MAAFS NEWSLETTER

VOLUME 8 SEPTEMBER 1980 NUMBER 4

The MAAFS Newsletter is the official publication of the Mid-Atlantic Association of Forensic Scientists, Inc., and is published at least twice each year. All communications regarding the MAAFS Newsletter should be sent to the Newsletter Editor, Dr. Edward Sykes Franzosa, at the DEA Special Testing and Research Laboratory, 7704 Old Springhouse Road, McLean, Virginia 22102.

JOBS

Al Bober is running an Employment Clearing House (under MAAFS auspices) for forensic scientists in the Mid-Atlantic area. He keeps resumes of MAAFS members who are looking for work for 90 days and provides the information to all potential employers who contact him. Al provides this service free of charge. All members interested in employment possibilities are asked to write to Al at the following address:

Al Bober
8430 Allenswood Road
Randallstown, MD 21133

If you should hear of a job opening or receive a notice of an employment opportunity, please send a copy of the notice to Al. Thank you for your co-operation.

† † †

COMMONWEALTH OF VIRGINIA
Bureau of Forensic Science

The Commonwealth of Virginia is seeking a Serologist, with experience, for its Tidewater Regional Laboratory located in Norfolk, Virginia.

Requirements: Graduation from an accredited college or university with a major study in natural or physical science, forensic science, police science or a related area and three years experience in applicable forensic laboratory work. A related master's degree may be substituted for one year of experience. Course work and experience should be related to the area of expertise. Experience may be substituted for education on the basis of two years of experience for each year of education.

Salary: Starting salary is dependent on experience and training. Present salary range is $16,040 to $21,910 plus benefits.

Contact:
Warren G. Johnson, Director
Bureau of Forensic Science
Post Office Box 999
Richmond, VA 23208
(804) 786-2281

Closing Date: October 31, 1980

The Commonwealth of Virginia is an equal opportunity employer

* * *

NOTICE: The Commonwealth of Virginia anticipates having a second opening for a Serologist at their Roanoke Regional Laboratory on or about November 1st, 1980.

† † †

The Dade County Crime Laboratory Bureau in Miami, Florida, is seeking a court qualified Questioned Document Examiner (Criminalist II) with a minimum of a Bachelor of Science degree and two years experience.

Salary negotiable; $23,700 to $30,050 with fair to excellent fringe benefits.

Contact:
Edward Whittaker, Commander
P.S.D. Crime Laboratory Bureau
1320 North West 14th Street
Miami, Florida 33125
(305) 547-7368

† † †

STATE OF FLORIDA
Department of Law Enforcement

Position Title: Crime Laboratory Analyst, Position number 00714
Toxicology/Chemistry Analysis

Job Location: the Jacksonville Regional Crime Laboratory

Salary Range: $17,246.88 (Minimum annual salary effective September 1, 1980)

Minimum Qualifications: Graduation from an accredited four-year college or university with major course work in one of the physical or natural sciences and 2 years of experience in a forensic laboratory; or completion of the Crime Laboratory Analyst Trainee Program. 4 years of experience in the identification and analysis of fingerprints may be substituted for the required college training. Professional experience in a forensic laboratory may be substituted on a year-for-year basis for the required college training.

—continued page four, column two—

Electrical Wiring in Structure Fires

The following article was taken from The Fire and Arson Investigator, Volume 25, Number 4, April-June 1975. We wish to thank the Editor, John Stuerwald of 12126 Nottingham Lane, Bridgeton, MO 63044, and the author, Dr. Bruce V. Ettling of Washington State University, Vancover, WA 98663, for their permission to publish this article.

I also wish to thank Jim Vandiver of the US Army CID, Europe, who sent me this article.

This article was received in response to the Letter to the Editor in August, 1980, issue of the MAAFS Newsletter by Ralph Plankenhorn of the Pennsylvania State Police Lab at Greensburg, PA. We are publishing this article with the thought that it might be of use to others in MAAFS besides Mr. Plankenhorn. Comments by MAAFS members are of course welcome as are technical articles and case studies on any aspect of forensic science.

– The Editor

Dr. Bruce V. Ettling
of Washington State University
at Vancover, WA

Electrical wiring in a burned structure will often be found with some heat damage. Two questions arise: was the damage caused by fire melting or by electrical current? and, if by electrical current, did it start the fire or result from the fire having damaged the insulation? The first question can be answered by examination of the wires themselves, but the second question involves other circumstances and evidence at the scene of the fire.

