



# VIRGINIA DEPARTMENT OF FORENSIC SCIENCE

## EVIDENCE HANDLING & LABORATORY CAPABILITIES GUIDE

### TRACE EVIDENCE: FIRE DEBRIS

#### Contact Information

If you have any questions concerning the Trace Evidence laboratory examination capabilities or evidence handling procedures, please call the Training Section or the Trace Evidence Section at the Forensic Laboratory that services your area.

<u>Laboratory</u>	<u>Section Contact</u>	<u>Phone Number</u>
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## **FIRE DEBRIS OVERVIEW**

Fires often involve the use of an ignitable liquid used as an accelerant which is a material used to spread and increase the rate and intensity of burning. Fire debris and other associated evidence are examined for the presence of ignitable liquids. The ignitable liquids identified are often petroleum products such as gasoline, kerosene or charcoal starter fluids. They may also be nonpetroleum-based ignitable liquids such as alcohols, acetone or turpentine. The results of laboratory examinations serve to assist the investigator to ultimately determine whether a fire was caused by arson or by other incidental means.

### **CAPABILITIES AND SERVICES**

**Identification of ignitable liquids from whole liquid samples and fire debris.**

### **COLLECTION GUIDELINES**

**ITEM** – Suspected Ignitable Liquids such as gasoline, kerosene, charcoal starter fluids, alcohols, etc.

**METHOD** – Place no more than 1 - 2 tablespoons of liquid directly into a small, clean, unused, lined, metal paint can. Alternatively, a glass jar may be used as long as the cap/cap lining is inert (Teflon, polyethylene, foil; NOT paper, cardboard, wax, rubber) and the glass jar is protected from breakage by placing it into a can or sturdy box which has been filled with packing material to cushion the glass jar. A polyethylene plastic bottle with a polyethylene cap would also be appropriate.

Do not submit a *fuel container* which contains liquid. The liquid must be removed from the container and only 1-2 tablespoons submitted as noted above. Unless there is a request for latent print processing on the container, there is no need to submit the entire container.

*Empty fuel containers* must either have their caps attached securely or must have the container openings closed over and sealed shut. Multiple layers of plastic secured over the openings with tape are suitable for this purpose.

**DISCUSSION** – The laboratory only needs a small amount of liquid for analysis. Larger quantities of liquid are unnecessary and create a potential for contamination. Fuel containers with liquid often leak or spill. Glass jars with inappropriate lids or plastic bottles other than polyethylene are not appropriate as the ignitable liquid can dissolve these materials leading to contamination or loss of the evidence sample. Not all plastics are appropriate as lids or containers.

**ITEM – Molotov Cocktails**

**METHOD** – Remove liquid from container and package 1-2 tablespoons directly into a small, clean, unused, lined, metal paint can. Alternatively, a glass jar as described above may be used. Remove the wick and package in a separate clean, unused, lined, metal paint can. After air drying, package the container so as to avoid the loss of possible latent fingerprints. If liquid is removed from the Molotov cocktail, the wick and container will generally not be examined for ignitable liquids.

If the container is broken, no liquid is present and there is a wick: Package the wick in a clean, unused, lined, metal paint can. Package the remains of the container in a separate clean, unused, lined, metal paint can.

If the container is broken, no liquid is present and there is no wick: Package remains in a clean, unused, lined, metal paint can.

**ITEM – Fire Debris Samples**

**METHOD** - Collect porous materials from the area at the interface between heavily charred areas and areas of marginal burn near the point(s) of origin. Package in clean, unused, lined, metal paint cans no more than  $\frac{3}{4}$  full.

**DISCUSSION** - Paint cans protect ignitable liquids from evaporation and contamination and when filled only  $\frac{3}{4}$  full provide a means for efficient extraction in the lab.

**ITEM – Comparison Samples**

**METHOD** - Collect comparison samples which contain unburned materials consistent with that found in the fire debris sample (e.g., wood, carpet, tile). Avoid collecting comparison samples from areas where accelerants may have been poured, splashed, tracked, etc. If the fire debris sample is charred carpet and foam padding then the comparison sample would consist of carpet and foam padding from an area that is believed to contain no ignitable liquid. It is recognized that it is not always possible to obtain a comparison sample due to the extensive damage caused by a fire.

Package in clean, unused, lined, metal paint cans. Fill the can no more than  $\frac{3}{4}$  full with the comparison sample.

**DISCUSSION** - Comparison samples assist the lab in determining what interferences may be present from the substrate material itself.

**ITEM – Samples Too Large for a Paint Can**

**METHOD** - Cut the evidence to fit into one or more clean, unused, lined, metal paint cans. Fill each can no more than  $\frac{3}{4}$  full. Indicate on the Request for Laboratory Examination form (RFLE) that these items can be combined.

If the evidence absolutely cannot fit into one or more clean, unused, lined, metal paint cans, then wrap the evidence multiple times (3-4) in heavy plastic. Submit this evidence ASAP – same day or next day. Call the lab before submission to inform them that evidence packaged in this manner is on its way.

Five quart metal cans are available for purchase. These cans are taller than traditional gallon cans and allow for easy packaging of long neck bottles and shoes which are too tall for gallon paint cans.

**ITEM – Suspected Ignition Sources such as candles, matches, fuses or fireworks.**

**METHOD** – Candles and matches should not be submitted. A clean, unused, lined metal paint can is appropriate for any other suspected ignition sources.

**DISCUSSION** – Candles and matches are not analyzed in Fire Debris cases. Fuses and fireworks would be analyzed as an explosives examination.

**ITEM – Hazardous Materials or “Dumping” Samples**

**METHOD** – If sample is liquid, follow the guidelines for Suspected Ignitable Liquids. For non-liquids, package the material in a clean, unused, lined, metal paint can. Fill the can no more than  $\frac{3}{4}$  full with material.

**DISCUSSION** – The only samples accepted will be those that require only the identification of an ignitable liquid. For instance, the Trace Evidence Section does not conduct flash point examinations or the analysis of PCB's in oil. These types of analyses will be referred to the [Division of Consolidated Laboratory Services](#). Please call the Trace Evidence Section with questions regarding these types of samples.

**SUBMISSION REMINDERS**

**NEVER** air dry evidence for fire debris analysis. This type of evidence is **VOLATILE**; it evaporates. The sooner the evidence is placed in an airtight metal paint can the better the chance of recovery of ignitable liquid residues.

Preferred packaging for evidence is clean, unused, lined, metal paint cans. Make sure the lids are on tight.

Fill cans no more than  $\frac{3}{4}$  full of fire debris.

When submitting liquids, put no more than 1 - 2 tablespoons in a paint can or glass jar. If using a glass jar, the lid must be appropriate ([as described above](#)) and the jar must be protected from breakage.

When submitting liquids from a labeled container, photocopy or photograph the labeling (front and back) and include with the RFLE.

If collecting a liquid using an absorbent material (e.g., cotton swabs, cotton balls, gauze), a control of the absorbent material **must** be submitted. Package the control absorbent material in a separate clean, unused, lined, metal paint. "Haz-Mat" absorbent material must not be used and will not be analyzed. It is also not advisable to use newspaper, feminine hygiene products, paper towels or toilet tissue as these materials may contain petroleum products or other materials that may interfere with the analysis.

Indicate on the RFLE if separate containers of fire debris from the same location may be combined.

Indicate on the RFLE if there is a suspected ignitable liquid that has been used. This is particularly important in the cases of fuel oil #2, kerosene and diesel fuel.

If ignitable liquids that evaporate quickly are suspected (e.g., alcohol, acetone, starter fluids, brush cleaners), indicate this on the RFLE.

If chemical incendiaries are suspected, indicate this on the RFLE.