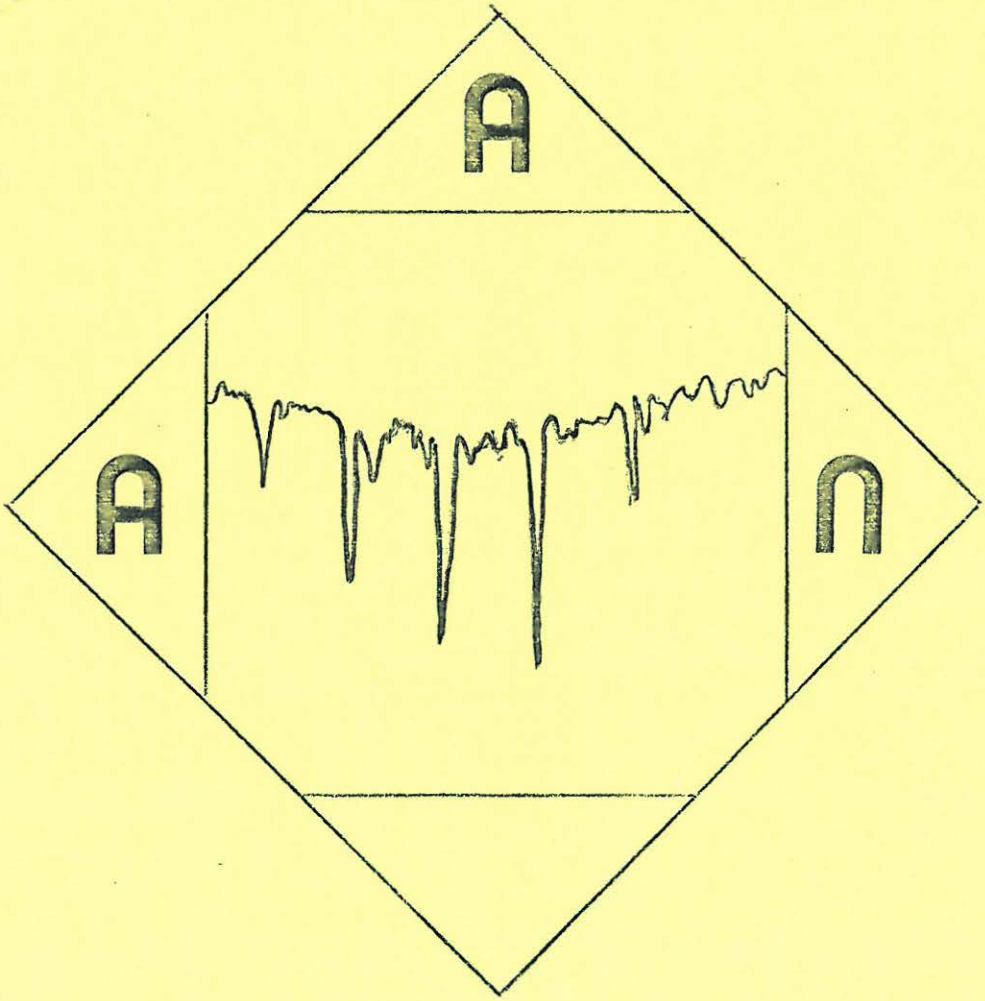
ARSON ANALYSIS NEWSLETTER

MARCH 1977 No.4



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A SIMPLE FIELD TEST FOR ACCELERANT RESIDUES IN SUSPICIOUS FIRES

Arson losses in the U.S. each year exceed one billion dollars. Most of these losses arise from "burning to defraud;" that is, to collect insurance. In far too many areas, there are no official investigations of these fires to confirm the cause — the police departments say they aren't trained to investigate fires, and the fire departments say that they are concerned only with fire prevention and fire control techniques. In the absence of a special arson investigation team, then, it is necessary for the claims representative to initiate a search of the fire scene.

Except for fires in which the structure has been completely destroyed, it is usually not very difficult even for those without formal arson training to ascertain the point or points of origin of the fire. The easiest sites to spot are those showing burning or charring where there is no obvious source of heat sufficient to have caused the damage; for example, scorching of a rug or baseboard where there is only smoke damage elsewhere in the room. Samples for laboratory chemical analysis should be collected from locations that will likely yield positive results. In many cases, however, the accelerant residues cannot be seen or smelled, and thus some method of screening samples in the field is required.

A simple test for constituents present in commonly-employed accelerants is one involving the use of a formaldehyde-sulfuric acid solution. Originally developed by Prof. LeRosen of Louisiana State University as a means of identifying a class of organic (carbon-containing) compounds known as aromatics, this solution has also been used under the name "Marquis reagent" to identify certain drugs. Experiments in our laboratories have shown that essentially all accelerants will give a "positive" test: for example, all types of gasoline (regular, super regular, premium, and unleaded), kerosene, fuel oils, charcoal lighter, cigarette lighter fluid, varsol, naphtha, paint thinner, varnish, lacquer, lacquer thinner, and turpentine.

