Arson Analysis Newsletter

CONTENTS

COMBINED ISSUE

May 1983 — VOLUME 7 NUMBER 3

July 1983 — VOLUME 7 NUMBER 4

ARSON ANALYSIS NEWSLETTER (AAN)

Published bimonthly by Systems Engineering Associates. The AAN is available for a subscription price of $12.00 per year for subscribers within the United States and $25.00 per year for subscribers outside of the United States.

Send all subscriptions and manuscripts to:

Systems Engineering Associates
7349 Worthington-Galena Road
Columbus, Ohio 43085
Attn: Ronald N. Thaman

The AAN solicits contributions from forensic scientists, arson investigators, and interested parties which have some unique or routine analysis which helps in the identification of flammable liquid or explosive residues. Articles herein express the views and opinions of the authors, which are not necessarily those of the AAN or Systems Engineering Associates (SEA).

Final Report
STAR 80-049 GRANT

Identification of Accelerants in Fire Atmospheres

by

Chris A. Clausen III
Department of Chemistry
University of Central Florida

INTRODUCTION

In our present day society arson has become a serious problem. The seriousness arises from the cost in lives and money. Estimates of the range of annual fire costs in the U.S. go as high as $5 billion. These estimates include physical damage, loss of use, fire suppression expenses and other factors. It is also estimated that as high as 40% of all fire damage is caused by arsonists. Besides the enormous waste of property, the arsonist also causes a number of deaths and serious injuries and endangers thousands of lives each year in committing this heinous crime. Considering this extensive economic loss, the danger to human life, and the terror spread by an arsonist - especially in residential communities, it is not surprising to learn that this crime was a capital offense until as late as the nineteenth century.

The spirit of Florida law implies that arson is a crime committed by any person who willfully and maliciously sets fire to, burns or causes to be burned, or who aids, counsels or procures the burning of any building or structure whatsoever class or character. The elements of proof required to convict a person of arson are concerned with the "burning", "malice" and "structure" aspects of the offense.

Obtaining elements of proof in the investigation of arson often presents a complex problem because the methods employed by incendiaries and the manner in which they operate are far greater in number and more varied in aspect than those employed by most other types of criminal. Proof of the commission

of the offense is rendered more difficult because the physical evidence, normally providing material assistance in an investigation, is often destroyed by the criminal act itself. For example the accelerant used to commit arson is most often volatilized and destroyed during the course of the crime.

Research into the development of new methods of accelerant detection is in a very dynamic state. The activity in this area has been brought about because there has been no agreement on the adoption of a single accelerant detection method. Thus there is a great need for the development of a single, expedient, and sensitive detection method that can be applied to all types of arson samples.

Currently four different methods are being used for the isolation, detection and identification of accelerants. Each of these methods is concerned with the analysis of arson debris samples.

1. Heated Headspace - Direct headspace sampling from a paint can containing the suspected arson debris. The isolated sample is then analyzed by infrared spectroscopy, gas chromatography and/or mass spectroscopy.
2. Steam Distillation - of charred chips of wood, carpet materials, etc. Analysis of the steam distillate is effected by the use of one or more of the methods listed for the heated headspace procedure.
3. Solvent Extraction - Extraction of suspected debris samples with an appropriate solvent, usually carbon disulfide. Analysis of the extract is effected as indicated above.
4. Concentration of Vapors on Charcoal - This method utilizes as enert

gas purge stream to carry any accelerant from a heated paint can onto a charcoal adsorber. After the accelerant vapors have been concentrated on the surface of the charcoal adsorber, they are removed in a desorption step and subsequently analyzed by one of the methods cited previously.

Each of the methods described is designed to isolate the identify accelerants in a sample that is obtained from the fire scene after the fire has been extinguished. At present there is no routine sampling method to detect and entrap the accelerants at the time that the fire occurs. This inability presents a two-fold problem. First, some accelerants may never be detected if they are not discovered before the fire is extinguished. Second, and lapse of time between the fire and later tests complicates successful prosecution of arson suspects because of difficulty in complying with the chain-of-evidence rule. Thus, a real need exists for a method whereby evidence for the presence of an accelerant can be collected during the course of the fire. The purpose of the research project described in this report and in report STAR 79-047 - 1980 by C.A. Clausen was to develop such a method.

The problem of early accelerant detection is due primarily to the difficulty in obtaining a sample of the accelerant while the fire is in progress. Since the only personnel likely to be in the immediate area of a fire are the fire fighters, they should be considered the most viable candidates to obtain representative samples of the fire atmosphere. However, the sampling procedure and equipment must be designed in such a manner that it does not detract from their primary purpose, extinguishing the fire. Thus the sam-

pling equipment must be small, light and easily turned on and off. It also must be attached to the fireman in such a way that it does not interfere with his mobility or vision. These criteria could be met if a small sampling device was attached to the coat of the fireman. In addition to meeting the above requirements the sampler must also be capable of withstanding the high temperature (e.g. 300 to 500^{o}C) that are encountered in the immediate vicinity of a fire atmosphere.

After developing a feasible method for sampling a fire atmosphere, the next question to be answered deals with establishing what if any differences exist in the composition of fire atmosphere samples when an accelerant is present and when one is not. It is known that heat can product hydrocarbons by pyrolysis of wood and synthetic materials (e.g. plastics, foam rubber, etc.). Therefore it is necessary to know the level of hydrocarbons that may be found in representative classes of materials upon burning. When this is known, a background correction can be made thereby establishing a baseline between expected and suspicious levels of hydrocarbons.

Our research on STAR Grant 79-047 has resulted in the development of a sample collection procedure that utilizes powered air pump that can be a sample of the fire atmosphere in pulled into the suction side of the pump through a small piece of tubing that contains two adsorber beds in series. The first adsorbent bed that the incoming gas sample contacts contains anhydrous calcium sulfate. The purpose of this adsorber is to remine most of the water vapor from the gas sample. After leaving the calcium sulfate adsorber, the gas sample then enters a bed of activated silica gel. Any organic compounds in the gas sample and adsorbed on the silica gel bed, with an efficiency that is greater than 90%. The gas sample depleted of organic compounds, is

then exhausted through the pump. The pump also has a digital counter which indicates the volume of gas that has been sampled. After a satisfactory volume (between 1 and 2 liters) of the fire atmosphere has been sampled, the silical gel and calcium sulfate tubes are removed from the pump, capped and later analyzed in a laboratory.

Our previous research demonstrated that an analysis of the compounds adsorbed on the silica gel bed can be effected by heating the silica gel to a temperature of 200^{o}C in a sealed vial containing a teflon septum. A sample of the gaseous contents of the vial is obtained by piercing the septum with a hypodermic syringe. The sample is then injected into a gas chromatograph for resolution into its components. Thus far in our research program we have analyzed hundreds of fire atmosphere samples by this technique and the method has been found to be very reliable and reproducible.

Our research has demonstrated that only five to eight different types of hydrocarbon compounds are detected by our method in a fire atmosphere that is produced by burning common woods such as pine, oak, etc. Consequently, it is relatively easy to detect the presence of hydrocarbon accelerants, which may contain hundreds of hydrocarbons, against the relatively simple background produced by the burning of wood. We have also found that burning synthetic materials that are used in home construction and furnishings contain many hydrocarbon compounds and therefore, create a very complex background chromatogram. However, even in these complex matrix fire atmospheres it is possible in more cases to identify the characteristic components of common hydrocarbon accelerants.

The major emphasis of this report is to document our findings with

regard to the various factors and parameters that have an effect on the detection and identification of accelerants in large scaled house fires. Our findings are based on twenty five large scale house burns and fifty small scale simulated house burns.

EXPERIMENTAL

In our previous study we reported that our portable air pump sampler is an SKC Model 222-3 obtained from the Supelco Company, Supelco Park, Bellefonte, PA 16823. We also reported that the best adsorbent system we found consisted of a six inch long by 0.76 inch diameter nylon tube packed with a three inch section of anhydrous $CaSO_4$ at the entrance port. The drying agent was held in place by a piece of glass wool. A standard NIOSH type 65/130 mg silica gel adsorption tube was inserted ofter the plug of glass wool. The downstream end of the silica gel tube was connected directly to the air pump by means of a piece of 0.25 inch i.d. flexible heat resistant tubing.

In our ever continuing search for the best adsorbent system, we evaluated several new adsorbents in this phase of the project. We evaluated adsorber beds containing molecular sieve 4A, high porosity charcoal, diatomaceous earth, chromasorb W/HAW, aluminum oxide and activated silica crushed to a mesh of 60-200. Each of these adsorbents was tested both with and without an anhydrous $CaSO_4$ pre-adsorber. Each adsorber was compared to the standard NIOSH silica tube - $CaSO_4$ combination. Only the fresh crushed silica gave greater detection limits. This is illustrated in Figs. 1 and 2, which show that an adsorber made of 3 grams of 60-200 mesh crushed silica detects approximately a 25% greater concentration of hydrocarbons, than the NIOSH silica tube when used under identical conditions in the sampling of an accelerant produced fire atmosphere. Thus, all subsequent fire atmosphere samples were obtained with 3 grams of 60-200 mesh crushed silica and a pre-adsorber of anhydrous $CaSO_4$.

ANALYSIS EQUIPMENT

All samples were analyzed with a Perkin-Elmer Sigma 1 gas chromatograph equipped with a 10 ft. x 1/8 in. stainless steel column packed with 10% SP-2100 or 100/120 Supelco port. The chromatograph was temperature programmed to hold on initial temperature of 35°C for 2 minutes and then rise at 8°C/min to 200°C which is held for 2 min. The He flow rate was maintained at 32 ml/min. The injection port was held at 200°C and the flame ionization detector was held at 250°C. Typical sample size was 1.0-2.0 ml which was injected into the gas chromatograph by means of a plastic syringe. In order to avoid contamination, a new syringe was used for each sample. The sample was obtained from the headspace of a 10 ml screw - cap desorption vial fitted with a teflon-faced silicon septa (Note: vials were obtained from the Supelco Company). The generation of the headspace sample was effected by trnasferring the entire contents of the silica gel adsorber to the 10 ml vial and heating to 200°C. Mass spectroscopy measurements were accomplished by use of a Perkin-Elmer Model RMU-6E unit.

