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Vacuum Searches in Narcotics Cases

Dust contains in small all the things that surround us. (Liebig)

The drug abuse problem is the most significant problem facing contemporary law enforcement agencies. Apprehending drug traffickers at the source or highest level of trafficking is the most efficient approach to the problem [*1*]. Successful prosecution of narcotics conspiracy cases deserves the best possible support from the forensic scientist.

In 1912, Edmond Locard established the usefulness of examining dust deposits to establish links between crimes and culprits [*2*]. Using microchemical tests, he identified traces of antimony, tin, and lead in the clothing of suspected coin counterfeiters. This fact successfully linked the counterfeit coin operation with the suspects.

The use of the vacuum cleaner as a dust collection device was introduced by Hulsebosch of Amsterdam and Schneider of Berkeley, Calif. in 1916 [*2*]. Since that time, the vacuum cleaner has been developed into a standard tool of the forensic scientist [*3*].

The lack of physical evidence is often a problem in prosecution of conspiracy cases. Investigation can implicate numerous suspects in drug trafficking, but raids and seizures do not always produce drug evidence. Of critical importance to establishing the charge of conspiracy is showing that manipulation of drugs took place at one location or that the same groups of people repeatedly manipulated drugs at various locations.

The technique of vacuum searching has been applied to these suspect locations. Positive identification of traces of drugs can be valuable in substantiating specific intelligence about drug trafficking. For example, the reliability of a cooperating individual's testimony can be demonstrated. This information can also be presented in court as *prima facie* evidence of involvement with narcotics.

Equipment

After evaluation of various vacuum sources and collection devices, the following two "outfits" proved most useful.

(1) Millipore Universal filter holder Model No. XX500 4720 (Millipore Corp., Bedford, Mass.) used with a portable vacuum pump, for example, Gellman No. 13152. The filter holder accepts a 47-mm filter pad.

(2) Sweeper Apparatus (Microchemical Specialties Co., Berkeley, Calif.) used with a Hippo portable vacuum No. 999 (Shop Vac Corp., Wood-Ridge, N.J.). The sweeper apparatus accepts an 11-cm filter pad.

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In selecting the best filter paper for this type of collection, consideration was given to heroin particle size. The size of the heroin particle is dependent on the method of final recrystallization in its production. In general a size of 1–10 μm was observed. For this reason Whatman GF/A glass fiber filter paper was selected. This paper is suitable for retention of .5 μm particles, and it also provides a flow rate approximately twice that of Whatman No. 1; however, Whatman No. 1 has been used successfully. The filter pore size was not as critical as originally thought, due to secondary filtration by collected dust.

The above outfits can be considered as the primary tools of this type of search. Assembly of a kit of peripheral equipment will facilitate an organized vacuum search.

Check List of Equipment
Vacuum tubing—10-ft length
Electrical extension cords, 2–15 ft length
Searchlight, preferably a compact, high-intensity light
Plastic bags of various sizes
Whirl-Pak® plastic bags
Labels
Evidence labels
Spatulas
Forceps
Pens and paper
Evidence envelopes
Methanol
Towels
Pasteur pipets and bulbs
Field testing chemicals
Spot plates
Plastic gloves
Disposable protective clothing

In all aspects of trace analysis careful attention must be paid to the problem of contamination. All items taken to a search location must be clean. All items of disposable nature should be from fresh stock and all other items must be scrupulously cleaned. It is helpful to separately package all items in plastic bags and to store the assembled kit in an area safe from possible contamination by drugs.

Some defense attorneys have addressed the remote possibility of traces of drugs being brought in on the shoes and clothing of chemists who, in the course of their work, come in contact with large quantities of drugs. In lieu of wearing clothing that has never been worn in the laboratory, disposable protective clothing can be purchased. The authors have found "Tyvek" coveralls and plastic shoe covers are suitable for this purpose. These items can be obtained from suppliers of clean-room equipment.

Further, with the collection techniques presented, the problem of introducing contamination during the collection of a sample will be limited to the collection device, which can be scrupulously cleaned between sweepings.

Preparation

Preparation for a vacuum search is of utmost importance. Close liaison must be established between the chemist and the officer in charge of the investigation. A meeting in the planning stage of an operation should be arranged at which the chemist should be thoroughly briefed on the following: (1) drug(s) suspected, (2) area to be searched, and (3) any other information which would aid the chemist in the search, such as probable areas where the drugs were secreted.

The officer in charge should agree to the following:

(1) The chemists should search immediately after the location is secured.

(2) If a drug detection dog is to be used, he must search after the chemists. The dog handlers must not carry any heroin in this operation. (Drug detection dogs are often "given the scent" or refreshed during a lengthy search.)

(3) Everyone participating in the operation must exercise extreme care to avoid bringing any traces of drugs into the location. Everyone should be prepared to testify to this.

(4) The chemists should be left alone during the search. A minimum number of personnel should be present in the unsearched areas.

(5) Chemists should maintain custody of all evidence relating to traces until the analysis is completed.

The officer in charge should also be aware that analysis of these samples is lengthy and that a conclusion may take some time to reach.

Collection Technique

The situation will dictate which collection device is to be used. For large areas, or where large samples were to be collected, we found the vacuum sweeper filter attachment to have advantages over the millipore filter. The millipore filter was much better for small localized areas, such as trap doors and secret enclosures. The collection device should be directed downward and forward of the chemist. Samples should not be taken from areas where the chemist has walked. The assistant should follow him with the vacuum, keeping the exhaust facing backwards. Immediately after the collection of the sample, the vacuum should be turned off so as to avoid picking up particles from the clothing of the man who is searching. The vacuum sweeping should immediately be placed in a Whirl-Pak® plastic bag and sealed in an evidence envelope. The contents of any household vacuum cleaners or air conditioner filters should also be collected.

