



# INDIANA STATE POLICE LABORATORY DIVISION

## PHYSICAL EVIDENCE BULLETIN

### IGNITABLE LIQUID RESIDUES

**INTRODUCTION:** Combustion requires three elements – heat, oxygen, and fuel. Fire will be extinguished when any one of these three elements is absent. Fire does not burn solids nor liquids (in general), but rather the gases formed above them. Heat acts to vaporize the liquid or solid, converting it to a gas which then combines with oxygen to "burn" above the liquid pool. Thus, when flammable liquids soak into material or run into "cracks" there will be insufficient oxygen to support combustion. In these cases residue of ignitable liquids can be collected.

#### A. THE SCENE

1. An arsonist will often pour an ignitable liquid in more than one place to be certain that "everything will go." Multiple points of origin are common. A sample from each point of origin should be collected.
2. An arsonist will generally use more than enough of an ignitable liquid to be sure that there is enough. This means that frequently some will remain for the careful investigator to collect.

#### B. LOCATING THE EVIDENCE

1. Points of origin of a fire should be located by an experienced arson investigator. Specialized experience and training are invaluable in determining a correct cause. For example: arsonists have been known to pour an ignitable liquid around each electric outlet to make the fire appear as though it was of electrical origin. Agencies may wish to consult with the Indiana State Fire Marshal for assistance.

2. Newspapers, furniture, carpet, and padding, or piled trash may serve to protect an ignitable liquid from heat that would otherwise have vaporized and burned away.
3. Remember that if a liquid is poured on a dry surface it will act like water in the sense that it will wet, run, spill, leak, drip, pool, or spread. To some extent it will be absorbed by porous materials.
4. It will flow downward into and along cracks and through holes. It may then be protected by cracks and seams of the flooring, the soil, or whatever surface there is below the floor.
5. A liquid will protect the surface carrying it until the liquid is vaporized away, causing charring. The unburned areas around and beneath the char may very well still contain the suspected liquid which can often be verified by analysis. It is therefore recommended that the edges of charred areas be collected.

### C. COLLECTING THE EVIDENCE

1. After a suspected area is discovered, first document it with proper photographs, sketches, and notes.
2. Within reason, collect as much of the suspected material as possible, and place in a sealed air-tight container. A clean non-oiled one-gallon or quart wide-mouthed paint can is usually sufficient. Do not use a container which has been used previously to hold any ignitable liquid, solvent or oil. Do not use plastic bottles, plastic bags, or paper bags; they are porous to ignitable liquids.
3. Liquid samples, thought to be accelerants, should be brought to the lab in clear glass bottles or jars. Only a small amount is needed (1 ounce). Liquid samples should not be sent through the mail.
4. Collect in different areas from each point of origin, placing each sample in a separate labeled container. Equipment and tools should be cleaned between the collection of each item.
5. Collect possible sources of physical evidence that may be associated directly with the fire scene. Physical evidence such as fussee's and Molotov cocktail evidence should be submitted for analysis.

**DO NOT OVERLOOK OTHER TYPES OF PHYSICAL EVIDENCE MATERIAL TO THE CASE; e.g., BROKEN GLASS, TOOLMARKS, ETC.**

#### D. COMPARISON STANDARDS

1. Always attempt to obtain comparison samples of any liquids that could possibly have been used as an accelerant. You may want to obtain control samples of other unburned "fuels" such as carpets, drapes, upholstery, etc., as they may contribute to the residues detected.
2. Place each control sample in a separate sealed air-tight metal container. Always label each control sample as carefully and completely as any other evidence material (see above).
3. Always transport in such a way that there can be no question regarding the possible accidental contamination of any of the questioned sample above. A narrative report describing the fire scene, its suppression and follow-up investigation can be included when available.
4. If a light ignitable product (e.g. ethanol) is suspected this should be noted on the request for examination.

#### E. RESULTS

1. The laboratory will attempt to identify ignitable liquids present. This identification may not be specific, due to changes undergone by the liquid during or after the fire. In cases of unusual or extensively burned samples, the lack of a comparison standard can make identification difficult.
2. An ignitable liquid residue can be identified as consistent with a submitted ignitable liquid comparison sample. Identification of an ignitable liquid residue may not be possible due to unusual or high level of background, low ignitable liquid residue levels, and weathering of samples.

Local agencies may wish to consult with the Indiana State Fire Marshal for assistance. For further information you may consult with your local District Indiana State Police Crime Scene Investigator or the State Police Laboratory in Indianapolis. The laboratory number is toll free 1-866-855-2840 or 317-921-5300.