RESULTS AND DISCUSSION

During the course of this phase of the research project we were able to test our sampling technique on twenty-five full-scale house burns. These tests were run in cooperation with ten different fire departments located in the Central Florida area. The general procedure that we used in conducting house burn tests is as follows:

1. A fire was started in one room of the house by using a small amount of hay with no accelerant present. The fire was allowed to build until the entire room had became engulfed in flame and the flames

had begun to spread to other parts of the house. Depending upon the fuel load present, the buildup took between 15 and 30 minutes

2. Once the fire had built to the level described above, a fire fighter team was sent in to extinguish the flames. The team usually consisted of either two or three men on a single hose. Portable air sampling devices were attached to each of the firemen on the hose team. The sampling pumps were started just prior to the firemen entering the burning building. In addition to obtaining samples of the fire atmosphere, a sample of air near the pumper truck was obtained at the same time. These samples were obtained for baseline purposes.
3. After the fire was extinguished, and the firemen exited from the building, the portable pumps were turned off and removed from the firemen. Each pump counter was read so as to calculate the volume of air sampled and the silica adsorber tubes were then removed from the pump, sealed and labeled for future analysis.
4. When the temperature of the burn area had dropped to near ambient levels, a liter of accelerant (gasoline or diesel fuel was used in all our house burns) was added to the debris in the burn area. A time period of between two and five minutes was allowed to pass before the accelerant was ignited.
5. After ignition, the fire was allowed to build to a level approximating that of the baseline burn. This normally took between ten to twenty minutes, at which time the fire fighting team entered the building and extinguished the fire in a manner consistent with the earlier burn. The air samples were handled according to the procedure des-

cribed in the baseline burn. Normally, total volume of fire atmosphere sampled was in the range of one to two liters, depending upon how long the fire fighting team remained in the burn area.

6. After the burn area cooled somewhat, the air above the burned debris was sampled in a manner consistent with our fire atmosphere sampling methodology.
7. For most of our large scale house burns, we would relight the fire between two and four times before the house was allowed to burn to the ground. Thus, we were able to obtain several sets of data for each of the houses that we burned.

An illustration of the type of data that we were able to gather on seventy-five percentof the house burns is illustrated in Figures 3 through 15. Figures 3 through 9 represent typical data for a gasoline initialed house burn, and Figures 10 through 15 represent typical data for a diesel initiated house burn. As is clearly evident from the chromatograms displayed for these two house burns the composition of the fire atmosphere contains information about the presence or absence of a hydrocarbon accelerant during the initiation of these burns. In addition, Figures 9 and 15 show that the atmosphere above an accelerated fire also contains traces of the accelerant even after the fire has been extinguished. Thus, this data plus additional sets of data from more than twenty other house burns serve to illustrate that the fire atmosphere during the fire and the post-fire debris atmosphere contain information about the presence or absence of an accelerant at the scene of the fire and that this information can be most effectively obtained by the use of the sampling and analysis methodology developed in this project.

However, we have also determined that certain conditions and circumstances can render our methodology incapable of establishing the absolute presence of an accelerant initiated fire. For example, when we would allow a house to burn completely to the ground from an accelerant initiated fire, we could not detect the presence of the accelerant in the fire atmosphere during the later stages of the the fire, nor could we detect the presence of an accelerant in the atmosphere above the burn debris when the fire had dried out.

We have tried to quantify the stage at which during an accelerated house burn the accelerant is completely consumed, but the number of variables that enter into this quantification have been too great to allow us to make any meaningful correlations. For example, we have been able to detect the presence of an accelerant in the fire atmosphere of one burning home 75 minutes after the fire began, while for a similiar burn conducted on a similar size home, we could not detect the presence of accelerant in the fire atmosphere 20 minutes after the burn began, eventhough we tried to control all known parameters between the two burns. However, in the final analysis we do feel that the fire atmosphere sampling and analysis methodology developed during our two year study could be of value in establishing the presence of arson in a large percentage of accelerant initiated fires. But it should be kept in mind that this methodology is not the complete answer and should only be thought of as another new technique to be added to the collection of tools available to fire investigators.

AAN NOTE: Unfortunately, the chromatograms are not good quality because the author was unable to obtain and submit the originals.

APPENDIX A

ARSON STUDY CHROMATOGRAMS

Figure 1 - Chromatogram of the fire atmosphere of a diesel accelerated laboratory pine burn as sampled by a NIOSH silica tube.

Figure 2 - Chromatogram of the fire atmosphere of a diesel accelerated laboratory pine burn as sampled by 3 grams of 60-200 mesh crushed silica.

Figure 3 - Chromatogram of the fire atmosphere of an unaccelerated Goldenrod house burn.

Figure 4 - Chromatogram of the atmosphere around the pumper fire truck (gasoline engine) during the unaccelerated Goldenrod house burn.

Figure 5 - Chromatogram of the fire atmosphere of a 1-liter gasoline accelerated Goldenrod house burn sampled by a fireman holding the hose nozzel.

Figure 6 - Chromatogram of the fire atmosphere of a 1-liter gasoline accelerated Goldenrod house burn sampled by a fireman on hose behind the nozzel man.

Figure 7 - Chromatogram of the fire atmosphere of a laboratory scale burn of a mixture of pine and gasoline.

Figure 8 - Chromatogram of a headspace sample of gasoline desorbed from silica gel.

Figure 9 - Chromatogram of the air above the debris of the gasoline accelerated Goldenrod house burn.

Figure 10- Chromatogram of the fire atmosphere of an unaccelerated Winter Park house burn.

Figure 11- Chromatogram of the atmosphere around the pumper fire truck (diesel engine) during the unaccelerated Winter Park house burn.

Figure 12 - Chromatogram of a 1-liter diesel accelerated Winter Park house burn sampled by a fireman holding the hose nozzel.

Figure 13 - Chromatogram of the fire atmosphere of a laboratory scale burn of a mixture of pine and diesel.

Figure 14 - Chromatogram of a headspace sample of diesel desorbed from silica gel.

Figure 15 - Chromatogram of the air above the debris of the diesel accelerated Winter Park house burn.

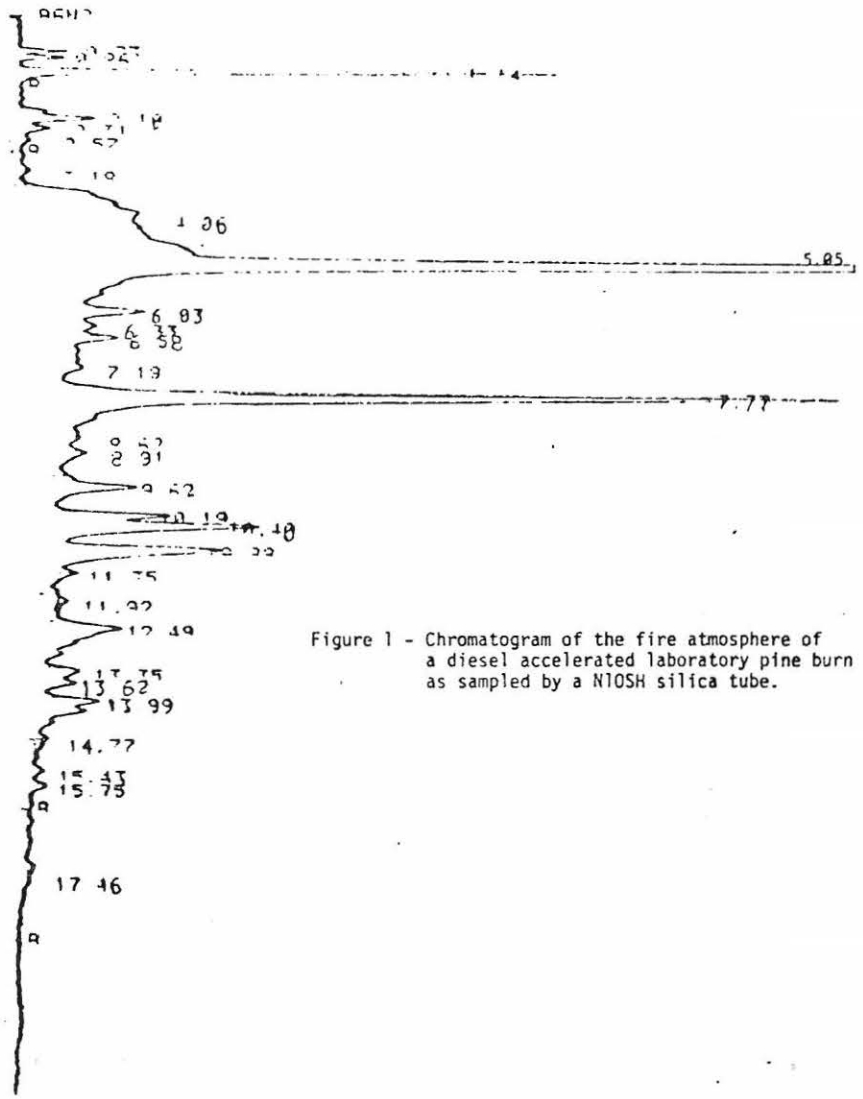

Figure 1 - Chromatogram of the fire atmosphere of a diesel accelerated laboratory pine burn as sampled by a NIOSH silica tube.