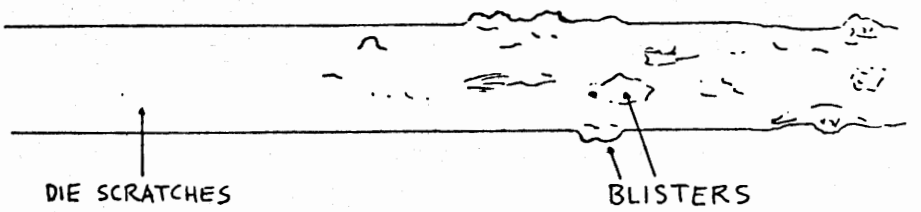
FIRE MELTING

Fire melting of copper conductors causes first some blistering and surface distortion of the copper (see Figure 1.) With continued heating, the surface layer of copper freely melts (melting point 1083°C or 1981°F) and flows causing thin, necked-down areas and beads of molten copper. The freely melted area is fairly smooth. If the fire subsides at this point, the cooled wire will tend to look like Figure 2. This thinning is often found in large-stranded conductors (see Figure 3.)

OVERCURRENT

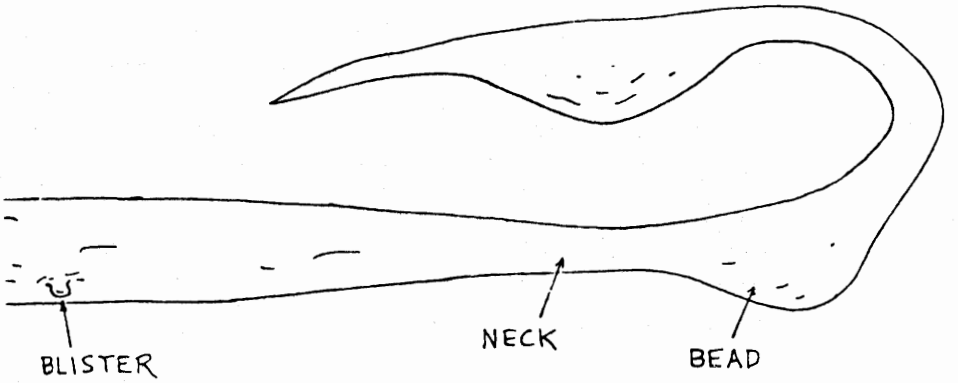
Electrical damage to a conductor may result from sustained overcurrent or from a contact short circuit. The first effect is to soften and then char the plastic (or rubber) insulation. This allows adjacent conductors in the cable to short to each other, to a separate ground wire, to a conduit or, with nonmetallic cable, to external objects such as water pipes.

Figure 1



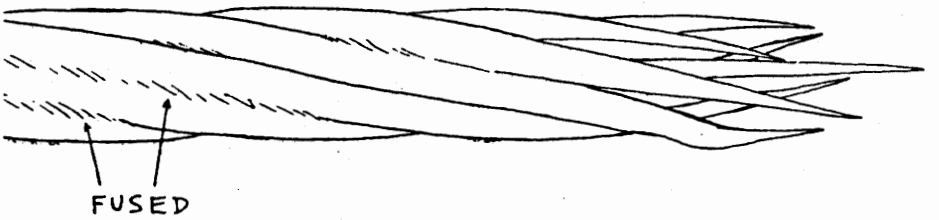
Copper conductor showing blisters and surface distortion.

Figure 2



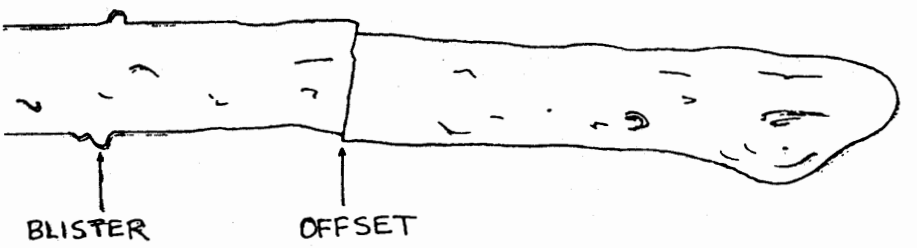
Fire melted copper conductor showing necking and beading where it freely melted and blisters where it only approached melting.

Figure 3



Stranded copper conductor showing pointed ends and strands fused together by melted copper.

