP COSTS

[From the NDIC *Narcotics Digest Weekly* 2005;4(29):1
Unclassified, Reprinted with Permission.]

A little over a year ago, Oklahoma's governor signed House Bill (HB) 2176, the landmark antimethamphetamine legislation that restricted the sale of tablets of pseudoephedrine, a precursor used in methamphetamine production. The legislation reclassified pseudoephedrine as a Schedule V narcotic and required that cold medications containing the chemical be placed behind pharmacy counters and that buyers show identification and sign for the purchase. Since the enactment of the law in April 2004, the number of methamphetamine laboratories seized statewide has decreased dramatically - between 70 percent and 80 percent - according to the Oklahoma State Bureau of Narcotics and Dangerous Drugs Control. Prior to enactment of HB 2176, the average number of laboratories seized monthly in Oklahoma by the 25 multijurisdictional drug task forces was 92. In April, the month in which the law went into effect, the number of laboratories seized statewide decreased to 48, and by December the number of laboratories seized dropped more than 50 percent to 21. Overall, the total number of methamphetamine laboratories seized in Oklahoma decreased from 1,233 in 2003 to 812 in 2004; of the 812, almost 43 percent had been seized in the 3 months prior to passage of HB 2176. The decrease in the number of laboratory seizures will have a direct impact on costs associated with methamphetamine production in Oklahoma - most notably cleanup costs. According to the Oklahoma State Bureau of Investigation, it costs the state an average of $3,500 to clean up a single methamphetamine laboratory. Based on the decrease in the number of laboratories seized in Oklahoma from 2003 through 2004, the state saved an estimated $1,473,500 in expenses linked to the cleanup of methamphetamine laboratory sites.

NDIC Comment: The success of the pseudoephedrine control legislation in Oklahoma has prompted at least 44 other states to either adopt or consider adopting laws similar to HB 2176. Six of those states now allow only pharmacies to sell drugs containing pseudoephedrine, while seven other states require that retailers lock up pseudoephedrine products or sell them from staffed counters. On the federal level, two U.S. Senators have introduced the Combat Meth Act

of 2005 (Senate Bill 103), which is similar to the legislation adopted in Oklahoma. The original version of the bill required that cold medications containing pseudoephedrine be moved behind pharmacy counters and sold by a licensed pharmacist. As of June 28, 2005, the bill had been revised to allow an exception for stores without a pharmacist on duty, such as convenience stores and some grocery chains. The revised bill would provide states the option of working with the Drug Enforcement Administration (DEA) to license certain employees who are not pharmacists to sell the medications. The bill also would limit the amount that one person could purchase in a 30-day period to 7.5 grams - the equivalent of 250 30-milligram tablets - and require purchasers to show identification and sign for the purchase. A vote on this federal antimethamphetamine bill may occur sometime in July 2005.

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- INTELLIGENCE BRIEF -

MAJOR CANNABIS GROW SITE ERADICATED IN THE SHASTA-TRINITY NATIONAL FOREST (NORTHERN CALIFORNIA)

[From the NDIC *Narcotics Digest Weekly* 2005;4(30):2
Unclassified, Reprinted with Permission.]

On July 7, 2005, law enforcement officials eradicated 44,109 cannabis plants from a grow site in Shasta-Trinity National Forest in northern California; officials suspect that the site had been operated by Mexican nationals. The grow site, which was detected during a routine aerial reconnaissance flight the previous week, covered nearly 5 acres of land and was situated in a remote area in the eastern part of the forest, north of Shasta Lake and several miles east of Interstate 5. The site seized on July 7 - the largest grow site ever seized in Shasta County - was the first of seven sites seized from July 7 through July 15; the total number of plants seized during that period was 112,214. Near the site seized on July 7 were three campsites where individuals who maintained and guarded the grow site had been living. Several suspects fled the scene when law enforcement officials arrived; no arrests were made at the scene. Officials seized a shotgun and ammunition at the campsites. Participants in the eradication effort included officials with the Shasta County Sheriff's Office Marijuana Eradication Team, Shasta Interagency Narcotics Task Force, U.S. Department of Agriculture Forest Service, California Bureau of Narcotic Enforcement, and Campaign Against Marijuana Planting (CAMP).