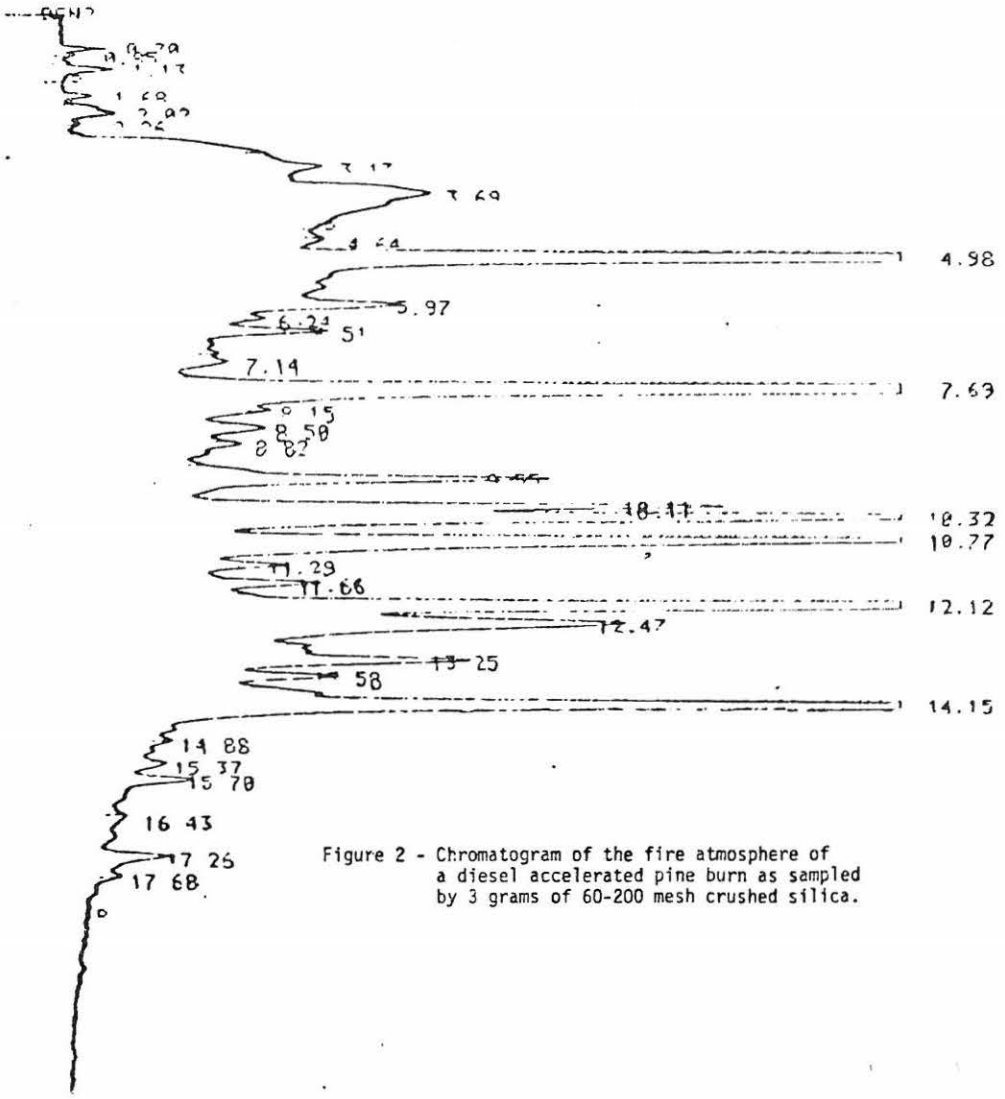

Figure 2 - Chromatogram of the fire atmosphere of a diesel accelerated pine burn as sampled by 3 grams of 60-200 mesh crushed silica.

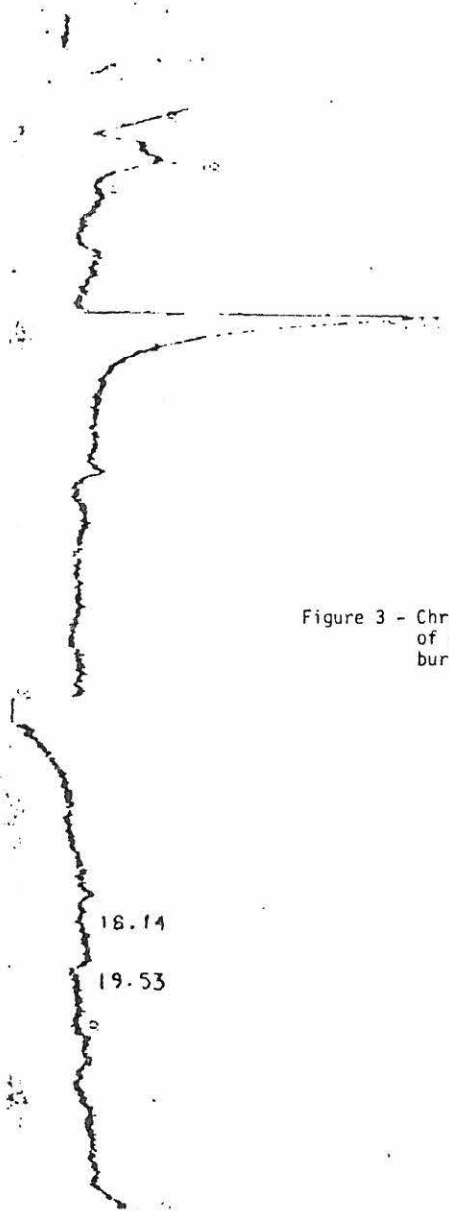

Figure 3 - Chromatogram of the fire atmosphere of an unaccelerated Goldenrod house burn.

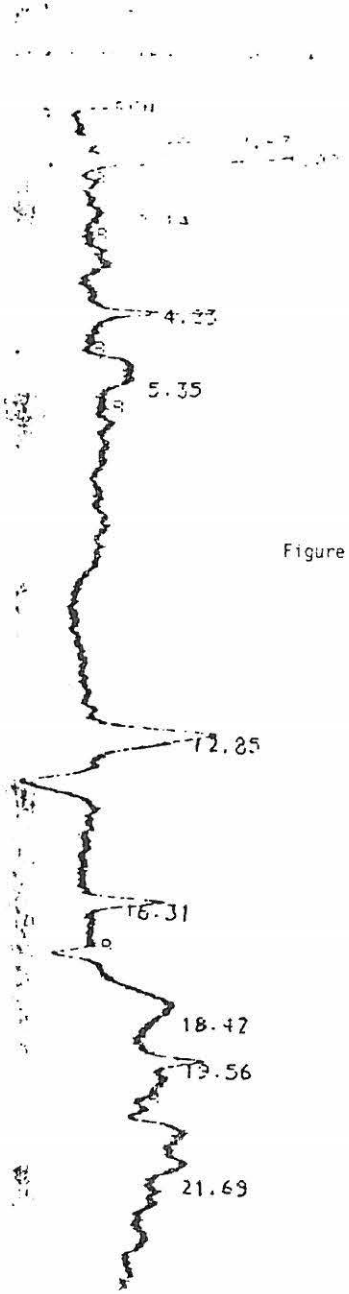

Figure 4 - Chromatogram of the atmosphere around the pumper fire truck (gasoline engine) during the unaccelerated Goldenrod house burn.

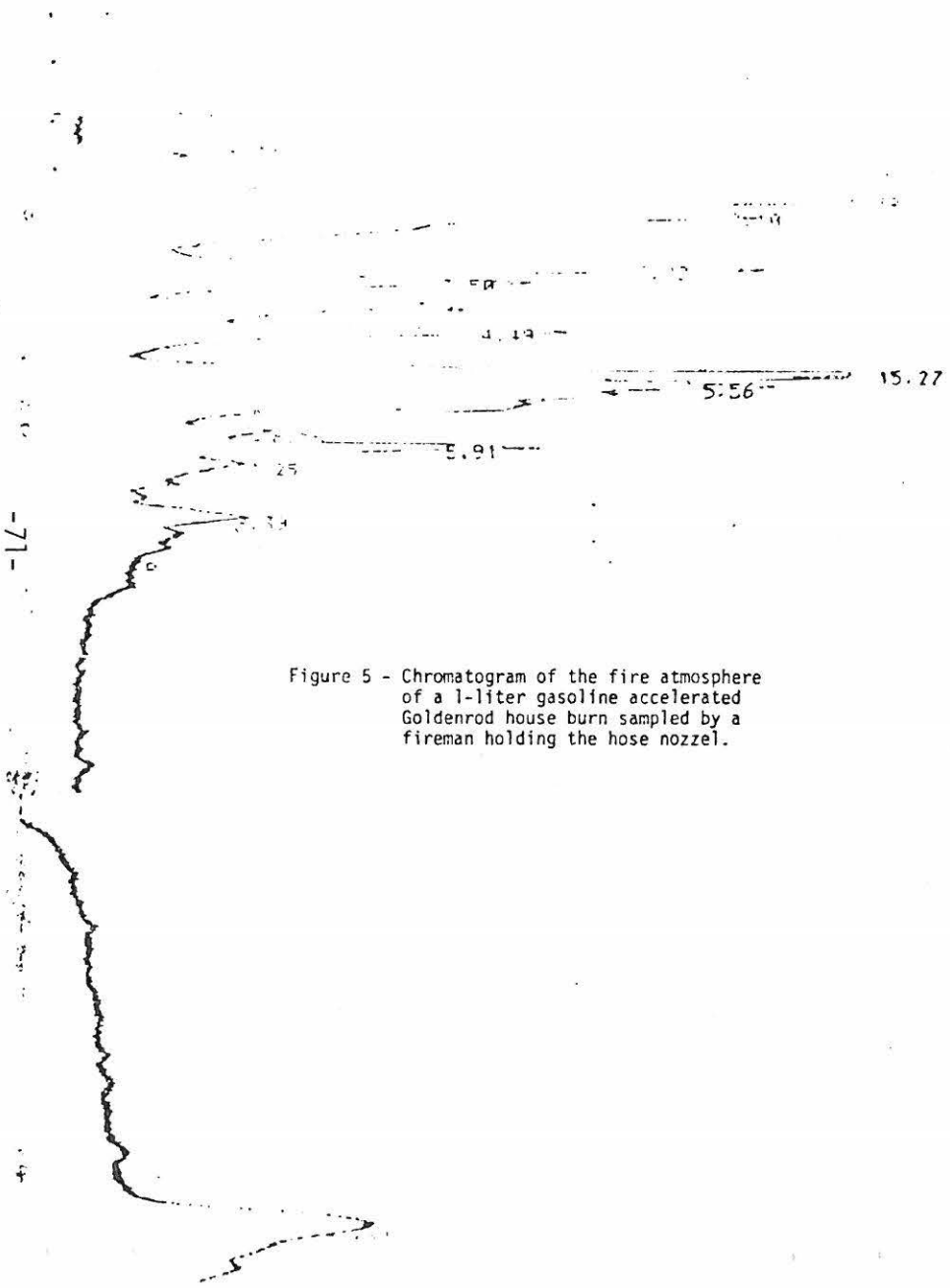

Figure 5 - Chromatogram of the fire atmosphere of a 1-liter gasoline accelerated Goldenrod house burn sampled by a fireman holding the hose nozzel.