Figure 4



Copper conductor heated by sustained overcurrent showing separated end, offset from partial melting and blistering.

Asbestos-insulated conductors are not easily subject to this hazard.

If the conductors somehow do not short out and the overcurrent persists, current heating eventually will bring the wire up to its melting temperature. Initially there is blistering and then melting of the entire cross section of the wire. This happens because electrical heating occurs within the wire in contrast to fire heating, which comes from outside of the wire. As soon as the conductor melts at any one point and opens the circuit, current stops and the rest of the conductor starts to cool. However, there may have been other points along the conductor which were starting to melt. These may leave off-sets when the conductor suddenly started to cool before those points separated (see Figure 4.)

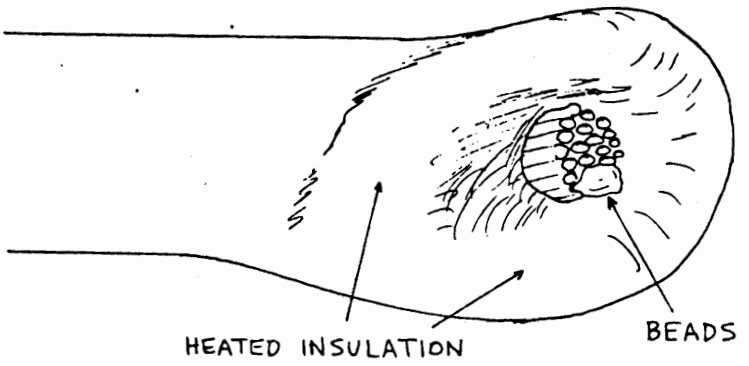
Overcurrent damage is not common in permanent wiring because overcurrent protection normally opens the circuit before the conductor gets hot enough to melt even the insulation. Where overcurrent protection has been defeated or fails to operate as designed, overcurrent heating may result. However, the likelihood of shorting to melt the conductor at that point further reduces the chances of finding conductors melted from sustained overcurrent. In a partially burned structure, overcurrent damage will occur throughout the circuit, even in parts of the structure where there was no fire. Evidence of overcurrent may be found in softened or deformed insulation or in changes in the crystal structure of the copper as seen in metallographic examination.

SHORT CIRCUITS

Contact shorts cause heating primarily at the point of contact, although there is some heating along the conductors while high current is flowing through the arc. An energized conductor that is somehow brought into contact with a grounded object or return conductor often will not make solid contact but will form an arc where current flows through the point contact which is of higher resistance than anywhere else in the circuit. The intense heating from the arc melts and spatters copper. Beads may form on the ends of small conductors or strands of conductors. If overcurrent protection opens the circuit, the wiring will cool with those beads showing (see Figure 5.) Larger conductors and cables will not form large beads. Rather, there will be residual melted ends and often streaks or spots of copper spattered over the unmelted part of the metal (see Figure 6.) Sometimes there will be cavitation in the cables (see Figure 7.)

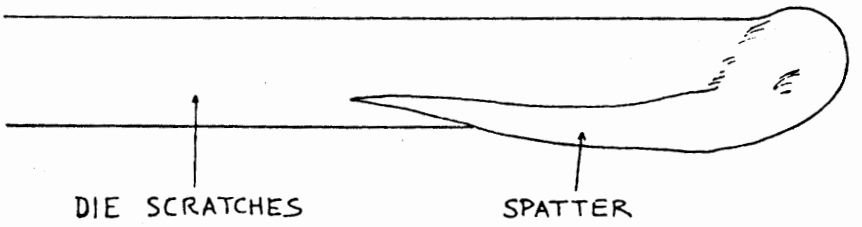
Sometimes an energized conductor will contact a ground with enough force to make a good contact (as in closing a switch) and an arc either will not form or will be too brief to do more than melt a small area, which will solidify as heat is dissipated to the rest of the metal objects. This would be like switch contacts fusing together. In this circumstance, the part of the circuit involved will be in an overcurrent situation as described above.

Figure 5



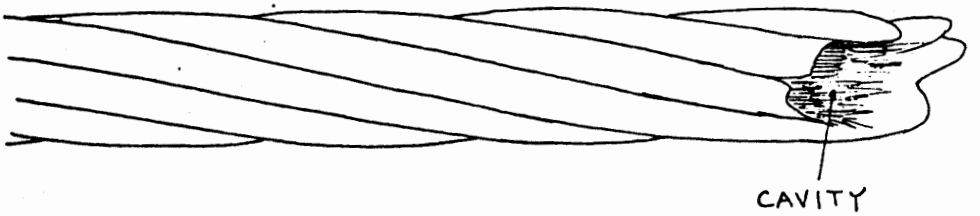
Lamp cord showing fused ends of strands and insulation heated by the arc without subsequent fire damage.