NDIC Comment: Mexican drug trafficking organizations (DTOs) increasingly are operating large cannabis grow sites in secluded areas throughout California, and eradication of these sites has increased in the state. Seizures of large cannabis grow sites operated by Asian and Caucasian criminal groups also have increased in California; however, these grow sites tend to be smaller, less sophisticated, and much less frequently encountered by law enforcement authorities than those operated by Mexican DTOs. According to CAMP data, 84 percent of the cannabis plants eradicated in California in 2004 were from grow sites operated by Mexican DTOs - a marked increase from 69 percent of plants eradicated in 2001. CAMP officials report that the size of cannabis grow sites also has increased significantly in recent years - primarily grow sites operated by Mexican DTOs. CAMP data indicate that in the late 1990s, large grow

sites contained 3,000 to 5,000 plants; however, since the early 2000s, large grow sites have contained 5,000 to 10,000 plants. Moreover, very large grow sites - such as the Shasta-Trinity National Forest site with over 44,000 plants - increasingly are being discovered by law enforcement authorities. Federal officials report that Mexican DTOs are expanding their areas of operation and have established cannabis grow sites in other states such as Idaho, Oregon, and Washington. They likely will continue to expand their operations into isolated areas in these and other states.

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Request for Information - Carisoprodol (Soma®)

Carisoprodol (Soma®) is the recommended international nonproprietary name of a drug prescribed for the relief of pain, muscle spasm and limited mobility associated with painful musculoskeletal conditions. It is used as an adjunct to rest, physical therapy and other measures. It is currently not controlled under the U.S. Controlled Substance Act (CSA), and is available for therapeutic use by prescription. Carisoprodol is both structurally and pharmacologically related to Schedule IV substances, namely meprobamate and mebutamate. Carisoprodol shares some similarities with barbiturates or alcohol in its pharmacological effects.

Reports from medical professionals, state authorities and law enforcement personnel indicate the significant diversion, trafficking, and abuse of carisoprodol. According to the National Forensic Laboratory Information System (NFLIS), federal, state, and local forensic laboratories analyzed 1,992 carisoprodol drug samples in 2004. According to the Drug Abuse Warning Network (DAWN), there were 10,094 emergency department mentions for carisoprodol in 2002. Carisoprodol abuse has resulted in injury (seizures, coma) and death. Carisoprodol has often been abused in combination with products containing narcotic analgesics and/or benzodiazepines. Because of these concerns, some states have controlled carisoprodol.

The Drug Enforcement Administration (DEA) has reviewed the relevant data and requested a scientific and medical evaluation and scheduling recommendation for carisoprodol from the Department of Health and Human Services. The Dug and Chemical Evaluation Section (ODE) of the DEA's Office of Diversion Control continues to gather information on the abuse, diversion, and trafficking of carisoprodol. Reports of actual abuse are extremely important factors in establishing the abuse potential of a substance that is being considered for control under the Controlled Substances Act. ODE would appreciate receiving any information related to law enforcement encounters and/or the identification, diversion, and abuse of carisoprodol. Please contact Dr. Srihari R. Tella, Pharmacologist with ODE, at (202) 307-7183 with any pertinent information pertaining to carisoprodol. Information may also be provided to Dr. Tella by fax ((202) 353-1263), by email to: Srihari.R.Tella -at- usdoj.gov, or by mail addressed to the Drug and Chemical Evaluation Section, Office of Diversion Control, Drug Enforcement Administration, Washington, DC 20537.

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SELECTED REFERENCES

[Selected references are a compilation of recent publications of presumed interest to forensic chemists. Unless otherwise stated, all listed citations are published in English. Listed mailing address information (which is sometimes cryptic or incomplete) exactly duplicates that provided by the abstracting services. Patents are reported only by their *Chemical Abstracts* citation number.]

1. Abbaspour A, Mirzajani R. **Simultaneous determination of phenytoin, barbital, and caffeine in pharmaceuticals by absorption (zero-order) UV spectra and first order derivative spectra - multivariate calibration methods.** Journal of Pharmaceutical and Biomedical Analysis 2005;38(3):420. [Editor's Notes: Presents the title study. Contact: Shiraz Univ, Coll Sci, Dept Chem, Shiraz 71454, Iran.]

2. An OY, Gao XY, Baeyens WRG, Delanghe JR. **Determination of ephedrine and related compounds in pharmaceutical preparations by ion chromatography with direct conductivity detection.** Biomedical Chromatography 2005;19(4):266. [Editor's Notes: Ephedra herbs were also analyzed by the presented technique. Contact: State Univ Ghent, Dept Pharmaceut Anal, Fac Pharmaceut Sci, Harelbekestr 72, B-9000 Ghent, Belgium.]

3. Cody RB, Laramee JA, Durst HD. **Versatile new ion source for the analysis of materials in open air under ambient conditions.** Analytical Chemistry 2005;77(8):2297. [Editor's Notes: A new ion source ("DART") was installed on a high resolution TOF mass spectrometer and used to identify materials on surfaces without any sample collection or prep steps. (Unspecified) "drugs of abuse" were included in the list of applications (in the abstract). Contact: JEOL USA, Inc., Peabody, MA 01960.]

4. Dong XC, Wei WA, Ma SJ, Sun H, Li Y, Guo JQ. **Molecularly imprinted solid-phase extraction of (-)-ephedrine from Chinese Ephedra.** Journal of Chromatography A 2005;1070(1-2):125. [Editor's Notes: Presents the title study. Contact: Nankai Univ, Coll Chem, Tianjin 300071, Peoples R China.]

5. Elliott S, Burgess V. **The presence of gamma-hydroxybutyric acid (GHB) and gamma-butyrolactone (GBL) in alcoholic and non-alcoholic beverages.** Forensic Science International 2005;151(2-3):289. [Editor's Notes: Determines the natural presence of GHB and GBL in over 50 beverages (confirming small amounts in various wines). The detection method was not specified in the abstract. Contact: Regional Laboratory for Toxicology, Sandwell and West Birmingham Hospitals NHS Trust, City Hospital, Dudley Road, Birmingham B187QH, UK.]

6. Honorio KM, daSilva ABF. **A study on the influence of molecular properties in the psychoactivity of cannabinoid compounds.** Journal of Molecular Modeling 2005;11(3):200. [Editor's Notes: The AM1 method was used on 28 different cannabinoids. Contact: Univ Sao Paulo, Dept Quim & Fis Mol, Inst Quim Sao Carlos, CP 780, BR-13560970 Sao Carlos, SP, Brazil.]

7. Hsieh H-M, Liu C-L, Tsai L-C, Hou R-J, Liu K-L, Linacre A, Lee JC-I. **Characterization of the polymorphic repeat sequence within the rDNA IGS of *Cannabis sativa*.** Forensic Science International 2005;152(1):23. [Editor's Notes: Presents the title study. Contact: Department of Forensic Medicine, College of Medicine, National Taiwan University, No. 1 Jen-Ai Road Section 1, Taipei 10051, Taiwan ROC.]

8. Huhn C, Putz M, Martin N, Dahlenburg R, Pyell U. **Determination of tryptamine derivatives in illicit synthetic drugs by capillary electrophoresis and ultraviolet laser induced fluorescence detection.** Electrophoresis 2005;26(12):2391. [Editor's Notes: The CE method used *alpha*-cyclodextrin and stacking. Contact: Univ Marburg, Fachbereich Chem, Hans Meerwein Str, D-35032 Marburg, Germany.]

9. Hyun MH, Tan G, Cho YJ. **Liquid chromatographic enantioseparation of aryl alpha-amino ketones; cathinone.** Biomedical Chromatography 2005;19(3):208. [Editor's Notes: Used a crown ether-based chiral stationary phase. The resolution of cathinone was judged to be applicable for the analysis of khat. Contact: Pusan Natl Univ, Dept Chem, Pusan 609735, South Korea.]