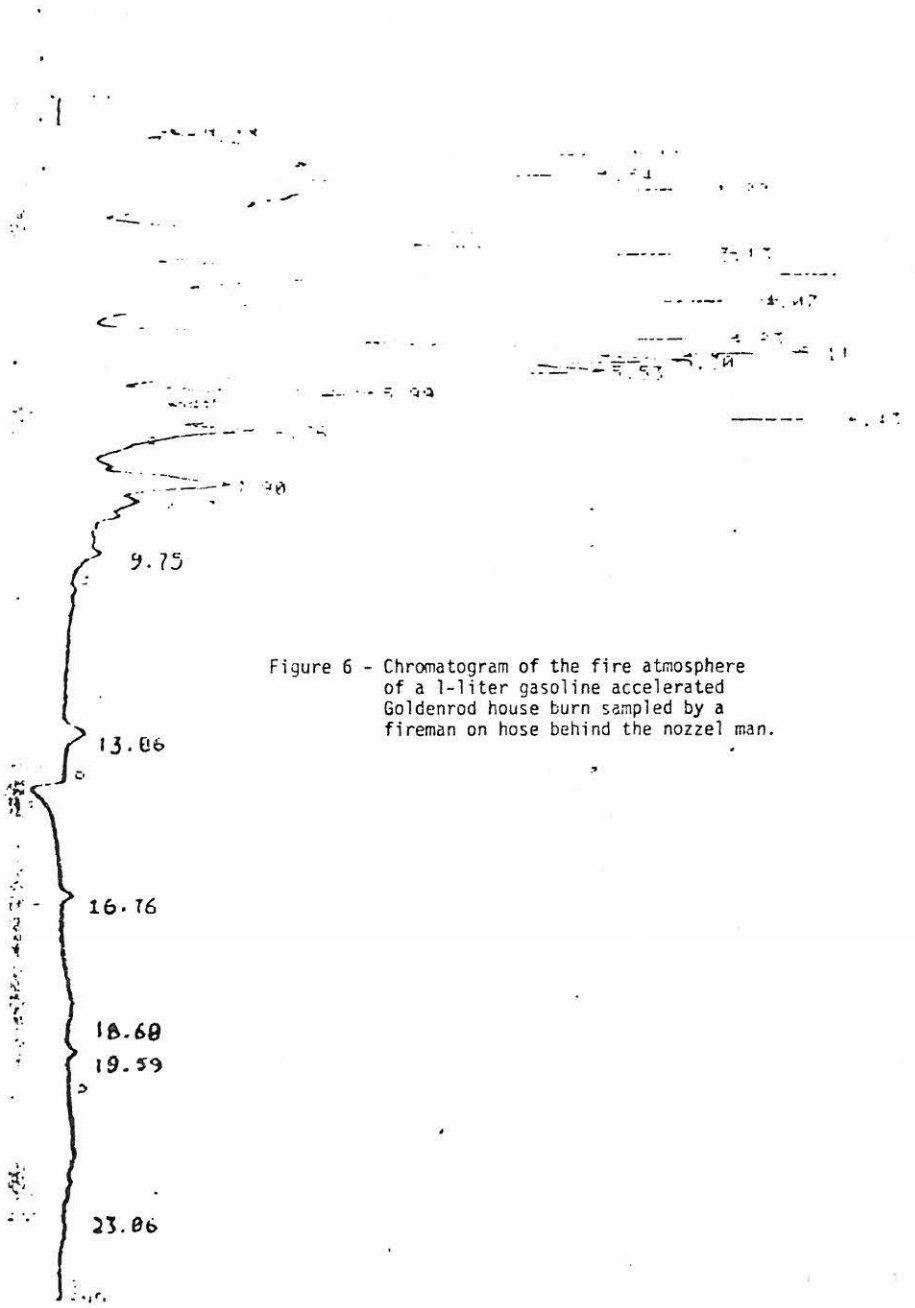

Figure 6 - Chromatogram of the fire atmosphere of a 1-liter gasoline accelerated Goldenrod house burn sampled by a fireman on hose behind the nozzel man.

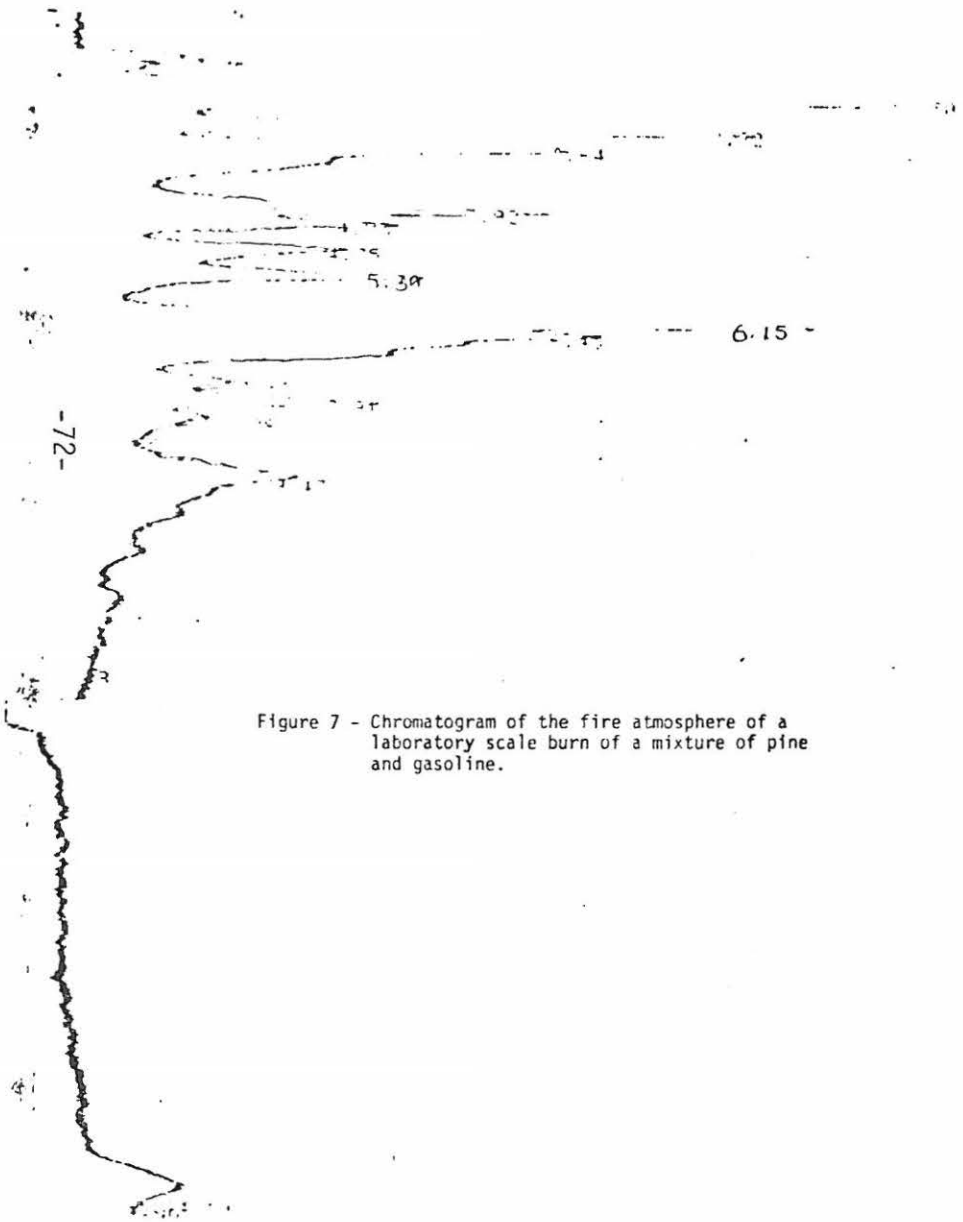

Figure 7 - Chromatogram of the fire atmosphere of a laboratory scale burn of a mixture of pine and gasoline.

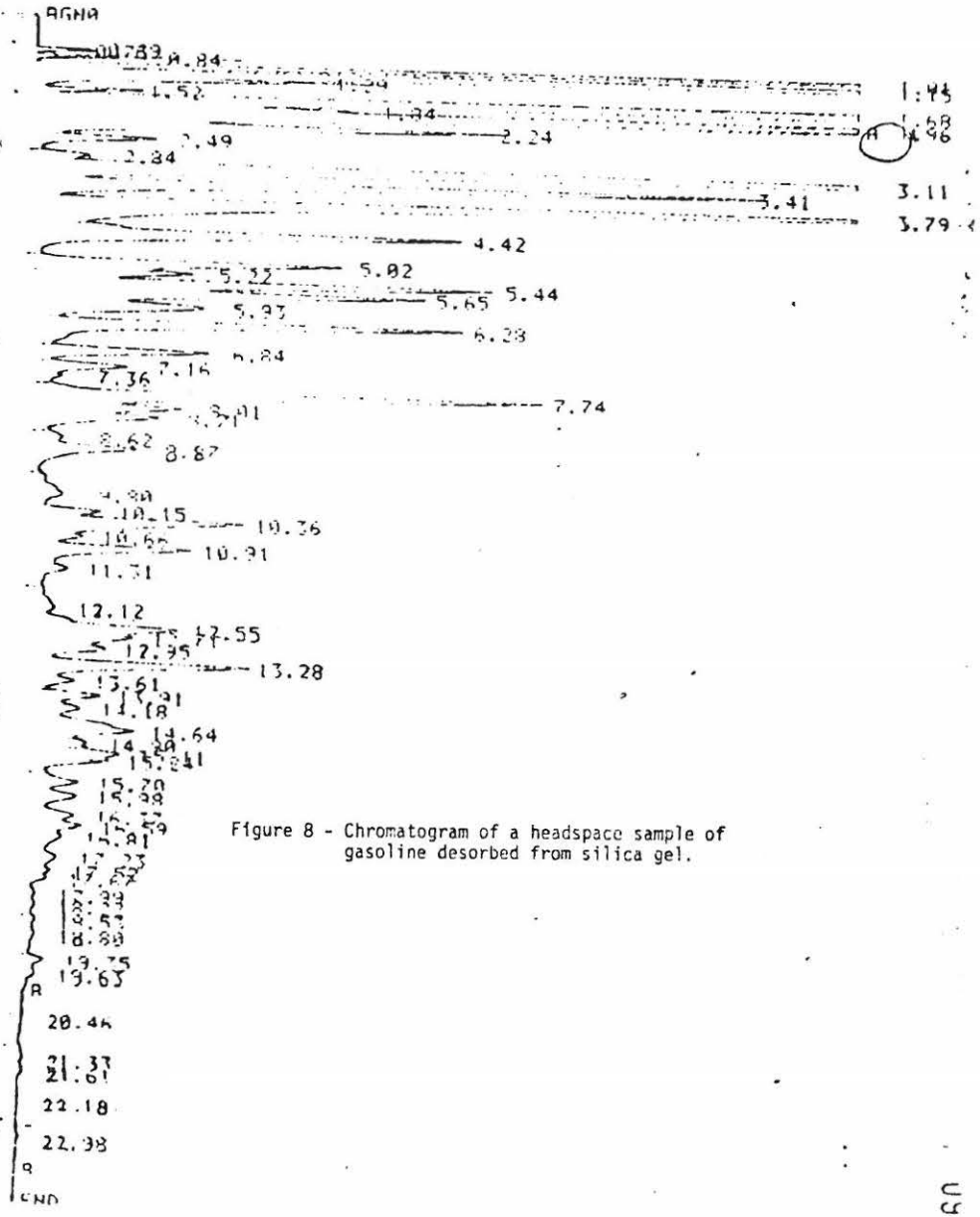

Figure 8 - Chromatogram of a headspace sample of gasoline desorbed from silica gel.

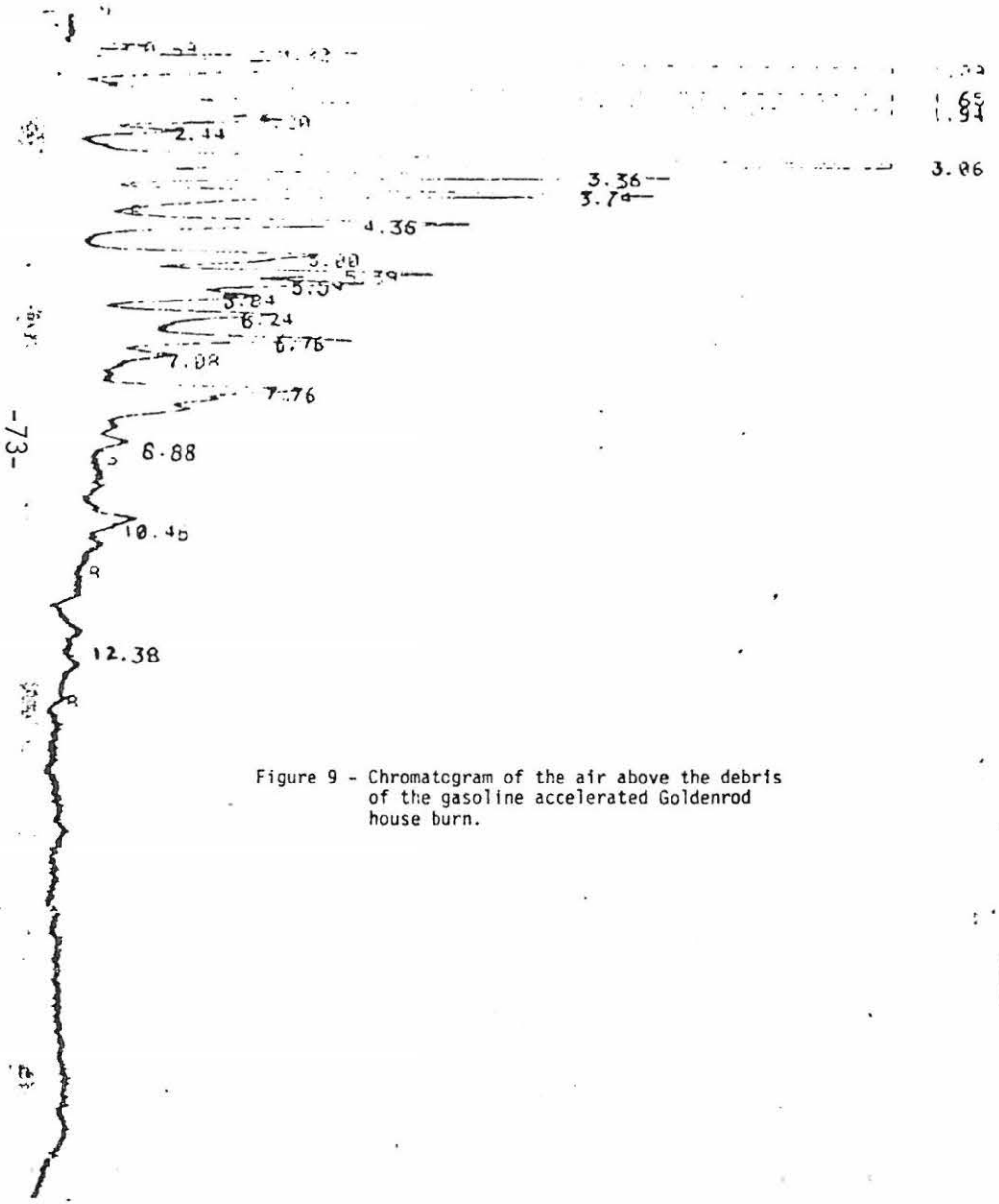

Figure 9 - Chromatogram of the air above the debris of the gasoline accelerated Goldenrod house burn.

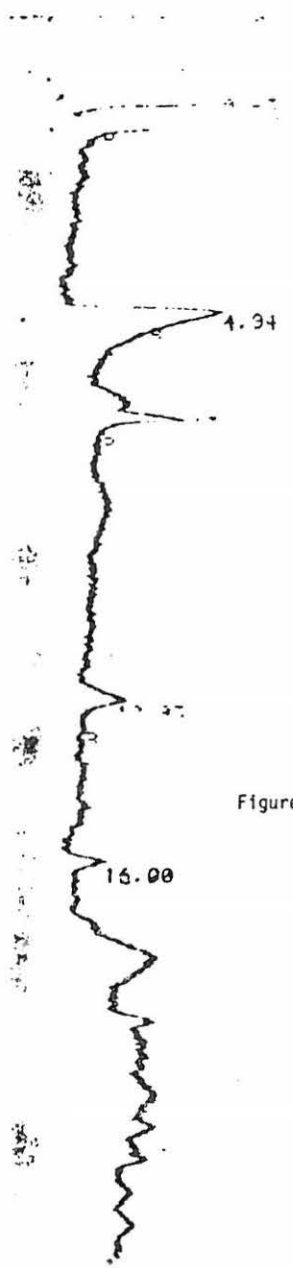

Figure 10 - Chromatogram of the fire atmosphere of an unaccelerated Winter Park house burn.

Figure 11 - Chromatogram of the atmosphere around the pumper fire truck (diesel engine) during the unaccelerated Winter Park house burn.

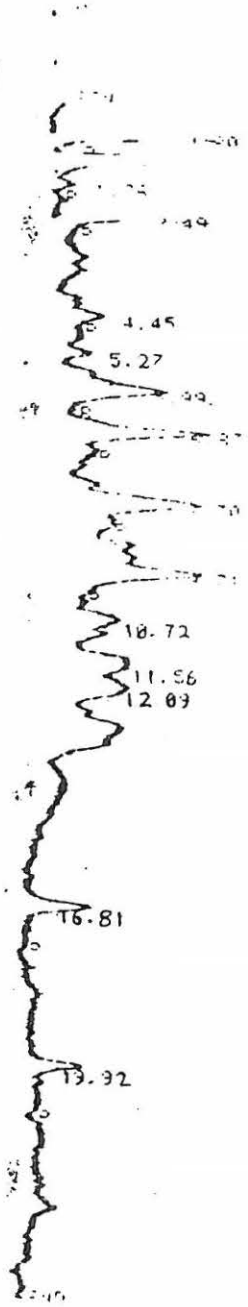

Figure 12 - Chromatogram of a 1-liter diesel accelerated Winter Park house burn sampled by a fireman holding the hoze nozzel.

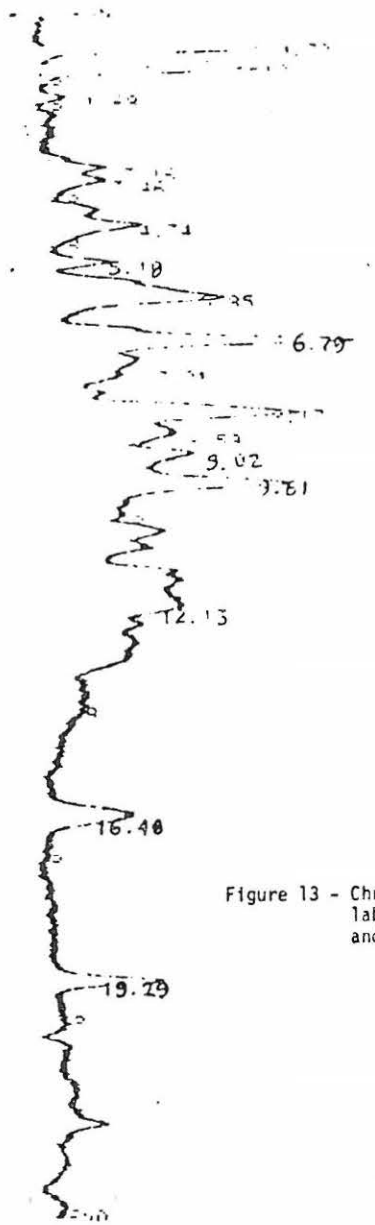

Figure 13 - Chromatogram of the fire atmosphere of a laboratory scale burn of a mixture of pine and diesel.