Figure 6



Copper conductor showing end fused by a contact short circuit.

Figure 7



Stranded copper conductor showing cavitation on the end from melting by an arc.

Lamp, appliance and extension cords have some distinct characteristics. They are often exposed to fire damage in a room while the permanent wiring within the walls is still unaffected and energized. As insulation is burned away, the adjacent stranded conductors may make contact in several places, leaving small beaded areas along the conductors (see Figure 8.) These do not draw enough current to trip breakers and are usually too feeble to start a fire except in very easily ignitable materials. They are more likely a result of a fire. However, a single larger beaded area at a severed end of a lamp cord is more likely to have been able to start a fire. Sometimes light contact shorts show up on adjacent conductors in permanent wiring.

INTERPRETATION

The question of whether observed electrical damage caused a fire or resulted from destruction of insultaion by fire requires an overall evaluation of circumstances. If the apparent origin was not in the area of observed damage, then it likely did not start the fire. If the burn pattern showed progress from the area of wiring damage to the rest of the structure, then

it possibly did start the fire. Were there fuels in that area to ignite or to spread a fire? Was the breaker tripped on or off? Etc! The question of electrical cause can be answered reasonably after the evidence is fitted in with all other information.

Aluminum melts at 660°C (1220°F) and almost any fire will cause it to melt. Aluminum wire does not melt with the characteristic necking and beading which copper wire displays. The effects of overcurrent and fire are not well known and subsequent fire will in most instances melt the rest of the aluminum, thus destroying any characteristics from overcurrent.

Remember that in all circumstances of electrical wiring causing a fire, the characteristics of shorting, and even overcurrent if the entire circuit is heated enough, can be obliterated by subsequent fire heating to give the smooth necked and beaded appearance. Short circuits, overcurrent and hot fire are not guaranteed to give the effects described herein. However, when these effects are found, there is a high probability that they were caused as described.

MISCELLANEOUS EFFECTS

Copper which has been heated in oxidizing conditions gets oxygen into the center of the wire. Then, if it is further heated under reducing conditions (such as in a mass of glowing charcoal), it becomes brittle. If bent, such a wire will break off with a squared-off but rough-looking face. This has no value in determining the cause of the fire.

Another oddity that shows occasionally is a rough, broken end of a wire with a silvery appearance. This is a result of molten aluminum dripping onto the copper while very hot. Copper and aluminum form a hard, brittle alloy. When a length of copper wire that includes a spot of alloy is bent, the wire will break with a rough face. This also has no value in determining the cause of the fire.

Sometimes, where a copper conductor has shorted to a galvanized object or some object made of zinc or tin, a spot of bright brass will be seen where the zinc or tin fused with copper to form a brass-type alloy.

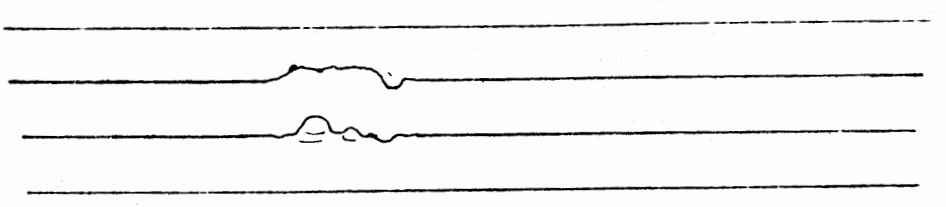
Metallographic examination of sections of wiring can be useful, but ordinarily the best evidence comes from the gross physical appearance of the wiring that can be seen by the unaided eye or with low magnification.

The following was submitted by Rick Tontarski of the BATF National Lab, Rockville, MD, to supplement the article by Bruce Ettling.

Bruce Ettling has set down guidelines for the interpretation of electrical evidence on fires. The point to emphasize is that these are

—continued on column 3 this page—

Figure 8



Lamp cord minus insulation showing weak contact short circuit.

"For heaven's sake, man, look ashamed. We're being televised."

JOBS continued

Requirements: Must be qualified by the Department of Law Enforcement to testify as an expert witness in state or federal courts.