10. Kvasnicka F, Biba B, Cvak L, Kratka J, Voldrich M. **Separation of enantiomers of butorphanol and cycloamine by capillary zone electrophoresis.** Journal of Chromatography A 2005;1081(1):87. [Editor's Notes: "Cycloamine" is a precursor for the synthesis of butorphanol. Cyclodextrins were used as chiral selectors. Contact: Inst Chem Technol, Dept Food Preservat & Meat Technol, Technicka 3, Prague 6, Czech Republic.]

11. Munro TA, Rizzacasa MA, Roth BL, Toth BA, Yan F. **Studies towards the pharmacophore of salvinorin A, a potent kappa opioid receptor agonist.** Journal of Medicinal Chemistry 2005;48(2):345. [Editor's Notes: Presents the title study. Contact: Univ Melbourne, Sch Chem, Melbourne, Vic 3010, Australia.]

12. Pothier J, Galand N. **Automated multiple development thin-layer chromatography for separation of opiate alkaloids and derivatives.** Journal of Chromatography A 2005;1080(2):186. [Editor's Notes: Presents the title study, using planar chromatography. Contact: Univ Tours, Fac Pharm Philippe Maupas, Lab Pharmacognosy, 31 Ave Monge, F-37200 Tours, France.]

13. Siegner AW, Jr. **The Food and Drug Administration's actions on Ephedra and androstenedione: Understanding their potential impacts on the protections of the Dietary Supplement Health and Education Act.** Food and Drug Law Journal 2004;59(4):617. [Editor's Notes: Abstract and Contact information not provided.]

14. Smyth WF. **Recent applications of capillary electrophoresis - electrospray ionisation - mass spectrometry in drug analysis.** Electrophoresis 2005;26(7-8):1334. [Editor's Notes: A critical review, covering the time frame 2000 - 2004. Includes some classes of controlled substances. Contact: Univ Ulster, Sch Biomed Sci, Coleraine BT52 1SA, Londonderry, North Ireland.]

15. Xie JP, Zhang JY, Liu JP, Tian JN, Chen XG, Hu ZD. **Rapid and sensitive determination of ephedrine and pseudoephedrine and pseudoephedrine by micellar electrokinetic chromatography with an on-line regenerating covalent coating.** Biomedical Chromatography 2005;19(1):9. [Editor's Notes: Used hexamethyldisilazane as the on-line regenerating covalent coating. Ephedrine and pseudoephedrine were first derivatized with 4-chloro-7-nitrobenzo-2-oxa-1,3-diazol for LIF detection. The method was applied to highly sensitive detection of ephedrine and pseudoephedrine in herbal preparations. Contact: Lanzhou Univ, Dept Chem, Lanzhou 730000, Peoples R China.]

16. Zelkowicz A, Magora A, Ravreby MD, Levy R. **Analysis of a simulated heroin distribution chain by HPLC.** Journal of Forensic Sciences 2005;50(4):849. [Editor's Notes: Fifteen simulated samples were tied back to their three respective origins. Detection was by PDA-UV.

Contact: Analytical Chemistry Laboratory, Division of Identification and Forensic Science, National Police Headquarters, Jerusalem, Israel.]

17. Zhang QB, Rich JO, Cotterill IC, Pantaleone DP, Michels PC. **14-Hydroxylation of opiates: Catalytic direct autooxidation of codeinone to 14-hydroxycodeinone.** Journal of the American Chemical Society 2005;127(20):7286. [Editor's Notes: Details not provided in the abstract. Contact: Albany Mol Res Inc, Biosci Div, 21 Corp Circle, POB 15098, Albany, NY 12212.]

Additional Reference of Possible Interest:

1. Houck MM, Bowen R. **An argument for light microscopy - A review of forensic microscopy for trace evidence analysis.** Forensic Science Reviews 2005;17(1):1. [Editor's Notes: An overview of microscopy. Does not include forensic drug analysis by microscopy. Includes basic background on microscopy, refractive index, numerical aperture, lenses, polarized light microscopes, and fluorescence microscopes. Contact: Forensic Science Initiative, West Virginia University, Morgantown, WV (zip code not provided).]