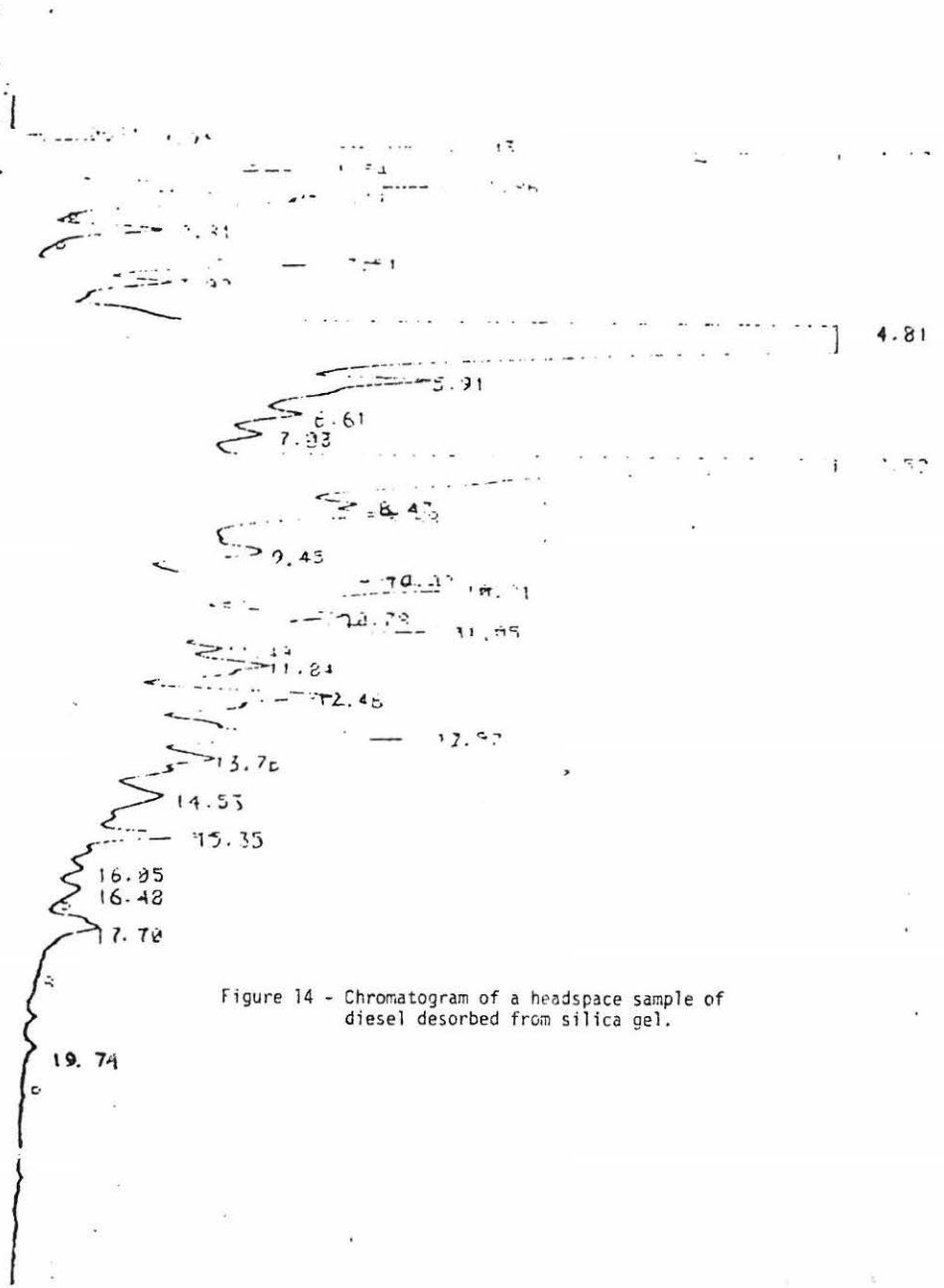

Figure 14 - Chromatogram of a headspace sample of diesel desorbed from silica gel.

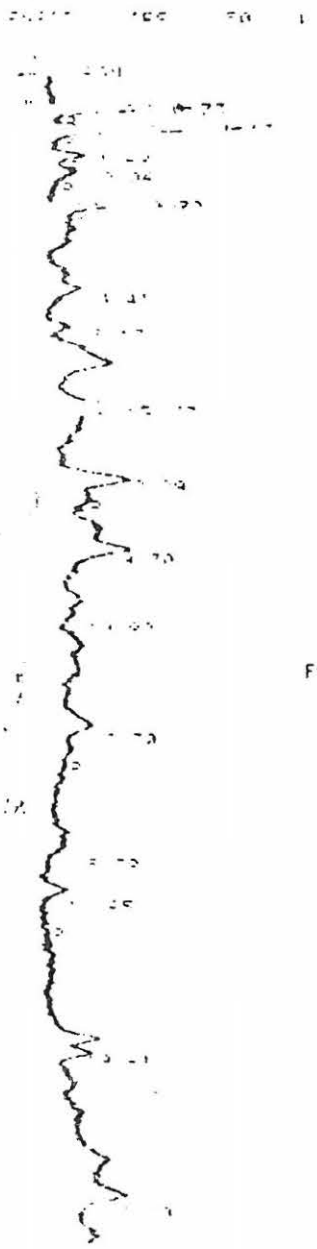

Figure 15 - Chromatogram of the air above the debris of the diesel accelerated Winter Park house burn.

AAN Notes

* FROM OUR READERS

The following was submitted by Celia Hartnett, Criminalist III, State of California, Department of Justice, 820 Francis Botello Road, Goleta California 93017:

"I thought you might be interested in a case I worked several years ago. It serves as a good reminder to keep an open mind about the types of examinations one might utilize in an arson case, other than GC.

A trailer on a construction site was vandalized and then set alight. The trailer was totally destroyed. It was apparent that the perpetrator had yanked out the sink in the trailer, stuffed it with papers, etc. and used it to torch the trailer by shoving it underneath. Samples of everything, including the kitchen sink, were collected from the scene.

A potential suspect's clothing was submitted to the lab for examination and charred particles were found adhering to his jacket. We used a scanning electron microscope with an energy dispersive X-ray to analyze the particles, which had a bluish color to them. We found a high amount of copper, plus zinc and sulfur and other minor trace elements which compared nicely to the burnt sink fittings."

* FROM THE ARCHIVES

Bill Dietz from ATF in Treasure Island, California, writes:

"Here is the article that mentions RHODOKRIT H-630. With a larger number of subscribers maybe someone has actually seen or used it!! With so many hydrocarbon based materials these days, such as carpet, padding, plastic material, etc., any melting of these products from heat could result in the powder turning red."

The article which Bill is referring to was first published in the Oct.-Dec. 1953 issue of the Fire & Arson Investigator and mentioned in the AAN notes of the Volume 1, No. 6 issue.

Can anyone help enlighten the readers of the AAN to RHODOKRIT H-630?

* SEMINARS OFFERED

Below and on succeeding pages is a calendar listing law enforcement seminars being offered during 1983-84 by the University of Delaware, 2800 Pennsylvania Avenue, Wilmington, Delaware 19806. All of the seminars are in Wilmington, Delaware and many of them are in cooperation with state and local police agencies. They are in chronological sequence.

For more information, contact Mr. Jacob Haber, Continuing Education Program Specialist, at the above address or call (302) 738-8155.

October 24-25	FIRE AND ARSON INVESTIGATION SEMINAR Fee: $210.
October 31- November 1	INTERNAL AFFAIRS Fee: $225.
November 14-16	PUBLIC SAFETY RADIO DISPATCHERS' SEMINAR Fee: $230.
November 14-16	ROBBERY AND BURGLARY INVESTIGATION SEMINAR Fee: $275.
November 28-30	MANAGING THE CRIMINAL INVESTIGATION Fee: $275.
December 5-6	POLICE VICARIOUS LIABILITY Fee: $250.
December 5-9	HOMICIDE INVESTIGATION Fee: $325.
December 12-14	USE OF SUPERVISORY PRINCIPLES WITHIN COMMUNICATION CENTERS. Fee: $310.
January 9-10	INFORMATION SECURITY SYSTEMS Fee: $325.
January 9-11	POLICE HANDLING OF JUVENILES Fee: $275.
January 11-12	COMPUTER CRIME: DETECTION AND INVESTIGATION Fee: $325.
January 16-17	CRIME ANALYSIS SEMINAR Fee: $250
January 16-17	INDUSTRIAL ESPIONAGE: COUNTERMEASURES AND INTELLIGENCE TECHNIQUES. Fee: $325.
January 23-25	POLICE INTERVIEW AND INTERROGATION Fee: $257.

January 25-26	DISPATCHER STRESS AND BURNOUT REDUCTION Fee: $210.
February 1-2	COMMUNICATION CENTER BUDGET FORMULATION AND IMPLEMENTATION. Fee: $210.
February 6-17	POLICE SUPERVISORY PRINCIPLES. Fee: $1,200.
February 13-15	ENHANCEMENT OF POLICE MANAGERIAL SKILLS Fee: $350.
February 23-24	DEVELOPING AND IMPLEMENTING OF A POLICE STRESS AND BURNOUT REDUCTION PROGRAM. Fee: $225.
March 5-6	FIRE AND ARSON INVESTIGATION Fee: $210
March 19-20	INTERNAL AFFAIRS Fee: $225
March 26-27	INTELLEGENCE OPERATIONS Fee: $225.
April 2-4	PUBLIC SAFETY RADIO DISPATCHERS' SEMINAR Fee: $225.
April 16-18	ROBBERY AND BURGLARY INVESTIGATION TECHNIQUES Fee: $275.
April 23-25	MANAGING THE CRIMINAL INVESTIGATION Fee: $275.
May 7-8	POLICE VICARIOUS LIABILITY Fee: $250
May 14-16	USE OF SUPERVISORY PRINCIPLES WITHIN COMMUNICATION CENTERS. Fee: $310.
May 15-16	USE OF PRIVATE AND PUBLIC COMPUTER INFORMATION SOURCES. Fee: $325.
May 17-18	DATA BASE SECURITY SYSTEMS Fee: $325.
May 21-23	POLICE INTERVIEW AND INTERROGATION Fee: $275.
May 30-31	EMPLOYEE THEFT INVESTIGATION Fee: $325.
June 4-6	POLICE HANDLING OF JUVENILES Fee: $275.
June 6-7	DISPATCHER STRESS AND BURNOUT REDUCTION Fee: $210.

* NEW BOOK

Publisher
John Wiley & Sons, Inc.
New York, New York

212 867-9800
1 WILEY DR
SOMERSET NEW JERSEY
08873

KIRK'S FIRE INVESTIGATION, 2ND ED.
400pp, Cloth Copyright c 1983 Available: November, 1982

DeHaan, John .....California Dept of Justice, Bureau of Forensic Services

MARKET: Soph/Sr-level courses on Fire Investigation, Arson Investigation, in two- or four-year programs in Fire Science or Criminal Justice. Also appropriate for university-level courses in criminalistics or forensics.

DESCRIPTION: A thorough revision of Paul Kirk's classic text on fire investigation by John DeHaan, a research scientist and fire investigator. Designed as a text and reference for students of fire investigation and professional fire investigators, it covers all phases of a fire problem--from fuels, ignition and combustion to fire behavior and post-fire diagnostic signs. Covers technical topics such as fire deaths, vehicle fires, physical evidence and laboratory work. Reflects the most current capabilities of the lab in assisting the investigator. Author is well published and well known in the field.

FEATURES:

1. Organization of the text provides a step-by-step introduction to the field--from elementary chemistry to post-fire diagnostic signs.

2. Current: Makes use of the most recent information and data, reflecting the state-of-the-art in both knowledge and technique.

3. Comprehensive and Authoritative: Covers a broad range of topics including electrical fires, fire deaths, fabrics, hazardous materials, legal issues. Combines the highly respected work of Paul Kirk with information on all aspects of fire investigation based on extensive experiments conducted by John DeHaan.

CHANGES IN NEW EDITION: This is a thorough revision of Paul Kirk's work. Chapter 10 ELECTRICITY AND FIRE, Chapter 13 CHEMICAL FIRES AND HAZARDOUS MATERIALS, Chapter 15 FIRE RELATED DEATHS, and Chapter 16 ARSON AS A CRIME are wholly new to this edition. There is also important new material on arson law, evidence, search and seizure, and courtroom testimony.

SUPPLEMENTS: None

TABLE OF CONTENTS:

* MEETING

The California Association of Criminalists' Fall Seminar will be held October 20, 21 & 22 in Ontario, California. The following particulars apply:

Place: Red Lion Inn (next to Ontario Airport)

Dates: October 20, 21, 22

Host Lab: San Bernardino Sheriff's Crime Lab

For details on the meeting, contact:

William Baird
San Bernardino Sheriff's Regional Crime Lab
200 South Lena Avenue
San Bernardino, California 92415
(714) 383-7344

International Association of Forensic Sciences
10th Triennial Meeting, Oxford, England,
18 - 25 September 1984

The 10th triennial meeting of the IAFS will be held in the university city of Oxford, England, from Tuesday, 18th September, to Tuesday, 25th September 1984. The general theme of the meeting will be "Forensic Science - The Changing Years" and, within this general theme, the three major sub-themes will be "Quality Assurance", "Mass Investigations" and "Evidential Value". The outline structure of the meeting is already well-established and preliminary bookings have already been made of sufficient university and hotel accommodation to cater for the expected number of participants.

I am particularly grateful for the help and advice offered to me by so many people including Dr Chris Giertsen, who took the trouble to come from Bergen to brief me on the 1981 meeting; to Professor Tom Marshall, who gave me the benefit of his experience in the organisation of the Edinburgh (1972) meeting, to Dr Bill Eckert who left me a recorded tape of advice in my absence on his way back home from the Bergen meeting. Mr Doug Lucas has not only given me advice stemming from the organisation of the enormously successful Toronto meeting in 1969, but has also undertaken to participate in the 1984 meeting as Chairman of the Criminalistics Section.

The Plenary Sessions

The 1984 meeting will consist of plenary sessions, in which leading forensic scientists, lawyers and police officers will speak on general topics. There will also be specialist sessions. The plenary sessions, of which there will be one each day, will be given by leading figures in the forensic sciences and its associated professions. These will be of great importance since it is predominantly in the plenary sessions that we hope to make the syntheses and the advances in conceptual matters that are all too frequently lacking in the specialist sessions. I am pleased to announce that Dr Alan S Curry has kindly accepted the invitation to give the opening plenary lecture. Alan Curry's work in the field of Forensic Toxicology over the past thirty years warrants him being considered, as many of us do, as the founder of modern Forensic Toxicology. However, his interests and experience in the forensic sciences range much more widely than a single field and the audience at the first plenary session will have much to look forward to in Dr Curry's lecture.

The Specialist Sessions

The specialist sessions will be organised by the sections of the Association (of which more later). We currently anticipate that there will be perhaps 6 or 7 concurrent series of specialist sessions. It is our intention to organise the programme so that participants who wish to move from one session series to another at a particular time may rest assured that the paper he or she wishes to hear will be given at the scheduled time, subject to normal reservations. I feel it very important that participants, who invest a great deal in the meeting by way of professional time and finance, should reasonably expect that their requirements are met to the fullest possible extent.

Each Session Series will be held in a single lecture theatre and there will be a permanent staff in each theatre to deal with general organisation and audio/visual aids. As far as possible the lectures in a particular specialist section will be given in the same session series theatre. Full advance notice will be given of any necessary changes. There will be sufficient presidential staff to deal with all non-sectional queries and, in addition, a separate staff to deal with accommodation matters.

The Organisation of Subject Sections

Each subject section will have a chairman and a secretary. The secretary will, in all cases, be domiciled in the United Kingdom whereas the chairman may or may not be domiciled in the United Kingdom. The function of the chairman and secretary of each individual section will be to referee the submitted papers and to recommend to the President that they should be accepted or rejected. The section officers will also nominate session chairmen for appointment by the President and (with the agreement of the President) will invite specific papers from specific individuals. Within these constraints the organisation of the various specialist sections will be the responsibility of the section officers as defined above. Since, in some cases, a particular topic may extend over the subject matter of two or more sections, in these cases we expect that the sectional officers will co-operate closely amongst themselves to produce a joint session or sessions.

Several specialist sections have already been formed and these are listed in the appendix. It should be noted that the names of the sections relate largely to the special subject content of the section and the precise title may be changed in the final programme.

It can be seen that much of the organisation of the 10th triennial meeting will be decentralised, subject to the requirements of internal self-consistency. This being so it will be useful if any suggestions relating to the organisation of the meeting can be made either to the President or to the section chairmen or secretaries. Although we have over two years ahead of us during which to organise a very successful meeting it would be a great mistake not to prepare the general framework at the earliest possible moment and this I have attempted to do.

Either I or my nominated representative will be attending various national and international meetings in forensic science and forensic medicine before September 1984. We hope that every opportunity will be taken by participants in these meetings to discuss their requirements for the international meeting in 1984 with the President or his representative.

Stuart Kind

PRESIDENT

International Association of Forensic Sciences

"Clarke House"
18A Mount Parade,
Harrogate,
North Yorkshire,
England HG1 1BX.

21 July 1982

SUGGESTED LIST OF TOPICS: FIRE INVESTIGATION

Note:

This list is intended as a guide for those intending to submit papers. It is neither exhaustive nor exclusive. Some of the headings may include subject material suitable for alternative sections of the meeting (for instance Explosion Investigation or Criminalistics).

Fire Research

The chemistry and physics of fire growth and the applications of research results in fire science to 'real' situations. This could include novel building materials and furnishings or new building methods and their effect on fire spread patterns from the investigators point of view.

Laboratory Techniques

Methods for the detection, recovery, identification and discrimination of fire accelerants have rapidly developed in recent years. Many, such as adsorption/desorption methods, are still formative. Other, less publicised laboratory techniques exist, however, for dealing with other materials, such as flammable non-hydrocarbons and incendiary chemical mixtures.

Scene Techniques

There are numerous methods of locating a seat of fire, the physical appearances of the burning patterns can provide many pointers. Instrumental approaches have been made where accelerants have been suspected ('sniffers'). Some assumptions used in scene evaluation are untested and others are unreliable. Are there any reliable and universal observations which could be made?

Fatal Fires

The pathology of fire deaths has advanced in recent years with a recognition of the causative factors present in smoke and heat. The psychology of the fire victim has also received some attention. Using fire to mask a crime or as a direct weapon to cause death involves fire investigators with many difficult problems both of interpreting the cause of the fire and the means by which the victim became involved. Suicide by fire is not an uncommon incident.

Arson

Arson is, arguably, one of the most rapidly increasing causes of fire. Internationally it is recognised as one of the most difficult of crimes to detect and secure a conviction. Many countries will have common problems, irrespective of their legal systems. These are mostly practical - the determination of criminal action and the linking of the crime to a suspect. This area also involves the recognition of 'series' crime and, consequently the converse when a suspect confesses to numerous fires which may or may not have been recognised as criminal. The interface of arson investigation with criminalistics is apparent and may be explored.

Legal and Evidential Problems

In the United Kingdom recent decisions, such as R. v. Denton (1981) R. v. Stephenson (1979), R. v. Caldwell (1981), have had a direct bearing on the fields of criminal liability and recklessness in arson. Similarly Michigan v. Tyler (U.S. Supreme Court 1978), has raised problems of admissability of evidence in the USA. Liability in damages is another field in which the law made recent moves.

International Aspects

International consultancy has its own aspects. International Law may well complicate liability or damages claims, while actual access to a fire scene (eg on a ship) may be severely restricted. Are there any practices which can establish a 'minimum acceptance' value where, say, insurance interests are satisfied? Are there "global" standards of performance and if not could any be set? Apportionment of damages must of necessity be an area worthy of discussion.

Marine Fires

The structure of ships frequently makes these fires unique. In many cases the manner of and the time taken in fire fighting renders interpretations based on building fire observations out of the question. The presence of fuels in ships also makes the interpretation of whether or not fire accelerants have been used a difficult problem.

Case Histories

These will in many ways prove instructive as well as entertaining. The usual as well as the unusual can be presented using any of (or additional to) the categories suggested above.

CHAIRMAN

R. A. Cooke
Home Office Forensic
Science Laboratory,
Wetherby

SECRETARY

Dr Robin Holleyhead
Dr J H Burgoyne and
Partners

THE INTERNATIONAL ASSOCIATION OF FORENSIC SCIENCES
President Professor Stuart S Kind Telephone 0423 56068 Clarke House PO Box 41 Harrogate HG1 1BX England

GUIDELINES TO AUTHORS

1. Each paper will occupy a slot of 20 minutes and this timing (which includes changeover, introduction and illustrations) will be rigidly enforced. This is necessary so that a participant may change from session to session at a predetermined time, if he or she wishes, without disappointment.

2. Refereeing of papers will be carried out by the Section Chairman and Secretary.

3. The abstracts of papers will be published in a special issue of the Journal of the Forensic Science Society with a standard type face. It would be useful, therefore, if a standard layout is employed in scripts. This should be in the form:

   NAME (Block capitals) and TITLE (Mr, Dr, Prof etc.)
   Full Address (in Upper and Lower case)
   Title of the Paper (in Upper and Lower Case and Underlined)

   Thereafter the author's abstract should be typed in lower case with capitals where required. The total of the headings and of the abstract text itself must be no more than 250 words.

   Abstracts should be sent to Professor W J Tilstone, Forensic Science Society, Clarke House, 18A Mount Parade, Harrogate, North Yorkshire HG1 1BX, England.

   Papers should be sent to the Section Secretary at the same address, ie Forensic Science Society, Clarke House, 18A Mount Parade, Harrogate, North Yorkshire HG1 1BX, England.

4. The suggested list of topics is guide only and papers on other topics will be accepted.

5. All papers will be delivered in English.

   The Section Chairman and myself will be pleased to help authors who are not writing in their native languages with their texts.

DR ROBIN HOLLEYHEAD

Dr. J.H. Burgoyne and Partners
(Secretary Fire Investigation Section)

MAY 1983

INTERNATIONAL ASSOCIATION OF FORENSIC SCIENCES

OXFORD 1984

SECTION OFFICERS

DOCUMENT EXAMINATION

Prof J Mathyer — CHAIRMAN
Institut de Police Scientifique et de Criminologie
Place du Chateau 3
Lausanne
SWITZERLAND

Mr D M Ellen — SECRETARY
Metropolitan Police Forensic Science Laboratory
109 Lambeth Road
LONDON SE1 7LP

CHARACTERISATION OF BLOODSTAINS

Dr G Sensabaugh — CHAIRMAN
University of California
School of Public Health
Department of Biomedical and Environmental
Health Science
Berkeley
CALIFORNIA 95720, U.S.A.

Dr P H Whitehead — SECRETARY
Home Office Forensic Science Laboratoratory
Sandbeck Way
WETHERBY LS22 4DN, W. Yorkshire

CHARACTERISATION OF HUMAN HAIR

Dr M Wittig — CHAIRMAN
Bundeskriminalamt Krim. Techn. Institut
Postfach 1820
6200 Wiesbaden
WEST GERMANY

Dr J Robertson — SECRETARY
Forensic Science Unit
University of Strathclyde
Royal College
204 George Street
GLASGOW G1 1XW

TOXICOLOGY

Not yet appointed — CHAIRMAN

Dr A C Moffat — SECRETARY
Home Office Central Research Establishment
Aldermaston
READING RG7 4PN
Berkshire

CRIMINALISTICS

Dr D M Lucas — CHAIRMAN
Centre of Forensic Sciences
25 Grosvenor Street
Toronto
Ontario
CANADA M7A 2G8

Dr R L Williams — SECRETARY
Metropolitan Police Forensic Science Laboratory
109 Lambeth Road
London SE1 7LP

HAEMOGENETICS

Not yet appointed — CHAIRMAN

Dr J Thorpe — SECRETARY
Forensic Science Unit
University of Strathclyde
Royal College
204 George Street
GLASGOW G1 1XW

FORENSIC PATHOLOGY

Professor A K Mant — CHAIRMAN
29 Ashley Drive
WALTON-ON-THAMES
Surrey

Professor B H Knight — SECRETARY
Dept of Pathology
Welsh National School of Medicine
The Royal Infirmary, Cardiff, Wales CF2 1SZ

CLINICAL FORENSIC MEDICINE

Dr P Bush — CHAIRMAN
39 Millswyn Street
South Yarra
3141 Victoria
AUSTRALIA

Dr M D B Clarke — SECRETARY
Vine House
Huyton Church Road
Huyton
nr LIVERPOOL L36 5SJ

FORENSIC PSYCHIATRY

Prof R Bluglass — CHAIRMAN
Midland Centre for Forensic Psychiatry
All Saints Hospital
Lodge Road
Birmingham B18 5SD

Dr R Antebi — SECRETARY
Duke Street Hospital
253 Duke Street
GLASGOW

BODY FLUIDS OTHER THAN BLOOD

Dr M Lawton — CHAIRMAN
Chemistry Division
Department of Scientific and Industrial Research
Private Bag
Petone
NEW ZEALAND

Dr A M C Gallop — SECRETARY
Home Office Forensic Science Laboratory
Aldermaston
READING RG7 4PN, Berkshire

LAW AND FORENSIC SCIENCE

Prof J K Mason — CHAIRMAN
University of Edinburgh Medical School
Teviot Place
EDINBURGH EH8 9AG

Mr A R Brownlie — SECRETARY
2 Abercromby Place
EDINBURGH EH3 6JZ

PATTERN AND PROCEDURE IN CRIME INVESTIGATION

CHAIRMAN

Not yet appointed

Mr R E Stockdale — SECRETARY
Home Office Central Research Establishment
Aldermaston
READING RG7 4PN, Berkshire

MATHEMATICAL AND STATISTICAL EVALUATION OF EVIDENCE

Prof D Lindley — CHAIRMAN
2 Preston Lane
Minehead
Somerset TA24 8AQ

Mr I W Evett — SECRETARY
Home Office Central Research Establishment
Aldermaston
READING RG7 4PN, Berkshire

TEXTILE FIBRES IN FORENSIC SCIENCE

Dr D Patterson — CHAIRMAN
Department of Colour Chemistry
The University of Leeds
LEEDS

Mr R Cook — SECRETARY
Metropolitan Police Forensic Science Laboratory
109 Lambeth Road
LONDON SE1 7LP

FORENSIC ODONTOLOGY

Dr K A Brown — CHAIRMAN
Department of Oral Biology
The University of Adelaide
Box 498 GPO
Adelaide
SOUTH AUSTRALIA 5001

Dr I R Hill — SECRETARY
The Old Swan
Swan Lane
Marsh Gibbon
Bicester
Oxon OX6 0HH

FIREARM EXAMINATIONS

E E Hodge — CHAIRMAN
Firearm and Toolmarks Unit
F.B.I.
WASHINGTON,
U.S.A.

Dr W H D Morgan — SECRETARY
Northern Ireland Forensic Science Laboratory
180 Newtownbreda Road
BELFAST BT8 4QR, Northern Ireland

FORENSIC INVESTIGATION OF ROAD TRAFFIC ACCIDENTS

Dr W J Rodger — CHAIRMAN
Strathclyde Forensic Science Laboratory
173 Pitt Street

* COMMENTS FROM THE 1982 AAN QUESTIONAIRE

Question #1:

* Yes, if there is as much information in the 4 issues as there is now in 6.

* If the AAN were to be reduced to four issues per year instead of 6, I would expect that the additional time would permit the editorial board enough additional time to add some additional substance to the newletter.

* Surely we can get more articles. I have a number of ideas which might be useful to you.

* I don't think there is enough analytical research or methods development being done that will generate large numbers of articles. Have you tried soliciting articles from people who give papers at regional association meetings (Midwest, Mid-Atlantic, Northeastern, Southern, etc.) or culling articles from the IAAI chapter newsletters or insurance magazines?

* I know how hard it is to maintain quantity and quality. Quality is much more important.

* I would think if you reduced the frequency by 30% and did not increase the contents, there should be a reduction in rate. Otherwise, it would be equal to an increase in rate of 30%. Not Good!

* We would rather have more, assuming the articles are useful, but we will take what we can get. Suggestions for stimulating more articles:

1. Technique highlights - the sort of thing that people do not normally write up but would be useful. For example, some alternative techniques for making "carbon wires" (for passive absorption of flammable liquid residues for subsequent thermal desorption). The present published method takes too long and the resulting wires are too fragile. If someone knows of a better technique, we would be interested.
2. A call for papers on specific subjects. These could take the form of "Guest Column" as well as paper format; a column format might stimulate some discussion. Some possible subjects:
   a. Interpretation of data-chromatograpms: Can you ever say automotive gasoline is present? If not, what can you conclude? How much must be evaporated before you can no longer so conclude?
   b. Report writing: There are various philosophies on this subject. Some people do not think opinions should be in reports; we think they are the point of the report.
   c. Surveys of labs on a series of narrow subjects so that we can go into more depth on the subjects.
3. Some of these or all could be organized by other people. We, for example, would like to run a survey or two if we could do it our way.

* Solicitation of articles from sources other than AAN readers would provide a much larger data base to draw from.

* A possible solution may be 4 issues a year at a slightly reduced cost, say $2.00 less per subscription.

* Would like to see at least 2-3 articles in each issue. Confusing to have the November 1982 issue arrive in May 1983. Possible to change dates and leave numbers the same?

* The last AAN, dated Nov. 1982, was not received until the last of May 1983.

* The cost should drop accordingly.

* The information in AAN has been the best available and even 4 issues would be valuable. It's unfortunate that not enough material is being submitted as I am sure it is out there, but just not getting to you. You are not the only publication experiencing this problem and many are competing for the same information. I believe there is a need for this publication and hope you can hang in there a while longer. Is there a possibility of attracting a major publisher which may enhance the prestige thus encouraging articles that are now being submitted elsewhere? Keep up the good work.

* It is a shame to cut back, but I understand the problem. Who has the time to do significant work and write it up for publication? I for one am needing training beyond the FBI and ATF schools.

* The real question is, "Is there that much happening in Arson Analysis/Arson Activity to wirte about?".

* Provided of course total pages and content remains at least the same.

Question #2:

* Perhaps a letters section and invited feedback on articles would be valuable.

* I find the articles very informative and not infrequently thought provoking. I am relatively new to arson analysis and find the newsletter an important source of information.

* A question/answer section would be useful. Also helpful hints or new products section could be informative and interesting.

* I would like to see more articles but I know and recognize the problems.

* Sometimes the copies leave something to be desired. This last issue had poor copies of the chromatograms.

Question #3a:

* It is useful for keeping tabs on the field, and as reading material for training new workers in the field. Some of the articles are interesting but not directly applicable to our present service; they would be useful if we decided to offer such service. Some are applicable to our present service and some of these are useful.

* Yes, but I would like to see greater emphasis on less technical aspects of gas chromatography. Most articles are written so that lab technicians and not investigators are the main audience.

* Need some areas other than lab analysis.

* Sometimes.

Question #3b:

* Possibly a little slow to come to print. Most techniques I have at least heard of before reading them in AAN.

* Have received interlibrary loan requests for some items, but most articles too technical for our use.

* The articles were often useful as far as lab work is concerned but may be too narrow. I have settled into a workable lab scheme and I see little to make me want to change procedures.

* About 50-50 which is a good ratio.

* I have not yet had a lot of problems with the testimony of chemists, far more with fire investigators.

Question #4:

* Other professions: criminalists, police, librarians

Other General Comments:

* I would be interested in the results of another questionaire on techniques being used in arson analysis today including sample recovery, columns, instrumentation, percentage of positive cases and possibly how people handle finding turpentine in wood samples (e.g. do they report no acclerants, or report turpentine but qualify it with a statement that it occurs naturally in wood or distinguish between added turpentine and that which occurs naturally in coniferous woods).

* Suggestion - offer some topic titles for submitting articles to AAN. For example: court decisions, interesting court/criminal cases, training guidelines for burning structures, laboratory protocol for arson analyis.

* Some major areas I would like to see are:

  a. How to build a GC reference library for identification with and without a computer.

  b. Status of arson legislation in various states.

  c. Impact on arson investigation by the demise of ATF.

  d. Impact of Class I status of arson -- better or worse?

  e. The relative importance of lab results to arson cases.

  f. Appropriate levels of instrumental sensitivity and background.

  g. Key features in testimony, particularly where keyed to the field investigator's testimony.

  Also, we might want to do some editorial review. Authors often fail to cite critical previous articles on the same subject or cite detailed operating conditions. I would be happy to help.

* COPY QUALITY OF AAN

The quality of articles, graphs, photographs, and chromatograms is dependent upon the quality of materials submitted for reproduction. Accordingly, try to submit originals whenever possible or, if not possible, submit at least good copy.

AAN WELCOMES THE FOLLOWING NEW SUBSCRIBERS

Irene Amock, Chemist
Snell Environmental Group
1120 May Street
Lansing, Michigan 48906

Robert A. Bethem
Industrial Analytical Laboratory, Inc.
1523 Kalakaua Ave., Suite 207
Honolulu, Hawaii 96826

John R. Davis
815 West Springfield Road
Springfield, Pennsylvania 19064

John A. Bornmann
DAS Company
3 Briarwood Lane
St. Charles, Missouri 63301

Michigan State Police
Grayling Laboratory
103 James Street
Grayling, Michigan 49738

Louisiana State Police
Crime Lab
376 East Airport
Baton Rouge, Louisiana 70806

American Criminal Laboratory
Friedberger Lanstr Betts 262
6000 Frankfurt/Main
APO New York 09757

Pennsylvania State Police
Lima Regional Laboratory
P.O. Box 24
Lima, Pennsylvania 19037