How to Apply: Submit a completed State of Florida Employment Application to:

Mr. Jeffrey Long, Personnel Officer
Department of Law Enforcement
Post Office Box 1489
Tallahassee, Florida 32302

Application Deadline: September 25, 1980

Preference in appointment and employment shall be given to Departmental employees (promotional) as well as to veterans and other persons as required by Chapter 295, F.S. Veterans Preference Law.

only guidelines. A definitive answer to the question "did the short cause the fire?" or "did the fire cause the short?" cannot currently be answered in the laboratory. As Ettling points out, an overall evaluation of the circumstances must be considered. The interpretation of the fire scene will point to an electrical source of ignition.

Listed below are other papers dealing with electrical fires. Another source of information concerning electrical fires, particularly if appliances are suspected to be the cause, is the Consumer Product Safety Commission (CPSC).

In the CPSC, Larry Mulligan, Bill King, Ed Krawiec and Bob Kelly (301-492-6508) have fire investigation experience and electrical expertise.

(1) Bruce Ettling, *Electrical Wiring in Building Fires,* **The Fire and Arson Investigator,** October – December 1969.

(2) Kenneth A. Harkness, *Electric System Fire Hazards,* **The Fire and Arson Investigator,** October – December 1961.

The Fire and Arson Investigator also contains articles dealing with other electrical fires such as television and electric motor fires.

MEMBERSHIP APPLIACTION

Print in ink or type application; obtain signatures of two current MAAFS members and then mail form to Secretary-Treasurer. Application fee is $2.50 (non-refundable) and must accompany this application form. Yearly dues at $7.50. By-Laws require applicant to attend one MAAFS meeting before application can be accepted.

Name:

Occupation/Job Title:

Employer:

Business Address & Phone:

Home Address & Phone:

(Please circle or check your preferred mailing address.)

Education and Experience (include all past employment relating to the forensic sciences):

Circle MAAFS Meetings that you have attended (By-Laws require attendance at one meeting before application can be accepted):

Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1977	1977	1978	1978	1979	1979	1980	1980	1981	1981	1981	1981

Membership in Professional or Scientific organizations:

Signature of Applicant:

Date:

Proposed by:

Seconded by:

FORENSIC SCIENTIST OF THE YEAR AWARD

For the Forensic Scientist of the Year Award I hereby nominate:

Name:

Address:

Give a brief summary of the nominee's background and reasons for the nomination:

Submitted by Name:

Address:

Phone Number:

Nominations by ten (10) members will be required in support of each nominee for the award. All nominations will be submitted to the Awards Committee for authentication and review by two (2) month before the semi-annual Spring Meeting. The nominations will then be forwarded to the Executive Committee who determines a final choice of one or none before the Spring Meeting.

Submitt this form to: Rose Marie Lanzetta
Maryland State Police Headquarters
Reisterstown Road
Pikesville, Maryland 21208

Program

MAAFS 1980 Fall Meeting

The MAAFS 1980 Fall Meeting will be held at the Crystal City Marriott located in Arlington, Virginia, on Friday, October 10, 1980, and the morning of Saturday, October 11, 1980.

FRIDAY – OCTOBER 10th

8:00 AM – Registration Opens

9:00 AM – Introduction and Opening Remarks

9:15 AM – *Obliterated Writing – An Unconventional Approach* by Lee R. Waggoner, Document Section, FBI Laboratory, Washington, DC

A brief recap of the conventional methods used in deciphering obliterated writing will be presented. An additional method which may be applicable in cases meeting certain criteria will then be discussed. Slides showing the results will be presented.

9:45 AM – *Case Presentation prior to Court Testimony* by Al Johnson, Bureau of Alcohol, Tobacco & Firearms, Washington, DC

10:15 AM – Coffee Break

10:35 AM – *Manufacture, Analysis and Quantitation of Hashish Oil* by Joseph Boni, Bureau of Forensic Science, Richmond, VA

11:00 AM – *Development of an Atmospheric Sampling Technique for Detection of Trace Hydrocarbons at the scenes of Suspected Arson, or the Rocky R & D Horrow Show* by Bruce Gibbins, Technical Services Department, Naval Investigative Service, Washington, DC

11:25 AM – *The Value of Color Slides for Courtroom Presentations in Questioned Document Cases* by Richard French, US Postal Service Crime Laboratory, Washington, DC

12 Noon – Lunch

1:00 PM – *The Detection of Fetal Hemoglobin in Bloodstains by means of Thin Layer Immunoassay* by Mark Fredenburg, MS, and Nicholas T. Lappas, PhD, Department of Forensic Sciences, The George Washington University, Washington, DC

A novel method for the detection of fetal hemoglobin in bloodstains is presented. It involved the use of thin layer immunoassay (TIA). The technique is shown to differentiate adult and cord bloodstain extracts containing the equivalent of approximately 0.02 ul of blood.