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THE DEA FY - 2005 AND FY - 2006 STATE AND LOCAL FORENSIC CHEMISTS SEMINAR SCHEDULE

The remaining FY - 2005 schedule for the DEA's State and Local Forensic Chemists Seminar is as follows:

September 19 - 23, 2005

The FY - 2006 schedule is as follows:

November 14 - 18, 2005
February 6 - 10, 2006
May 8 - 12, 2006
July 10 - 14, 2006
September 11 - 15, 2006

Note that the school is open only to forensic chemists working for law enforcement agencies, and is intended for chemists who have completed their agency's internal training program and have also been working on the bench for at least one year. There is no tuition charge for this course. The course is held at the AmeriSuites Hotel in Sterling, Virginia (near the Washington/Dulles International Airport). A copy of the application form is reproduced on the last page of the August 2004 issue of *Microgram Bulletin*. Completed applications should be mailed to the Special Testing and Research Laboratory (Attention: Pam Smith or Jennifer Kerlavage) at: 22624 Dulles Summit Court, Dulles, VA 20166. For additional information, call 703/668-3337.

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SCIENTIFIC MEETINGS

1. Title: 15th Annual CLIC Technical Training Seminar (Fourth and Final Monthly Posting)
Sponsoring Organization: Clandestine Laboratory Investigating Chemists Association
Inclusive Dates: September 7 - 10, 2005
Location: St. Louis, MO
Contact Information: O. Carl Anderson, Kansas Bureau of Investigation, carl.anderson -at- kbi.state.ks.us
Website: None

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2. Title: Midwestern Association of Forensic Scientists (MAFS) Annual Fall Meeting (Fourth Monthly Posting)
Sponsoring Organization: Midwestern Association of Forensic Scientists
Inclusive Dates: October 3 - 7, 2005
Location: St. Louis, MO
Contact Information: Bryan Hampton, bhampton -at- saintcharlescounty.org
Website: None

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Computer Corner #197

Digital Laboratory Efficiency Strategies

by Michael J. Phelan
DEA Digital Evidence Laboratory

Digital Evidence Laboratory managers have two general responsibilities - Quality and Quantity. Digital Evidence Laboratory managers must first and always focus on quality, ensuring that the examination sufficiency is commensurate with the investigator's and prosecutor's needs. The cost of an incomplete, incorrect, or poorly executed examination can easily become enormous in terms of damaged organizational reputation, and for additional corrective action response efforts such as re-examination time, re-training time, and quality assurance/managerial oversight time.

In addition to ensuring Quality, managers need to routinely review their business practices to ensure that their digital evidence laboratories are operating as efficiently as possible. Digital evidence examinations utilize high-cost personnel (commercial labor rates range from $60 - $400 per hour) and are time intensive (an average computer examination takes 40 work-hours). Failure to optimize examiner activities can result in wasted examination efforts, which in turn results in inefficient use of resources and reduced laboratory productivity (meaning fewer examinations are completed).

There are at least six major areas that need continuous assessment and monitoring. These are: Functional specialization, examiner training, examiner recruitment, technology, cost control, and quality assurance. Each of these areas can impact one or more of the key operational aspects of a digital evidence laboratory, such as evidence handling, imaging/archiving, examination, and reporting. The Strategy Matrix below was developed to identify the relative importance that various management techniques can have on key laboratory operations.

Digital Evidence Laboratory Management Strategy Matrix

	Evidence Handling	Imaging/Archiving	Examination	Reporting
Specialization	Important	Very Important	Very Important	Useful
Training	Important	Very Important	Extremely Important	Useful
Recruitment	Important	Very Important	Extremely Important	N/A
Technology	Extremely Important	Extremely Important	Extremely Important	Extremely Important
Cost Control	Important	Important	Important	N/A
Quality Assurance	Extremely Important	Extremely Important	Extremely Important	Extremely Important

Specialization is a traditional management efficiency technique that is usually more suited to centralized laboratory operations because of the potential benefits resulting from economy of scale. An example of an evidence handling efficiency improvement would be to add an evidence technician position to receive and handle digital evidence submissions. This specialization sharply reduces or even eliminates the need for a higher paid examiner or supervisor to intake, label, package, and control digital evidence exhibits. Another specialization strategy would be the use of full time technical staff (imagers) to copy and archive digital evidence. Like the above suggestion to add an evidence technician, this specialization of labor also avoids using more skilled and more highly trained examiner staff to perform an important, but fairly routine task. Similarly, examinations of non-routine submissions such as web or database servers, Macintosh computers, Reduced Instruction Set Computers, can be assigned to those examiners who are most qualified to process these uncommonly encountered technologies. Specialization can even be applied to examination reporting; for example, the use of clerical staff to oversee the distribution of reports and filing can result in overall laboratory productivity enhancements, again by freeing up more specialized personnel to focus on their primary responsibilities.

In the areas of digital evidence laboratory training and recruitment, management should periodically review the staff's current technical and operational capabilities, and identify future needs, before they arrive and become impediments to productivity. Just five years ago, the basic examiner skill set “only” involved mastery of one or more standard imaging tools and a suite of software examination utilities, including keyword searching, unerase file recovery, and file fragment data reconstruction. In contrast, today's basic skill set includes multiple imaging tools, mastery of at least one full-scope examination program (such as Encase, Ilook, FTK, Vogon, etc.), and a working knowledge of both Internet (HTML) and database (such as SQL) technologies. Management needs to ensure that today's staff is trained for today's requirements - but also while keeping a wary eye on tomorrow's challenges. Obviously, management must anticipate future requirements when it recruits new employees. Therefore, each law enforcement agency needs to have a clear understanding of future investigative initiatives, and the likely impact that they will have on the digital evidence examination workload. Furthermore, because different law enforcement organizations investigate different types of crimes (fraud, Internet intrusion, child exploitation, etc.), their respective digital examiners should have specialized knowledge and skills (such as databases, Internet technologies, HTML coding, operating system logs, etc.), as needed to address those missions.

Technology is another area that offers potential enhancements in productivity. Some recent technological advances that are already benefiting digital evidence laboratories include: 1) Storage Area Networks (SANs) to store and distribute digital evidence copies for examination; 2) DVD/CD robotics or automated tape loader systems to automate the evidence archiving processes; 3) Faster computer systems and more powerful examination software to maximize examination quality and examiner productivity; and 4) Laboratory automation or information system technologies that can better document, compose, store, and distribute examination work products.

Cost Control is an important matter for any manager that has budget constraints (and what manager does not?). The most important cost element in any digital evidence laboratory is examiner time (time is money). Therefore, digital evidence laboratories should establish firm limits of examination levels of effort. Supervisors need to direct work in order to ensure that frivolous and/or unnecessary examination tasks are not performed. For example, a fraud investigation may require only a business's database records, a child exploitation investigation may need only a minimum number of incriminating pictures, a hacker investigation may require computer log data covering only a very specific time period, and a conspiracy investigation may require only certain e-mail communications. "Global" examinations are no longer feasible or necessary. Supervisors should ensure that digital evidence collections are sufficiently broad to address possible unknown investigative directions; however, the actual examination effort needs to be properly scoped out, and should represent a consensus among the case agent, examiner, and examiner's supervisor.

Quality Assurance activities should be viewed as an opportunity, not a cost. Failure to ensure quality will only result in additional time, effort, and expense for both laboratory management and examiner staff, to correct and/or remediate problems that could have (and should have) been avoided. Quality assurance systems need to be documented, sufficiently broad to include all major elements of laboratory operations, and have objectives that can be routinely monitored (and corrected as needed). Quality assurance is a full time activity that requires independence and high level management access.

No two digital evidence programs are the same, even those with nominally identical missions. Digital evidence laboratory management must adapt their strategies to their unique organizational situation and budgetary realities. Systematic reviews of opportunities to increase productivity should be made on a regular basis. There is an old aphorism that: *If things are staying the same, it probably means that you are falling behind.* This is certainly true in the world of technology, and it is also applicable in the world of management.

Questions or comments? E-mail: Michael.J.Phelan -at- usdoj.gov

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