Analysis

The foremost point noted from analysis of several vacuum searches is that no one analytical procedure will be applicable in all situations. Each sample collected presented different analytical problems. Challenges were met in the areas of trace analysis and micro trace analysis.

The techniques presented are not intended to be all-inclusive, but rather a report on methods that have worked for the authors in a number of cases.

Optimally the work area for the analysis should be separated from the rest of the laboratory if possible. The idea of a "clean room" can be profitably employed here. In any event, the work area must be thoroughly decontaminated and all dust should be removed from the area. The glassware used should either be new or thoroughly cleaned by the chemists conducting the analysis. All solvents should be from sealed bottles. The analysis should not be undertaken while large quantities of pure drugs are being analyzed in the immediate area.

Controls must be employed at all stages of the analysis. Blanks taken from the laboratory area, equipment, and solvents should be routinely examined.

Thin-layer chromatography (TLC) [*4*,*5*] is the method of choice for initial screening. Although R_F matches on several systems are highly indicative of a compounds identity, TLC is most valuable in providing information that a sample contains no narcotic.

Effort may then be concentrated on the samples which gave positive results in all TLC systems employed.

Because the samples are invariably complex mixtures, retardation of the narcotic is occasionally observed. For this reason an additional spot of sample reinforced with standard narcotic is helpful in interpretation.

After further cleanup, the sample can be subjected to analysis by gas-liquid chromatography (GLC) [*4,5*]. Microcrystal tests [*6*] and infrared analysis using frustrated multiple internal reflectance (FMIR) [*7,8*] are used to obtain a positive identification. Interfaced gas chromatography/mass spectrometry (GC/MS) [*9,10*] has been successfully employed in a number of cases, particularly where pure alkaloid could not be isolated.

Because these samples will contain various other components, the particular extraction procedures will vary in suitability from sample to sample.

The following procedures have proved useful:

1. A direct methanol or chloroform extraction is performed on the sample.
2. A liquid-liquid solvent extraction is performed on the sample.
3. An ion pairing column chromatographic separation [*11*] using 0.1 *N* HCl as the immobile phase [*12*] may be performed on a residue at any phase of the analysis. The column is first eluted with 0.1 *N* HCl saturated ether. The alkaloid can be eluted with H_2O saturated chloroform.
4. Preparative thin-layer chromatography has also been used, but with limited success.
5. General alkaloid extraction procedures [*13*] were often found useful. For example, a residue can be taken up in 0.1 *N* HCl and washed with NaCl saturated ether. The aqueous phase is then extracted with chloroform which is reduced in volume and extracted with 0.1 *N* H_2SO_4. The acid is made basic with ammonia and extracted three times with chloroform. The chloroform is then acidified with 10 percent HCl in methanol and evaporated to dryness.

In many samples several of the above procedures were used at different stages of the analysis.

Results and Discussion

Vacuum searches have been employed in nine investigations. In five of these locations traces of heroin were identified. In one location traces of cocaine were identified. In three locations no controlled substance was detected. In two of these investigations prosecution has been completed and, in both cases, the physical evidence disclosed by the vacuum search was instrumental in the successful prosecution of the case.

The nine investigations involved 55 separate collections. Of these, 17 were reported as positive and 13 others gave strong indication of the presence of drugs. No controlled substances were detected in 25 collections. In general, positive findings were obtained in areas that intelligence had indicated were storage or testing areas. The defendant's vacuum cleaner should be considered a prime target for collection. In six of the nine cases, vacuum cleaners were available and examined. From four of these, milligram quantities of narcotics were isolated.

The usefulness of vacuum searching is illustrated by the following representative case.

A Special Agent of the Bureau of Narcotics and Dangerous Drugs (BNDD), acting in an undercover capacity overseas, infiltrated an international smuggling ring. He provided specific information about a vehicle containing a multikilogram quantity of pure heroin being shipped to the United States.

Surveillance was initiated and the vehicle was allowed into the country, picked up, and parked at a prearranged location. Sometime later a known drug trafficker was observed

moving the car to a new location. The car was finally picked up by a new driver and driven to an apartment building parking lot. At this point BNDD Agents seized the drugs and apprehended the defendant. No other evidence was observed in the defendant's apartment.

With the evidence on hand, the defendant could have been prosecuted as a courier. Further investigation disclosed that the defendant had rented the apartment for several years but apparently did not live there.

A vacuum search was conducted and traces of heroin were found in numerous locations in the apartment. This physical evidence was instrumental in the prosecution's proof that the defendant had rented the apartment for the sole purpose of manipulating narcotics. The defendant received a long prison sentence, commensurate with the charge of conspiracy to distribute narcotics.

A great deal of information can be gained from a microscopic examination of vacuum sweepings. If qualified personnel are available, this should also be considered.

Conclusions

The method of vacuum searching by qualified personnel has been shown to be valuable in the development and prosecution of narcotics conspiracy cases. This technique should be considered when intelligence is available that large quantities of relatively pure drugs have been stored, cut, or manipulated.

The information gained from this technique has been extremely useful. The need for additional and correlative studies is indicated in the areas of detectable limits, innocent transfers, and the application of other analytical methods for this technique.

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