The test solution is prepared by adding two drops of formalin solution to one milliliter (about one-thirtieth of a fluid ounce) of concentrated sulfuric acid in a test tube, which is placed in a capped container filled with debris. Heating of the container will

cause dark brown discoloration in the test tube solution if the weight of the accelerant in the debris exceeds approximately one-millionth of an ounce (a fraction of a drop). Since a laboratory analysis can detect amounts of accelerant far lower than this, samples that are collected at sites having clear indications of the presence of a flammable material (e.g., from the burning pattern) should not be discarded, even though they give "negative" results.

Upon completion of the test, the test tube should be removed, and the container sealed and brought to the laboratory for chemical analysis by gas chromatography.

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"THE ELECTRICAL ENGINEER AND THE ARSON FIRE"

Many electrical engineers throughout the country today investigate fires related to a possible liability claim on a defective product or poor installation practices, however, few seem to be involved in the arson fires. In a complete arson investigation, the elimination of the electrical system and associated apparatus should be as important as the identification of the accelerant itself.

The greatest problem associated with the elimination of the electrical system is the electrical short circuits which occur between branch circuit conductors. These short circuits are usually discovered by the evidence of "beads" or "melted sections" along the copper or aluminum conductors. Although the majority of these short circuits are caused by the destruction of the conductor insulation, the fire investigator is usually forced to eliminate them by fire patterns or by general shapes of the beads based on rule of thumb techniques.

As far reaching as today's technology has advanced, no standardized procedure has been developed which can enable determination of the difference between the short circuit which has caused the fire and the one which has been created by the fire. Part of the problem lies in the fact that few people are aware of the arson problem and fewer are interested in the electrical portion of the investigation.

Systems Engineering Associates has conducted research related to the tensile strengths of the conductors and is presently involved in a surface analysis technique based on the atmosphere in which the short circuit takes place.

Research projects are usually restricted by available funding but not by the lack of ideas to solve the problems. This problem suffers from lack of funding and ideas. To that end, I am seeking any ideas to the possible answer and I am convinced that the people involved with arson fires can find it. If you are interested, please write to me and we can take another step toward the elimination of arson and its enormous effect on society.

In a conviction for arson and possession of a firebomb, no error was found in the inability of a defense expert to effectively re-examine the physical evidence. Gas chromatographic examination of vapors from the evidence containers had detected gasoline. The containers were left open during subsequent examinations and the gasoline vapors dissipated. The defense expert was thus unable to perform GC examinations but was provided with the chromatograms from the state laboratory. He based his conclusion that different products were present in the firebomb fragments and on the defendant's gloves upon his examinations of the state's test results. It was contended that the inability of the defense expert to conduct his own analysis denied the defendant a fair trial. The appellate court found that where evidence is scientifically analyzed and then lost, unintentionally or in the absence of bad faith, the result of the analysis is still admissible at trial. The fact of inadvertent destruction or loss goes to the weight of the evidence rather than to is admissibility and that at trial no objection had been made to the admission of the evidence. The conviction was affirmed.

Gedicks v. State 62 Wis. 2d 74, 214 N.W. 2d 569 (1974)

Charles R. Midkiff
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A defendant convicted of two counts of murder and two counts of arson contended on appeal that the trial court erred in not admitting the results of testing with a psychological stress evaluator (PSE). This technique, which has received considerable publicity, measures variations in the speech patterns of a person under stress. It is claimed that lying produces stress which can be detected by the PSE operator. The results of the PSE were exculpatory for the defendant and he moved to have them admitted at trial. The Court of Special Appeals of Maryland held that the difference, if any, between the psychological stress evaluator and a lie detector is too minor and shadowy to justify a departure from previous decisions not to admit results of polygraph testing. They noted that a lie detector test by any other name is still a lie detector test.

State v. Smith 31 Md. App. 106, 355 A. 2d 527 (1976)

(NOTE) This decision should be of special interest in arson investigations where the polygraph is often used, although the results may be inadmissible in court.

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* A good article appeared in the Journal of Chromatography (Volume 128 (1976) pages 271-280) regarding the analysis of gasoline from storage tank seepage. Sample chromatograms of "weathered" gasoline were displayed along with individual case studies.

* The next issue of the AAN will have feature articles on the automation and computer assisted analysis of fire debris samples. Any laboratory now using automation or data systems of any kind are requested to submit articles or informative short cuts currently used in their laboratory. Please participate in the AAN!

* The following standards have recently become available to the Systems Engineering Associates Chemical Laboratory from The Standard Oil Company of Ohio. These fuel oil samples are available to any lab interested in adding these flammable liquids to their inventory of accelerant standards:

Kerosene
Diesel Supreme
#2 Diesel
#2 Heat Oil
#5 Fuel Oil
#6 Fuel Oil

Please send requests to the attention of:

Wayne Brashear
Systems Engineering Associates
7349 Worthington-Galena Road
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Sample vials and a self-addressed mailing carton are requested.

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READING LIST - FLAMMABLE LIQUID DETECTION

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March 1977