1:30 PM – *A Novel Method for the Detection of Morphine in Urine* by Nicholas T. Lappas, PhD, and Mark Fredenburg, MS, Department of Forensic Sciences, The George Washington University, Washingt n, DC

A method for the detection of morphine in urine has been developed using thin layer immunoassay (TIA). Preliminary studies have demonstrated that morphine may be detected in urine samples (14 ul) which have a morphine concentration of 100 ng/ml. Triplicate analyses of several samples may be performed simultaneously in an average time of 5-10 minutes per sample.

2:00 PM – Questioned Document Panel Discussion

3:00 PM – Coffee Break

3:15 PM – *Use of the Ficin-Capillary Tube Method for Lewis Type Red Cells* by James L. Mudd, Research Unit, FBI Laboratory, Washington, DC

The use of capillary test tubes, as described by M. N. Crawford (1978), for the Lewis typing of ficin treated red blood cells was studied. Three hundred blood samples were tested by standard tube tests and capillary tests with no discrepancies being observed. The capillary technique with ficin, proved to be both accurate and rapid (10 minutes for capillary as opposed to 30 minutes for test tube) for Lewis typing red cells. This technique also allows for the conservation of expensive Lewis antisera by permitting 4000-5000 tests to be conducted from a 2 ml bottle of antisera compared to approximately 20 tests which can now be obtained.

3:40 PM – *The Differentiation Between Human Seminal Acid Phosphatase and other naturally occuring Acid Phosphatases by use of Specific Activity* by James L. Mudd, Research Unit, FBI Laboratory, Washington, DC

Human seminal acid phosphatase (SAP) was determined to be very stable when stored dry on cotton cloth at 22°C. The specific activity of SAP (units of enzyme/mg protein) was determined to be 150 to 136,000 times greater than the specific activities obtained for preparations of selected acid phosphatases (AP) from other human and non-human sources. Sodium thymolphthalein monophosphate, though less reactive, was determined to be a more specific substrate for SAP than 4 other substrates commonly used for measuring AP activity. The use of specific activity as a means of differentiating SAP from other APs encountered in fornesic case work was explored.

4:00 PM – *HPLC Applications to Forensic Analysis* by Dr. David Fretthold, University Hospitals of Cleveland, Ohio

4:45 PM – MAAFS Business Meeting

5:30 PM – Social Hour – Open Bar

8:00 PM – Hospitality Suite – T-Shirt Night – wear your most outrageous or provocative t-shirt you have!

SATURDAY – OCTOBER 11th

9:00 AM – Panel Discussion on Expert Preparation – From Schoolroom to Courtroom – panel members are: Karl Hepner of Bureau of Forensic Science, Merrifield, VA; Dick Howe of the University of Pittsburgh, PA; Nick Kuzmack of the Antioch School of Law, Washington, DC; Norm Mausolf of DEA Laboratory, Washington, DC; and Charles O'Rear of The George Washington University. Ed Franzosa will moderate and quell riots.

10:00 AM – Coffee Break

10:15 AM – *TLC and LC of Petroleum Dyes* by Michael A. Garten, FBI Laboratory, Washington, DC

A new and an improved method for the comparison of petroleum dyes has been developed. A thin layer chromatographic separation which is safer than the current TLC method has been evaluated and found to offer sufficent improvement over existing methods for petroleum dye comparison. Liquid chromatographic separation of petroleum dyes has also been developed.

11:05 AM – *Liquid Copper Sulfate Filters used for Infrared Luminescence Detection* by Gerald B. Richards, FBI Laboratory, Washington, DC

The construction of liquid copper sulfate filters in different concentrations and thicknesses are discussed. Further noted is the effectiveness of the filters in relation to standard Corning glass filters commonly used. Advantages and disadvantages of both types of filters are presented.

11:30 AM – Conclusion of the MAAFS 1980 Fall Meeting.

Jones' Law
The man who can smile when things go wrong, has thought of someone he can blame it on.

Notes: