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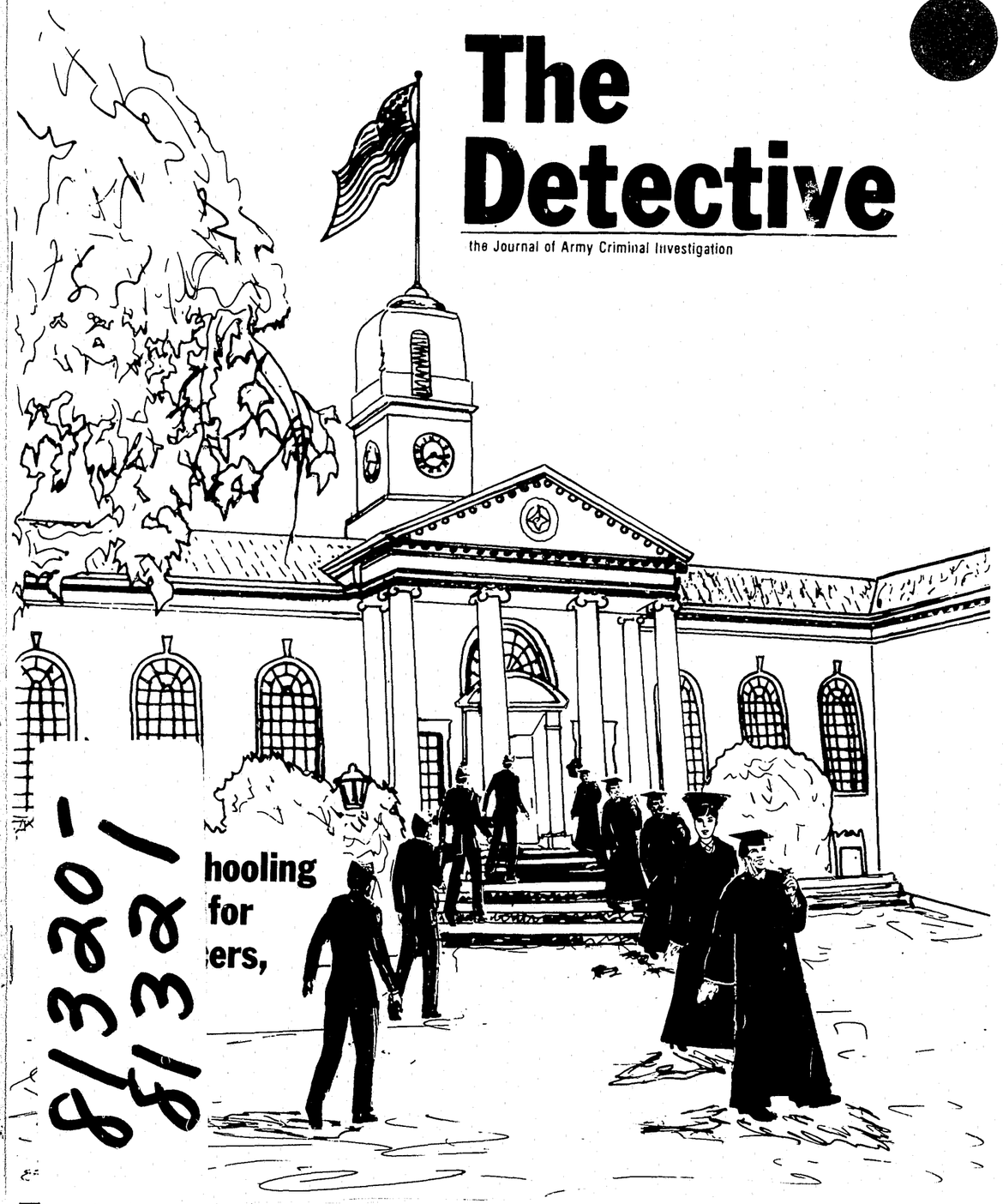

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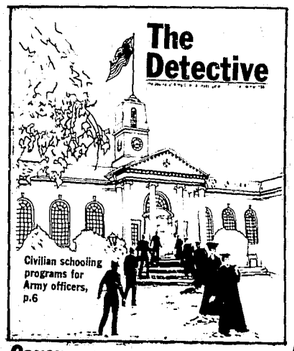

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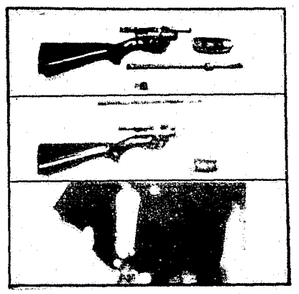

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Gunshot Residue Kits

by Special Agents Jim Stopper and Larry Flynn USACIL-CONUS

Since the inception of Gunshot Residue Analyses by USACIL-CONUS, there have been a number of articles, messages, and commentaries designed to keep CID agents up-to-date on the topic. All of the "changes to changes" have probably caused enough confusion by now. So our intention here will be to consolidate all available information. We have included all past material necessary for the uninitiated and the seasoned veteran alike to know about gunshot residue collection and analysis as it is conducted by USACIDC elements.

There are actually at least two distinct types of gunshot residue testing that can be performed. The first is usually done by the Firearms Division. It includes the search for and identification of unburnt powder particles and the determination of muzzle-to-target distances using the residue patterns deposited on the target. These examinations develop the facts that surround a shooting.

The second type of examination, which attempts to detect primer residue, is aimed at identifying the person or persons who fired the weapon. It is this second type of examination that we discuss in this article. And it is to this type of examination that we refer when we say "gunshot residue."

At this time, USACIL-CONUS does all of the gunshot (primer) residue testing for CID, as well as for some other DOD elements that have opted to use our services.

To determine whether or not a subject has handled or fired a weapon, this testing involves checking for antimony and barium, the two metallic elements often found in primer mixtures. (Recall that the primer mixture is detonated by the firing pin and subsequently ignites the gunpowder in the cartridge.)

To reiterate, when determining if a subject may have fired a weapon, the lab is not looking at the gunpowder remnants, but only at the residue from the primer mixture. And the nature of this residue is such that, at present, they examine only swabbings for it, but not gloves or other articles of clothing that the subject may have been wearing.

Primer mixtures are manufactured by only a few companies and cannot be related to a specific brand or type of ammunition. The lab cannot determine from a standard gunshot residue test what brand of ammunition was used. Likewise, they can't use the test to determine which weapon was used by a subject, nor which gun was used to fire a particular ammunition.

The term "neutron activation" is often used in discussion about gunshot residue analysis. Neutron activation is a method of analysis which USACIL-CONUS cannot perform; it requires the use of a nuclear reactor. Instead,

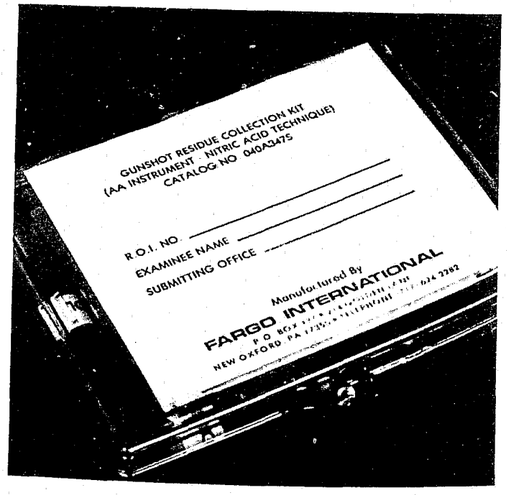


Fig. 1. Upon receipt, the kit should be sealed in plastic.

USACIL-CONUS uses the atomic absorbtion method. This is totally suitable for gunshot residue work and is much less expensive than neutron activation; it is also the method now used by most labs for gunshot residue work.

How should the residue be transmitted to the lab for analysis? By using the USACIDC-issue collection kit. This contains all of the items necessary to swab the subject's hands and provides the proper analytical controls as well. The process picks up the residue for protection in a vial. In this way the samples can be transmitted safely to their lab. Presently, two brands of kits are available: the original issue kit, manufactured by Sirchie, catalog No. NAA100-CID, and the replacement kits, manufactured by FARGO, catalog No. 040A3475. These two brands differ only slightly, but are essentially the same; either is suitable.

Each kit contains a set of instructions. Each agent must be familiar with the contents of the kits and the use of the items before doing a collection. The instructions included with each kit are easily understood and are printed here to acquaint all readers with them.

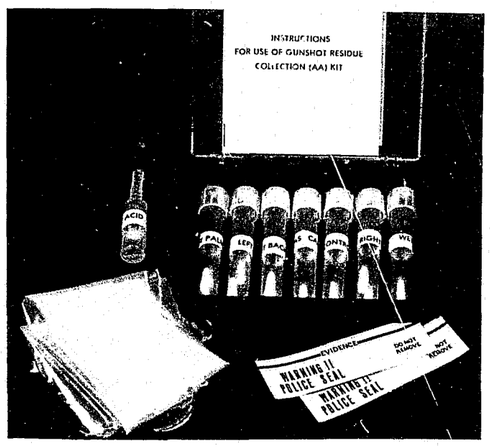


Fig. 2. All of the itmes shown above should be included iun the kit. They are: seven capped and labelled test tubes with swabs, one vial of dilute acid, gloves, evidence seal(s), and instructions.

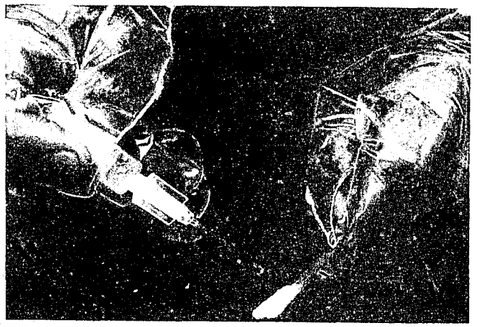


Fig. 3. Placement of the acid on a swab is shown. Notice that the dispenser tip does not actually touch the cotton.

Fig. 4. The method to be used in swabbing the web area of the hand is shown. Both swabs are used simultaneously.

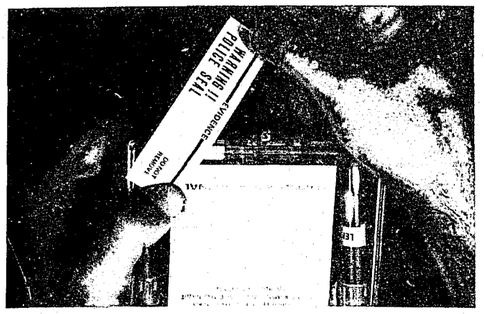


Fig. 5. When the collection process is complete, discard the gloves; they can't be used again. Make sure that all tubes, including the acid container, are sealed for return to the lab. Close the kit and place the red seal across the seam as shown. Use a separate DA 4137 for each kit.

Instructions for the use of Gunshot Residue Collection (AA) Kit

1. DO NOT use the kit if:

a. More than 6 hours have elapsed since the suspect shooting (not in suicide cases).

b. Suspect's hands have been cleaned or fingerprinted.

2. Apply the kit in the following manner:

The following steps should be followed in preparing to swab the areas to be tested for gunshot residue:

a. Thoroughly wash your hands.

b. Put on clean plastic gloves, and

c. Procedure:

(1) Take the swab from the tube marked "WET CONTROL" and moisten with 3 drops of 5 percent nitric acid. Replace the swab in the tube and seal it.

(2) Take the two swabs from the tube marked "RIGHT BACK" and moisten with 6 drops of 5 percent nitric acid.

(a) Using both swabs thoroughly swab the back of the right hand and upper wrist area including the back of the fingers. (Hold the subject by the forearm. DO NOT hold his hand.)

(b) Replace both swabs in the tube and seal.

(3) Using the same procedure as described in step (2), swab the right palm, left back, and left palm of the suspect. As each of these areas are processed with a pair of swabs, these swabs are repackaged as in step (2) above.

(4) Swab the inside of the cartridge case (if available) with the appropriate single swab moistened with 5 percent nitric acid. If the cartridge case is to be examined for ballistic marking, use distilled or tap water, since the acid solution may obliterate characteristic markings on the casing which would prevent ballistic comparisons. Then repackage this swab in step (2) above.

(5) Retain the container of nitric acid and submit for examination.

(6) DO NOT remove the swab from the tube marked "DRY CONTROL" this swab is for lab use only.

(7) If the cartridge case was swabbed with distilled or tap water (see step (4)), a sample of the water should be submitted. This can be sent by dipping a cotton ball in the water used and placing this in a plastic bag. Seal the bag and identify the contents.

3. Place the results of all residue collection efforts in the carrying case (DO NOT RETURN GLOVES) and send it to:

Commander
USACIL-CONUS
ATTN: Firearms Division
Fort Gordon, GA 30905

4. Use a separate DA Form 4137 for this kit.

5. The following information should be included on the lab request if known:

a. Date, time of shooting.

b. Date, time of swabbing.

c. Type and caliber of weapon and brand of ammunition.

d. Subject's hobbies.

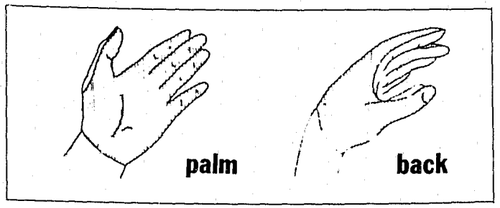
e. Whether right or left handed.

f. Subject's activities in past 24 hours.

g. Brief description of incident.

6. If available, the weapon and ammunition should be submitted for laboratory examination.

7. If the trace metal detection test is to be conducted, perform GSR collection first.



After reading the instructions, it should be clear that more-than-normal care is needed when collecting (gunshot residue) samples. Because the lab tests are so sensitive, contamination can be a severe problem. Acts that normally are considered inconsequential gestures can invalidate the entire set of tests.

Keep the following in mind:

•All surfaces in the area of the collection process bear swabs to anything except the acid solution and the object being swabbed.

•Don't touch the dispensing end of the acid vial to anything.

•Get into the habit of using the same hand for all "clean chores" such as swabbing; make sure you don't contaminate that hand. Use the other hand for all other chores, such a

them are needed. Anytime a swab is not used in a particular collection, the agent must include a statement regarding the deletion. For example, "The cartridge case swab was not used because no expended cartridges were found." The supporting information, which is requested in the instructions, is required; there is no good reason for not submitting it with the kit.

Kits were originally supplied through region headquarters, and any request for additional kits should still be directed to them. USACIDC elements submitting kits for analysis should automatically receive a replacement kit from the lab. The time to request any additional kits is now, before they are needed.

Once an incident requires a gunshot residue kit, it is too late to begin collecting materials. Why? Because you've got to gather such things as swabs, acid (which must be mixed, probably at the hospital), vials, labels, and gloves and that takes time. Time is your enemy when dealing with gunshot residue. Most residues dissipate after 6 hours. Any physical activity involving the hands decreases this time; washing eliminates it completely. (This is why it is imperative to cover the hands of a suicide victim as soon as possible after the shooting. If the person is pronounced dead at the scene, protect the hands before the body is moved.)

If, for some reason, a kit must be made from scratch, it cannot contain wood-shafted swabs or glass. There is no reason for sending such a kit to the lab for analysis. The contaminants from the wood products and (usually) from the glass, preclude analysis.

Check your kit supply today. If you don't have enough, reorder. Meanwhile, you can pick up some plastic-shafted Q-tips from the store, and some plastic test tubes or small ziplock plastic bags from hospital supply to hold you over until additional kits arrive. If you need to use these substitutions, don't forget to send a dry swab and a swab wetted only with the acid as controls (see the kit instructions). This will allow the lab to check for possible contaminants.

Sometimes an agent will open a bad kit, one in which the acid has evaporated, or the cotton on the swabs is falling apart. If the parts of the kit can't be used, either throw it away and use a new one, or salvage what you can and fill with available supplies. But remember not to use material made of glass or wood products.

Signs that a kit might be going bad are plastic components that have yellowed and paper labels or instruction sheets that are very brittle. If you see this, request a replacement kit.

What can you expect from a gunshot residue anal sis? Onl that it n t

probably handled or fired a gun; nothing more. The lab has minimum levels of barium and antimony which must be present. If the submitted samples meet or exceed those levels, the report will state that the swabs showed levels "consistent with gunshot residue"; that's as positive as it gets for gunshot residue analyses.

Because both elements need to be present for a "positive," the lab tests for the most rare (antimony) first. If it's not present they don't bother looking for barium. If there is some antimony, but not enough to pass the minimum levels for a "positive," they will try to inform you of this. Such a case might indicate use or handling of a firearm, but cannot be confirmed.

If no antimony is present, the lab will state that point blank. However, absence of antimony (and barium) does not mean that the subject did not fire a weapon. For example, rimfire ammunition (.22 caliber) usually doesn't contain antimony, so gunshot residue collection kits taken in instances involving .22 caliber weapons will often be negative (submit gunshot residue kits in these instances anyway). Also, the residues don't mean a lot. Do not necessarily back-off a subject just because the gunshot residue test comes back negative; and don't change the offense from "suicide" to "murder" just because the suicide victim's gunshot residue kit is negative.

Guidance on the use of gunshot residue kits versus trace metal detection test kits is sketchy and somewhat contradictory. (The pamphlet "Trace Metal Detection Technique in Law Enforcement," is available on microfiche through the National Criminal Justice Referral Service Microfiche Program, Box 6000, Rockville, MD 20850. The catalog number is NCJ00204.)

USACIL-CONUS' position is this: except for suicides, if less than 6 hours have elapsed since the shooting, perform the gunshot residue collection, regardless of most other circumstances. After 6 hours, proceed with trace metal detection tests. If you perform gunshot residue collection, you may wish to follow with the trace metal detection test anyway. In the case of a suicide, it's always gunshot residue, then trace metal detection test.

Gunshot residue can pinpoint a person who has handled or fired a weapon, and reliably. But to do so requires expediency and care. When done soon after an incident, and carefully, it can pay off. Statistics show that of kits analyzed at USACIL-CONUS, approximately 30 percent were "positive" or indicative of the same. This percentage is low because it includes elimination kits and kits involving .22 caliber weapons that are usually negative. We hope we have dispelled the doubts of those skeptics who believe gunshot residue collection