4 Scene Processing

To the uninitiated, the seizure of a clandestine lab may seem to be the culmination of the investigation. The long hours of surveillance, witness interviews, informant debriefings, information confirmation, and search warrant preparation lead to the excitement of the actual seizure. Yet, what seems to be the end of a process is, in reality, only the beginning. In some aspects, finding the clandestine lab is the easiest part of the investigation. Making sense out of what is found is far more difficult. The hazards indigenous to a clandestine lab crime scene make it impractical for even the best-prepared investigator to waltz through the scene, take a few photographs, throw the relevant evidence into a paper bag, and go back to the office.

The seizure of a clandestine lab should be a well-orchestrated event involving teamwork and timing. As in any team sport, each player has a specific job to do if the team is to be successful. The seizure of a clandestine lab requires that same teamwork and coordination. A clandestine lab seizure is a scheduled event requiring a number of small teams to perform their specialties in a coordinated sequence. These teams can be grouped into support teams and seizure teams.

Support teams are mostly comprised of non-law-enforcement personnel who provide services that may be needed during the various portions of the seizure process. These support teams include members from fire departments, emergency medical services, hazardous waste disposal companies, local health and environmental protection agencies, child protective services, and animal control. The circumstances surrounding the seizure can be used to predict exactly how many of these services may be needed.

Seizure teams are comprised of various law enforcement components with members that possess specialized training concerning clandestine labs. Each group has a specialized function. These groups are similar to those used in processing any major crime scene. Additionally, the hazards involved with clandestine labs require personnel and safety procedures to be incorporated into the scene processing procedures. Both explosive ordinance disposal (EOD) technicians and a forensic chemist who specializes in the manufacturing of controlled substances should be included in this group, even though they are not part of a typical crime scene response team.

4.1 Training

The hazardous nature of seizing a clandestine lab requires that people with specialized training be involved. The OSHA is in charge of enforcing the regulations established by Sections 1910.120, 1910.134 (respiratory protection), and 1910.1200 (hazard communication) of Chapter 29 of the Code of Federal Regulations (29 CFR …). Under 29 CFR 1910.120, an employer is responsible for providing training sufficient to educate employees concerning the dangers involved in working in a hazardous environment. As a result of such training, employees should be able to understand the hazards and risks associated with clandestine labs, understand the potential outcomes associated with an emergency response resulting from a clandestine lab, recognize and identify hazardous substances, and understand the need for additional resources when seizing a clandestine lab operation. The employer is also responsible for providing periodic (annual) refresher training to keep employees abreast of current information concerning hazards in their work environment.

To address these requirements, in 1986, the DEA began a training program designed to inform the personnel who investigate and respond to clandestine labs about the hazards involved in scene investigations. The objective of the program was to bring the DEA into compliance with 29 CFR 1910.120, 29 CFR 1910.134, and 29 CFR 1910.1200. The program initially covered DEA special agents, forensic chemists, diversion personnel, and task force personnel responsible for clandestine lab enforcement. The program included an initial 40-hour safety school, annual 8-hour recertification courses, a 32 h advanced course for site safety officers, and a comprehensive medical surveillance program.

There are a variety of training resources available to agencies that require safety training concerning clandestine labs. The DEA offered the initial 40-hour training course to law enforcement agencies that respond to clandestine lab scenes. Groups like the Clandestine Laboratory Investigators Association (CLIA) and the Clandestine Laboratory Investigating Chemists Association (CLIC) sponsored 8-hour recertification courses. Private companies, such as Network Environmental Systems, Inc. of Folsum, CA, were contracted to provide similar safety training to interested law enforcement agencies. State and local environmental quality agencies and fire departments can provide training on the handling of hazardous materials. The training information and resources an agency needs to educate its employees and comply with 29 CRF 1910.120 are available, if the agency is willing to explore the options that are available outside the traditional law enforcement training network.

4.2 Seizure Stages

Seizing and processing a clandestine lab are orchestrated events that involve arresting potentially violent individuals, then processing a crime scene and dealing with an environment that often contains hazardous chemicals. The involvement of hazardous chemicals in the crime scene necessitates that the seizure process be broken into a particular sequence of steps, with each step requiring a specific expertise. The steps of the seizure process include the preraid planning, the briefing, the entry and arrest, the hazard evaluation and abatement, the search and site control, and finally, the disposal of the hazardous waste.

4.2.1 Preraid Planning

Planning of a clandestine lab seizure starts long before the affidavit for a search warrant is written. Hopefully, the responsible agency identified the resources it will need to process the scene and established policies and procedures that delineate the notification mechanism necessary to coordinate their use during the seizure. Without proper planning, a clandestine lab seizure can turn into a nightmarish multiheaded dragon that law enforcement is not prepared to slay.

Development of an action plan and the policies and procedures required to safely process a clandestine lab is a labor-intensive process. It is also expensive to provide and maintain the training and equipment required. This can be a major administrative hurdle that an agency must take into careful consideration before jumping into the clandestine lab seizure pool.

To address this situation, many jurisdictions rely on a larger agency (i.e., a state or large metropolitan law enforcement agency) or pool their resources with other agencies to create a task force that specializes in investigation and seizure of clandestine labs. These alternatives provide the manpower and resources necessary to safely process clandestine lab scenes. Other agencies simply provide a response team that will process the scene. In many cases, the paperwork and physical evidence are handed back to the investigating agency for prosecution once the seizure process is completed.

There are a number of resources that should be identified as part of a clandestine lab response policy. Other law enforcement agencies in the region that may have beneficial investigative expertise should be sought out, such as the DEA or state narcotics enforcement agencies. Local fire department and emergency medical service (EMS) should be on standby in case of explosion, fire, or other medical emergency. Hazardous waste disposal companies need to be notified, and arrangements for payment must be initiated. Local health and environmental quality departments must be notified for public health reasons. Child protective services may be required, because children are frequently (albeit innocently) involved.

During the preraid planning stage, the primary investigator consults experts to ensure the known information is consistent with a clandestine lab operation. The investigator identifies the location of the suspected operation, provides information concerning why he believes there is a clandestine lab at that location, solicits the expert's opinion, and prepares an affidavit. The affidavit is then presented to a judge, who determines if there is sufficient evidence to establish the probable cause necessary to grant a search warrant.

Also described in the affidavit should be the hazardous nature of the chemicals involved and a formal request that they be disposed of professionally after being properly documented and after taking necessary samples. This statement notifies the court that there is a potentially hazardous situation, and that the law enforcement agency does not have the facilities to safely store or dispose of the chemicals seized. Further, the agency promises to make every effort to document and identify the items necessary to prove the State's case, while protecting the rights of the accused and maintaining public health and safety. This is quite a responsibility. It is imperative, therefore, that the document be carefully worded, because it must be all-inclusive.

It should be stressed that the bulk of the substance discovered will be *disposed of* rather than simply destroyed. "Destroy" implies intent to deceive. "Dispose" indicates a plan to mitigate hazards after the appropriate documentation and preservation steps have been taken. Even if the scene was properly documented and the necessary samples were taken, without the appropriate court authorization, the investigator may inadvertently cross the destroy/dispose line, negating all the evidence collected at the scene.

4.2.2 Briefing

All of the teams associated with the seizure of a clandestine lab should be brought together at the briefing. These teams include the entry team; the search team; EOD, and hazardous materials personnel; forensic chemists; fire department and EMS representatives; and representatives from other law enforcement agencies who may be assisting in the seizure. Personnel from local health or environmental quality departments and child protective services may be notified that their services may be needed, but their presence at the briefing is not required unless preliminary information exists indicating that they will be needed.

During the briefing stage, the lead investigator provides a history of the case, identifying the suspects and the location of the operation. Clandestine lab experts and chemists brief the group on the hazards associated with the type of operation that they can expect to encounter. The staging area and command post locations are disclosed. A separate entry team briefing is performed shortly after the main briefing. Although this is a short stage of the seizure process, it is necessary in order coordinate the resources that will be needed to process the scene.

4.2.3 Entry and Arrest

The entry and arrest stage is definitely an "adrenaline-pumping" and exciting phase of the seizure process. It is also the most dangerous. The danger is in the team's lack of control over the unknown scenario. An entry team trained in clandestine lab seizures should be able to enter and secure a location in less than 2 minutes. However, because of the unpredictability of the situation, during those 2 minutes, anything can go wrong. The operator's mental state and level of drug-induced psychosis is a total unknown. The exact state of the manufacturing process is in question at the time of entry. There may also be booby traps present in any part of the lab or its environs.

The entry team has two functions: (1) secure all the personnel within the immediate lab area and (2) be the eyes and ears of the evaluation and abatement team.

The entry team's primary function is to secure the lab location. This is done by securing, detaining, and then removing any people from the lab area. Who these people are and their relationship to the lab are irrelevant. The seizure is not the time and the lab area is not the place to determine who is involved in the operation and who is at the location for some other reason, however unrelated. This initial step is mandatory for the people's safety and the safety of the personnel who will subsequently be processing the lab scene for physical evidence. Leaving detained personnel in the lab area is not wise, because it needlessly exposes everyone to the hazardous materials in the lab. Leaving desperate suspects in the lab area may further provide them with opportunity to attempt to destroy evidence, thus dramatically increasing the potential for a hazardous materials exposure.

The second function of the entry team is to act as the eyes and ears of the evaluation and abatement team. What the entry team sees, hears, and in some cases smells or tastes, is vital information used by the evaluation team to develop the scene's abatement plan. Members of an entry team trained in clandestine manufacturing techniques recognize the sights and odors of the chemicals and equipment commonly used in clandestine labs. The entry team is in the lab area such a short amount of time that their training must provide them with the ability to recognize significant items and to know the importance of relaying said information to the abatement team for use in formulating the abatement plan.

Members of the entry team should be dressed in such a manner as to provide them with protection from the hazards they may encounter. In selecting the clothing worn during the entry phase, the team needs to consider inhalation and dermal exposures. All entry team equipment provides some level of dermal protection. However, there is a difference in philosophy when it comes to the use of respiratory protection. One extreme advocates not using any respiratory protection during the entry and arrest phase, reasoning that physical mobility, increased peripheral vision, and ability to give verbal commands outweigh the hazards of short-term exposure the team will experience. The other extreme counters that the lab atmosphere may contain lethal concentrations of any of many substances. Training and practicing entries while using the protective equipment helps overcome restrictions of the PPE. Wearing the equipment also adds additional psychological shock value to a dynamic entry as well to any people in the lab at the time, possibly buying critical time for the raiders. Anything that can be done to discourage last-minute tampering at the clandestine lab is recommended.

There are times at which a clandestine lab is encountered by law enforcement, fire departments, or EMS personnel during activities unrelated to clandestine lab investigations. The response to these situations is similar to that of an investigation-initiated seizure. An emergency on-the-scene briefing takes place that requires all professional expertise accumulated from other raids. The initial responders act as the entry team and remove all personnel from the area. They report to the site safety officer what they know about the inside of the lab area. In essence, they act as the entry team, becoming eyes and ears for the abatement team that they will then call.

4.2.4 Hazard Evaluation and Abatement

In clandestine lab investigations, the concept of crime scene processing changes once the site has been secured by the entry team. The main goal of the operation from this point is to create and maintain a safe work environment. If this goal is not achieved, the other goals of the operation may not be attained.

The site safety officer is responsible for implementation and maintenance of safe work practices at the scene of a clandestine lab seizure. His tasks include determining the hazard potential of the lab scene, establishing work zones, and determining the appropriate levels of protection for the various stages of the balance of the seizure operation. The total dynamics of the responsibilities of the site safety officer is beyond the scope of this book. However, in this section, some of the site safety officer's basic responsibilities will be presented so as to provide an understanding of what safety measures should be put into place.

The entry team's observations provide useful information that the site safety officer can use to develop the site control plan. Having this firsthand information from an objective source allows the site safety officer to make decisions in determining what PPE will be used, in establishing work zones, in ensuring safe work practices are being followed, and further, in making other vital decisions concerning workplace safety.

Interviewing the operator or other personnel who were removed from the lab area by the entry team (after arresting and reading them their Miranda rights if applicable), can supply useful information concerning what hazards may be inside. Some operators immediately invoke their right to remain silent and will not speak to law enforcement personnel. Other operators are perversely proud of their operation and are willing to tell someone who "admires the sophistication" of the operation all the details of what he is manufacturing and how he is doing it. The interviewer and the site safety officer must always consider the source of this information and bear in mind that the operator may have an interest in providing misinformation. His understanding of the technical aspects of the operation may be limited, and he may not know the real names of the chemicals involved. For these reasons, an expert in clandestine manufacturing techniques should sit in on the interview, if possible. The expert should not only know the technical aspects of manufacturing a wide variety of controlled substances, but also, more importantly, should recognize the slang terms for the equipment and chemicals that are commonly used in the various manufacturing processes. The lab operator may only know his chemical components by these names.

4.2.4.1 Site Control

Site control is a primary responsibility of the site safety officer. He determines what tasks will be performed and where, based upon an area's level of contamination. He also limits access to highly contaminated areas to personnel who have the required training and are wearing the appropriate PPE. The site safety officer will further divide the scene into areas based on level of contamination: hot, warm, and cold zones.

The hot zone consists of the area immediately surrounding the manufacturing operation or areas with open chemical containers. This area may only encompass the area surrounding an ice chest containing closed chemical containers, or it may incorporate an entire house, in which every room was used for some portion of the manufacturing operation. Who has access to the hot zone and what level of protection they should be wearing are the important issues. The hazardous nature of the hot zone mandates that access be limited and time inside be minimized. Once the hazards have been abated or removed, the hot zone can be downgraded to warm.

The warm zone is the area immediately adjacent to the hot zone. Its access should also be limited. However, the level of protection required here might not be as great. Items from the hot zone are moved into the warm zone, where they can be processed under controlled conditions. Hot zone workers take rest breaks and are decontaminated in the warm zone. Emergency rescue personnel stage here, in case an accident requiring a rescue occurs in the hot zone. Even though the hazards are not as great, access to the warm zone should be limited to trained personnel wearing appropriate PPE. The warm zone can be downgraded to a cold zone once the sampling process is completed, and the chemical containers have been sealed and segregated.

The cold zone is a hazard-free zone where the command post is located. Here, the lead investigator and site safety officer coordinate the seizure activities. Any eating, drinking, and smoking should only take place in the cold zone to reduce the possibility of ingesting hazardous materials. An access point to the warm and hot zone is established here to ensure that only authorized personnel enter the contained area and to document who had access to the crime scene for later court purposes.

4.2.4.2 Personal Protective Equipment

In conjunction with site control, the site safety officer must establish the levels of personal protective equipment (PPE) that will be required during the various stages of the processing operation. He relies on information from the entry team to determine the level of protection the evaluation team will require during the evaluation and abatement phase. The evaluation team's information will be used to determine protection levels required for subsequent stages.

PPE levels range from "A" through "D." Level A provides the greatest level of protection for all entry routes. Level D protection is not much more than work clothes.

Level A PPE is total encapsulation, and it provides the highest level of respiratory and skin protection. It is used in atmospheres that are IDLH and require extreme dermal protection from compounds to which skin exposure in small concentrations will result in impairing or life-threatening health effects. The use of supplied air provides for operation in oxygen-deficient environments.

Level B PPE provides protection similar to level A, but the configuration of the equipment does not offer quite the level of dermal protection. However, the respiratory system is totally protected. This level of protection is recommended for the assessment phase of operational clandestine labs. Some agencies utilize this level of protection for their entry team.

Level C PPE provides Level B barriers to dermal exposure, but respiratory protection has been downgraded from supplied air to an air purification respirator. This level of protection is appropriate when the composition and concentration of the work atmosphere is known and continually monitored. Level C protection is not appropriate for oxygen-deficient atmospheres. However, it is appropriate for work in ventilated areas in which the chemical composition of the hazardous materials involved is known.

Level D protection is used when the potential for chemical contact is minimal. It can be equated to industrial work clothes and is appropriate to protect the worker from incidental exposures.

The evaluation and abatement team has two primary functions: (1) identify and neutralize any potential hazard within the hot zone and (2) create a less hazardous environment so further scene processing can occur.

Using the appropriate PPE, the evaluation and abatement team will enter the hot zone to identify and evaluate the potential hazards. Team personnel should have a solid knowledge of improvised explosive devices (IEDs; i.e., booby traps), clandestine manufacturing techniques, and hazardous materials chemistry. A forensic chemist and an EOD technician form a complementary team that can evaluate and abate the identified hazards. At minimum, they should have equipment that can monitor the atmosphere's oxygen content and the level of flammable and explosive vapors. They may also use equipment that can identify and quantify levels of a variety of specific hazardous materials. The site safety officer is ultimately responsible for selecting the equipment used to evaluate and monitor the hot zone's atmosphere.

Abatement can begin once the hazards have been identified. The EOD technician performs "render safe" operations to items with explosive potential. A forensic chemist trained in clandestine manufacturing techniques can shut down active chemical reactions (see Table 4.1). Open chemical containers are sealed, and confined spaces are safely ventilated. Once these abatement procedures have been conducted and a safe work environment has been established, the actual processing of the scene can begin.

4.2.5 Scene Processing

The processing of a clandestine lab scene is a unique combination of processing a crime scene and a hazardous materials incident. Therefore, two considerations must be balanced during this phase. First, the integrity of the evidence must be maintained. Second, exposure to the hazardous materials must be kept to a minimum. These tasks can be accomplished simultaneously by implementing three steps: planning, documenting, and sampling.

The number of people used to process the lab area should be kept to a minimum to accomplish both of these tasks. Minimizing the number of people in the hot zone minimizes the number of people exposed to the highest

Table 4.1 Reaction Shutdown Guide

- Determine whether the reaction is being heated, cooled, or both.
- Remove heat from the reaction vessel.
- Maintain cooling to the reaction until the reaction appears to have gone to completion and the vessel is cool to the touch.
- Remove obstructions and ventilation tubing from the top of condensing columns.
  - Remember that cooling reactions can create a vacuum that could hamper the dismantling of the apparatus.
  - Note that if the reaction is being vented into water, the vacuum created by the cooling reaction could draw the water into the hot reaction mixture, leading to a violent reaction.
- Turn off at the source, if necessary, compressed gas containers connected to a reaction vessel.
- Allow the pressure of the reaction vessel to naturally reduce to atmospheric pressure.
  - Remember that release of pressurized contents of the reaction vessel may create a toxic exposure.
- Bring systems under vacuum slowly back to atmospheric pressure.
  - Note that water or oxygen in the air may react violently with the chemicals in vessel under vacuum.
- Allow filtration processes to naturally go to completion.

contamination levels. Because the lab area is generally a confined space, increasing the number of people in the area increases the potential for an accident. A small processing team can more efficiently perform the sequence of tasks required to preserve the integrity of the evidence.

4.2.5.1 Planning

Planning is an essential step of any process. The first step of establishing the plan for processing the clandestine lab scene is to touch nothing, instead using the powers of observation. Every clandestine lab is different, and the person in charge of the scene processing must avoid the desire to start moving things from the hot zone before evaluating the totality of the scene. He should walk through the scene, making mental notes and asking himself questions like: What type of lab is this? What process(es) is apparent? Which chemicals are present? What equipment is present? What does the operator seem to be trying to make? Once a picture of what the operator was trying to make and how he was trying to make it has been developed, a plan of how to process the scene to prove an hypothesis can be developed. Practical examples in Chapter 9 demonstrate why a walk-through should be conducted before processing every lab or making assumptions.

A word of caution is needed at this point. The objective of a forensic investigation is to allow the physical evidence to dictate the facts of the case. The scene should be looked at in a totally objective light. The physical evidence at the scene needs to drive how the search is conducted. The scene processing team needs to guard against getting caught up in the "get the bad guys" mentality of the seizure and focus on identifying, collecting, and preserving the physical evidence that indicates the presence of a clandestine manufacturing operation. This is not to say the team cannot focus on collecting evidence characteristic of a clandestine lab that also has common uses. However, investigators should also be careful not to place an illicit meaning on an innocuous item if the scene does not justify it.

4.2.5.2 Documentation

Documentation is essential to preserve the integrity of the evidence, because most of the evidence will be disposed of fairly quickly because of its hazardous nature. To give a complete picture of the clandestine operation, a combination of techniques is necessary. One augments and complements another, thus providing a thorough record of the existence of the evidence, even though it is no longer available. Methods of documenting a clandestine lab scene include photography, videotape, scene interviews, field notes, sketches, and inventories. Each has its strengths and weaknesses.

The documentation of the scene should take place throughout the seizure process. It can be initiated during the evaluation and abatement phase but usually begins during the initial walk-through, when photographs and field notes are taken. A sketch of the scene is made to supplement the photographs. This is followed by itemizing and taking inventory of the specific items that are removed from the scene. A final documentation of how the seized items are disposed of and the remaining items are stored is done.

4.2.5.2.1 Photography. Photography is the traditional method of recording and documenting crime scenes. It captures the way the scene first looked and documents specific items and situations. The initial series of photographs should tell a story and walk the viewer through the scene and portray the scene as the photographer observed it.

Photo documentation can commence once the scene has been secured, the hazards abated, and the atmosphere deemed safe. General overall photographs should be taken to depict the lab area as it was originally encountered. These photographs should be taken from multiple angles before anything is moved. If possible, a series of photographs creating a panoramic from a fixed point should be taken. This creates an overall view of the lab as the photographer encountered it. This should be followed by taking close-ups of specific items in their original location. Reaction apparatuses should be photographed before they are dismantled.

A photograph should be taken of every item or group of items seized. This can be done in the warm zone under controlled conditions. These photographs serve as corroboration to the written field notes and official inventory. They should be as clear and accurate as possible, because they are the official record. Photographs should be taken of the samples with their original container to demonstrate where the sample item was removed.

Individual item photographs should contain identifying information. This information should minimally include the case number, the exhibit or item number, and the date. A ruler scale should be included if volume calculations will be made using the geometry of the container at a later time.

A photo log should be maintained. This documents who took the photographs, when they were taken, what the photographs depict, and why the photo was taken. The investigator must remember that the photographs are more than pictures used to enhance his memory at some point in the future. They are evidence, and as such, they have the same requirements concerning maintaining the chain of custody, as does any other physical evidence seized from the scene. Photographs are discoverable evidence and must be treated as such. To complete a photography packet, the back of each photo should be labeled with the case number, photographer's ID, the photo number, and the total number of photos taken at the scene. This information should correspond to the information on the photo log.

The introduction of digital photography into clandestine lab processing has provided the investigator with tighter control over the images he generates during his scene investigation. It is suggested that an investigator using digital photography copy the images from his camera directly to a "read only" file format on a removable storage format (compact or floppy disc) to serve as the permanent record, much the same way negatives serve as the permanent record for traditional film photography.

4.2.5.2.2 Videotape. Videotaping the scene has become a popular method of visually documenting clandestine lab scenes. It is a real-time way to demonstrate how the site was originally found and it provides the viewer a sense of actually being at the location, as the photographer pans through the scene.

The audio component of videotape can be a help or a hindrance. If the person providing the commentary is knowledgeable about what is being viewed, it can augment the visual presentation. However, as exhibited in the Practical Examples in Chapter 9, the audio support did not accurately describe what was being viewed. This conflict caused problems during the expert's trial testimony. The videographer should, therefore, refrain from commenting if he is not sure what he is looking at.

As with a traditional photograph, videotape records of the scene are discoverable evidence. Every effort needs to be made to preserve the unaltered tape and maintain its chain of custody. Copies can be made as needed. However, the original tape must be fixed so that it cannot be altered or erased. It should also be labeled with the pertinent case information.

4.2.5.2.3 Field Notes. Field notes are taken on or about the time the clandestine lab is processed. They are another form of documentation that is used to augment the others. Field notes are used to supplement the visual images of the photographs or videotape. Field notes can be written at the scene, dictated into a recorder, and transcribed at a later time, or they can be written at the office immediately after the fact.

Field notes can take a variety of forms and are used to address the questions of who, what, when, where, why, and how concerning the crime scene investigation. Who assisted in processing the scene and had access to the evidence? What items were seized? When was the lab entered or seized? Where were the seized items located? Finally, why were certain items seized and not others?

The three basic forms of field notes are worksheets, narrative descriptions, and sketches. Each has its strengths and weaknesses. Most clandestine lab investigators utilize some combination of the three.

All forms of field notes must be treated as part of the written record and are subject to discovery. Each page should have the same basic information as a photograph and identify the author (name, initials, or ID number), case number, date, page number, and total number of pages.

Worksheets are unique to a specific task. They provide a convenient method of documentation and a format to walk a person (and later a jury) through the various phases of a clandestine lab seizure. There are worksheets or checklists for preraid planning and the hazard evaluation and abatement phases. Some investigators designed worksheets to assist in documenting specific items seized from the lab. Worksheets are good for noting routine responses to required repetitive tasks or confirming seizure of the same evidentiary items. However, worksheets can be ineffective if their parameters do not address the scene scenario. Worksheets with a narrative section can be used to provide additional information in situations that may be outside the scope of the worksheet.

A photo log form is an example of a worksheet used to supplement the photographs taken at the scene. This form contains fill-in-the-blank and narrative sections. There can be sections for time, date, photographer ID, photo number, and roll number. The section that describes the photograph and its significance is a short narrative.

There is no right or wrong way to take narrative notes. Notes can be as short or as long as the author desires. They can be short phrases used to assist the investigator's recall at a later time, or they can be multisentence explanations of how the author perceived the operation functioned. As long as the author can place his thoughts on paper in such a way that he can decipher them at a later time, the goal has been achieved. The only rules regarding narrative notes are that they be preserved and that each page contains appropriate case information.

Photographs and videotape document the actual presence of items at the scene. However, because they are two dimensional, they poorly demonstrate where things were located in relationship to other items. Wide-angle lenses or panoramic film might provide the answer, but their costs are rarely within the budgets of most law enforcement departments. Sketches, therefore, provide a means of demonstrating a spatial relationship that photographs do not. By combining these two-dimensional formats, a three dimensional perception that accurately depicts the scene can be developed.

Sketches can be as detailed as the drafter deems necessary. They can be used to provide a basic special relationship between items at the scene using visual approximations to determine distances. Sketches can also be extremely detailed, using exact measurements from fixed points to create a scaled drawing of the scene. As with all forms of field notes, information concerning the case and the drafter's ID should accompany the sketches.

4.2.5.3 The Search

Hot zone searches are handled differently from the balance of the scene because of the presence of hazardous materials and possible contamination. People who have not received specific clandestine lab training can process searches of warm and cold zones adjacent to the lab area using standard crime scene search techniques. However, a clandestine lab expert should be available to provide technical advice when clandestine-lab-related items are found in these areas.

Once the original condition of the scene is documented, the search and inventory can commence. The search is necessary to locate and identify the items of physical evidence necessary to establish the clandestine manufacture of controlled substances. Experts in a variety of clandestine manufacturing techniques should conduct the search. These experts are able to recognize the evidentiary significance of ordinary items at the location. The searchers should also have been provided the safety training required by 29 CFR 1910.120. Again, the hot zone is a hazardous materials scene that may also be a confined space, so the number of people conducting the search should be kept to a minimum.

There are three approaches concerning the search of the lab scene. First is simply utilizing a methodical approach. Second is using a "clear the area" approach. Last is implementing the "sample in place" approach. Personnel safety and legal considerations are used in selecting a search method.

First and foremost, a clandestine lab is a crime scene. Every effort should be made to preserve the integrity of the physical evidence. To this end, an organized search of the lab area is needed. A methodical search allows the processing team to sequentially move through the scene and identify, document, collect, and preserve each evidentiary item located. Once the item's location is noted, the time it is moved from the hot zone to the warm zone for further processing is documented. This approach can be time consuming and, thus, increases the length of time the search team is in the dangerous hot zone.

The "clear the room" approach minimizes the amount of time the search team is in the contaminated environment. This approach moves all of the items from the hot zone to the warm zone for processing, without detailing the exact location and time each item is removed from the scene. The overall photos and the sketch document the scene's original condition. Supplemental photos during the inventory and sampling in the warm zone serve to document individual items.

The third method is a compromise of sorts. The "sample and go" approach reduces the search team's contact with the hazardous materials by not moving them from the hot zone to the warm zone. The scene is searched, inventoried, and sampled without significantly moving any items. Once the team has completed its search and documentation of the hot zone, it is turned over to the waste disposal company. Using this method can increase the time in the hot zone but minimize the situations in which accidents while handling hazardous materials can occur.

The search of uncontaminated areas adjacent to the lab area can be conducted using traditional crime scene search techniques. However, a forensic chemist and EOD personnel should be readily available. It is common for searchers to find chemical or explosive devices in an area surrounding the location. Hazardous materials have been located in children's bedrooms, bathrooms, closets, attics, outbuildings, and vehicles parked on the street. The specialists are needed to evaluate the evidentiary significance of the items, to take the actions necessary to address any hazards, and also to preserve the evidence.

4.2.5.3.1 Inventory. The need for an accurate inventory of the chemicals and equipment seized from a clandestine lab goes beyond establishing the elements of the crime. The inventory is used to establish facts and render opinions concerning the lab that are not apparent at the scene. Evaluating the inventories of the seized items can identify manufacturing methods used and create estimates of production (see Chapter 6).

All law enforcement agencies have some type of form (worksheet) for documenting the items seized during the execution of a criminal search warrant. Depending on the agency's policies and procedures, these forms may or may not adequately depict the type and amount of chemicals and equipment seized. Therefore, it is suggested that a separate detailed inventory be taken to accurately document the types and amounts of chemicals and equipment seized, so that experts can objectively evaluate the information away from the hectic environment of the seizure and render opinions concerning the overall manufacturing operation.

4.2.5.3.2 Sampling. Even small operations can create a significant number of evidentiary items. The hazardous nature of the chemicals and contaminated equipment requires special storage conditions. Most law enforcement agency's property rooms are not equipped to handle the volume of evidence that can be generated by a clandestine lab. They also do not have the ventilation and safety equipment necessary to safely store and dispose of such hazardous waste seized. Therefore, taking evidentiary samples from the scene of a clandestine lab is a necessity. The balance of the items can be properly disposed of once properly documented.

It is highly recommended that a forensic chemist who specializes in clandestine labs perform the sampling. His knowledge of the various clandestine manufacturing methods allows him to select the significant items, while at the same time, keeping the samples to a manageable number for the forensic laboratory. He can recognize subtle differences in unknowns and select samples that will accurately depict the seized operation. He also has the training to allow him to safely handle the hazardous chemicals that require sampling and to recognize the materials that should be handled with kid gloves, or those that should not be handled.

Local statutes and case law will determine what to sample and how much to take. The guidelines assist in indicating which items should be sampled. Suspected controlled substances should be seized in total and submitted for examination, while explosives should be sampled. All suspected precursor chemicals should be sampled; their identity assists in determining the synthesis route used and in estimating the amount of final product that could be produced. Taking samples of reagents and solvents should be left to the discretion of the on-scene chemist. The identity of reagents assists in determining the synthesis route, and the identity of solvents can assist in determining the extraction method used.

The fate of labeled containers is not as well defined as one would think. It is a good assumption that the contents of a factory-sealed commercial container are what the label reports them to be. Opened containers with commercial labels may or may not contain what is on the label, and the on-scene chemist should treat them accordingly.

The only difference between an unlabeled container and a container that the operator has labeled is that the label reflects only what the operator originally placed into the container; the contents of an operator-labeled container may have been changed any number of times since the label was originally applied. Therefore, the container should be treated as an unknown.

The following is a general guide for sampling chemical containers. It is unnecessary to sample factory-sealed commercially labeled containers if they have been properly documented. The sampling of open containers with commercial labels is up to the discretion of the on-scene chemist. Commercially labeled containers with contents that are not consistent with the label should be sampled. Samples should be taken from all containers with altered commercial labels, handwritten labels, and without labels; and identification of such labels should always be indicated.

Reaction mixtures, extraction mixtures, waste liquids, and sludge contain a wealth of information in a single location. Lack of a label of any type indicates nothing. These mixtures may contain many, if not all, of the precursors, reagents, final products, and by-products for a given synthesis route. This wealth of information from a single source necessitates the sampling of these mixtures. Nothing should be ignored.

Glassware and equipment found at a clandestine lab scene may or may not contain residues that will provide information concerning what was being produced or the synthesis method being used. For safety reasons, the entire piece or a number of pieces of glassware or equipment must be submitted to the forensic laboratory if the identity of residue is deemed critical. This will provide a controlled environment for sampling and examination.

The search and inventory method used will determine where the samples will be taken. The "sampling in place" method is just that: samples are taken at the items' original location. Other methods move the items to an evidence-processing location, where the conditions of the sampling can be more controlled. Trained personnel wearing the appropriate PPE should do any sampling in a well-ventilated area.

The hazardous nature of the samples requires special packaging. Packaging should take into account the chemical properties of the samples and be designed to minimize the hazardous exposures and cross-contamination if a sample container is broken. Finally, the packaging should provide information concerning the sample's identity. This information should include the case number, item number, date, and any relevant information concerning the sample, such as its pH, field test information, original volume, or weight. Even the item's proximity to another item may be important. In Table 4.2, information concerning the appropriate packaging of clandestine lab samples is provided. Guidelines for items to include in a sampling kit are provided in Table 4.3.

The question of how many samples are required is invariably asked. As with every other aspect of clandestine lab investigation, there are a number of ways to approach the situation. All represent merely a difference in philosophy. The sampling camps can be divided into their extremes: one camp advocates taking only the minimum number of samples necessary to establish

Table 4.2 Sampling Guide

General Considerations
• Consult local statutes and case law concerning the type and amount of samples required.
• Conduct sampling in a well-ventilated area, preferably away from the lab area.
• Photograph all samples with the original container.
What to Sample
• Seize the entire amount of controlled substances.
• Sample all reaction mixtures.
• Take random samples of waste material.
• Sample unlabeled chemical containers.
• Leave the sampling of reagents and solvents to the discretion of the on-scene chemist.
• Sample each phase of a multiphase liquid.
• Leave the sampling of commercially labeled containers to the discretion of the on-scene chemist.
– Assume that factory-sealed containers contain what the label reports.
– Note that open commercially labeled containers may or may not contain what the label reports.
• Leave the sampling of glassware to the discretion of the on-scene chemist.
Sample Packaging
• Package liquid samples in glass vials with acid-resistant screw caps and place inside a sealed zip-lock plastic bag.
• Place solid samples into a sealed zip-lock plastic bag.
• Place solid and liquid samples inside a second sealed zip-lock plastic bag.
• Mark the outer-sealed zip-lock plastic bag with the appropriate case information.
• Place individual items into a single container filled with an absorbent material for transportation and storage.

Table 4.3 Sampling Kit

Necessary Items	Desirable Items
Camera (35 mm or digital)	Chalk or dry-erase board with markers
30, 1–2 oz glass vials with acid-resistant screw caps	Scales (1 kg and 100 kg capacity)
30, 25 ml disposable volumetric pipettes	Field test kit
60, 4" × 6" zip-lock plastic bags	• Disposable culture tubes
3 pipette bulbs	• Disposable plastic eye droppers
100, 3" × 5" index cards	• Wooden spatulas or applicator sticks
Marking pens	• pH paper
Tape	• Premixed reagents (See Table 4.4)
Ruler or tape measure	
Worksheets or notepads	

the elements of the crime, and the other advocates sampling everything in sight. What actually occurs is discretionary sampling by the on-scene chemist based on his experience and the law enforcement department's expectations based on similar venues.

Taking a minimum number of samples streamlines the scene-processing phase. Minimizing exposure to toxic materials, it potentially reduces the analysis time required by the forensic laboratory. The downside to this minimization is that if proper or sufficient samples are not taken at the scene, there is no backup physical evidence to examine. Additional samples required to supply information that would provide a different perspective to the operation are, thereby, forever unavailable, because once law enforcement leaves the scene, a hazardous waste disposal company usually removes bulk items.

Another consideration of minimization is the possible appearance of deception. The argument could be presented that by not "completely" sampling the scene, the investigators were attempting to hide evidence that would exonerate the suspect or would be intentionally misleading as to what was actually occurring at the location. Are these valid arguments? They are probably not. Can they arise? Yes, they can and do.

The other extreme is to sample everything. If the total operation consists of three or four items, sampling everything is not unreasonable. However, sampling 30 unknown liquids with similar colors and chemical characteristics may be excessive, expensive, and time-consuming. Still, a guiding principle may be that it is better to have too many samples than not enough. The forensic laboratory may choose not to analyze a sample if the examiner feels that no additional information will be derived from the examination. However, it should always be remembered that the laboratory cannot analyze what it does not have.

4.2.5.3.3 Field Testing. Field testing is used to address two basic questions: What is it? How much is there? However, existence leads to follow-up questions of where and when is it appropriate to answer the first two questions?

The "how much is there" question needs to be addressed at the scene. In order to establish the amount of controlled substance that could be produced by the operation, the weights and volumes of the precursor and reagent chemicals need to be determined. The original volumes of reaction and extraction mixtures, combined with the results of laboratory analyses of the samples, can be used to calculate the amount of controlled substance that was in the container at the time of seizure.

The volume estimate of commercially labeled containers is relatively straightforward: it can be assumed to be what is reported on the label. Estimates can be made for commercially labeled containers with contents that appear to be consistent with the labeling information (e.g., 500 g jar approximately half full or 500 ml bottle approximately 25% full). By physically weighing the container and subtracting the weight of an empty container, or one of the same approximate size and type, more accurate estimates

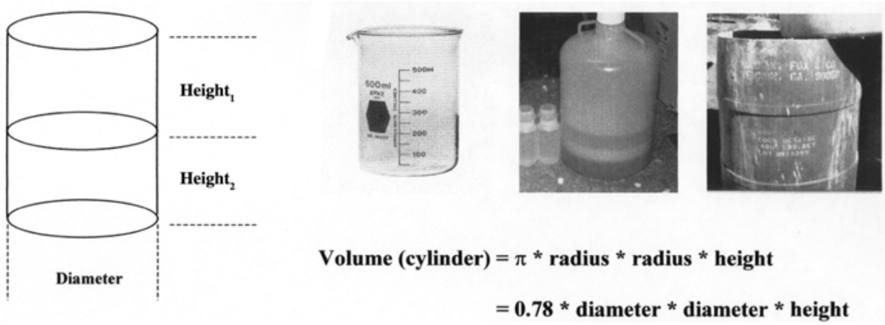

Figure 4.1 Cylinders.

of solid weights can be obtained. Measuring the dimensions of the liquid in the container and using basic geometry to calculate the volume of the liquid can lead to more accurate liquid volume estimates.

Determining the exact volumes of reaction and extraction mixtures and unknown liquids is more critical. These liquids potentially contain a controlled substance, the amount of which may be used in the sentence determination phase of a trial, if the suspect is convicted. Knowing the original volume of a container will enable the forensic chemist to calculate the amount of controlled substance that was in it.

All equipment and chemical containers found at clandestine lab scenes can be divided into one of three basic geometric shapes: cylinders, cones, or spheres. Cylinders (Figure 4.1) are the basic geometric shape of beakers, bottles, and drums. Erlenmeyer flasks, vacuum flasks, and separatory funnels are shaped like cones (Figure 4.2). Reaction flasks have a spherical shape (Figure 4.3). Knowing the basic shape of an object and the measurements of the liquids within it allows the actual volume to be calculated with preexisting mathematical formulas. Demonstrated in Practical Applications and Examples in Chapter 9 is how these calculations can be used in the field.

The accuracy of the answer to the "what" question is not as important to know at the scene. The exact identity of any given item cannot usually be established under field conditions. However, the ability to classify compounds and mixtures provides a means to efficiently group similar substances and streamline the sampling process. For example, knowing the basic chemical and physical properties of a liquid can tell the sampler whether the sample is a reaction mixture or a waste material. Knowing the relative density of an organic liquid will provide insight as to whether the final product will be on the top layer or the bottom. Certain chemical color tests can be used to provide presumptive information as to whether an item contains a controlled substance, or they can be used to indicate the item's reactive proper-

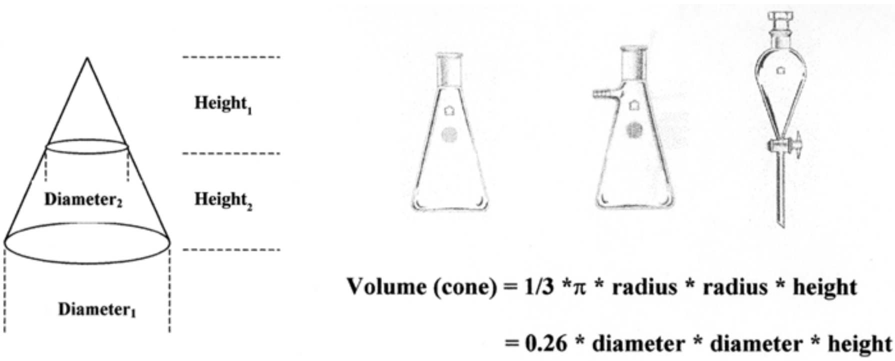

Figure 4.2 Cones.

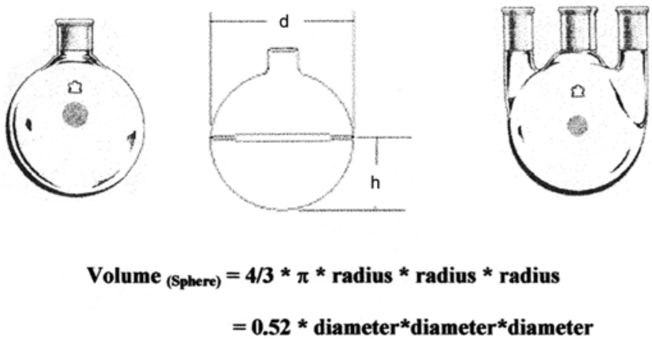

Figure 4.3 Spheres.

ties. For all of these determinations, a forensic chemist's experience on the scene is invaluable.

Described in Table 4.4 and Table 4.5 are the contents of field test reagents and some of the generic results that can be obtained from reactions with chemical color tests in the kit. As with sampling, field-testing should only be performed by trained personnel under controlled conditions. Trained personnel know the sequence of field tests for a particular sample that is necessary to provide an accurate picture of the samples' physical and chemical properties as well as potential contents. They are also aware of the subtle differences between a positive and a negative test result. Many field tests involve a sequence of chemical reactions, and the use of trained personnel reduces the likelihood of an incompatible chemical reaction.

4.2.5.4 Disposal

The final phase of a clandestine lab seizure must be considered long before the investigation begins. The following question must be asked and addressed:

Table 4.4 Field Test Reagents

Reagent	Formulation
Marquis	0.5 ml formaldehyde combined with 30 ml of sulfuric acid — store in amber glass vial with acid-resistant cap
Cobalt thiocyanate	5% aqueous solution of cobalt thiocyanate (CoSCN)
Copper sulfate	• Solution A: 5% aqueous solution of copper sulfate ($CuSO_4$); Solution B: saturated aqueous solution of sodium bicarbonate ($NaHCO_3$)
Dinitrobenzene	• Solution A: 2% solution of *m*-dinitrobenzene, in reagent alcohol; Solution B: 5% solution of sodium hydroxide (NaOH)
pDMBA	• Solution A: 2% solution of *p*-dimethylaminobenzaldehyde (pDMBA); Solution B: concentrated hydrochloric acid (HCl)
Silver nitrate	5% aqueous solution of silver nitrate ($AgNO_3$)
Barium chloride	5% aqueous solution of barium chloride ($BaCl_2$)
Diphenylamine	• Solution A: 1% aqueous solution of diphenylamine; Solution B: concentrated sulfuric acid (H_2SO_4) — store in amber glass vial with acid-resistant cap
Thymol	• Solution A: 1% aqueous solution of thymol; Solution B: concentrated sulfuric acid (H_2SO_4) — store in amber glass vial with acid-resistant cap
Nesslers	• Dissolve 5 g of potassium iodide (KI) and 10 g of mercuric chloride in 50 ml of deionized water; dissolve 20 g of potassium hydroxide (KOH) in 50 ml of deionized water; combine solutions
Methanol/sodium hydroxide	1 N solution of sodium hydroxide (NaOH) in methanol

What is going to happen to the hazardous waste generated as a result of the seizure?

In the early days of clandestine lab investigations, waste disposal was not an issue. Chemicals were routinely poured down drains or on the ground, thrown into the trash, burned, blown up, or simply submitted to the police property room for indefinite storage. These actions were taken ignorantly, yet innocently, without regard to chemical compatibility, the health and welfare of the people who would be subsequently exposed, or the environmental impact.

Since then, numerous safety and environmental regulations have been established to protect the health and welfare of workers, the general population, and the environment. Law enforcement is not exempt from these regulations. In many cases, the lead agency legally becomes the "generator" of the hazardous waste produced as a result of a seizure. As the generator, they have a "cradle-to-grave" responsibility to ensure that the waste generated by the seizure is disposed of in such a way as to not adversely impact the

Table 4.5 Field Test Reactions

Reagent	Color	Indication
Marquis	Orange	Phenethylamines, phenylacetic acid
	Purple	Opiates, MDA, MDMA
Cobalt thiocyanate	Blue	Cocaine HCl, PCP, meperidine, lidocaine
Copper sulfate	Blue	Ephedrine, pseudoephedrine, lidocaine
Dinitrobenzene	Purple	Phenyl-2-propanone (P2P)
pDMBA	Purple	LSD, indoles
Silver nitrate	White	Cl^-, CO_3^{-2}, SO_3^{-2}
	Crème	Br^-
	Yellow	I^-, PO_4^{-3}
	Brown	OH^-
	Black	S^-
Barium chloride	White	CO_3^{-2}, SO_3^{-2}, SO_4^{-2}, PO_4^{-3}
Diphenylamine	Blue	NO_3^-, ClO_3^-, ClO_4^-, nitro compounds, oxidizers
Thymol	Green	NO_3^-
	Brown	ClO_3^-
	Red	RDX, HMX
	Blue green	PETN
Nesslers	Orange	NH_4^+
Methanol/sodium hydroxide	Red to orange	TNT
	Blue to brown	DNT
Sulfuric acid	Yellow orange	ClO_4^-

environment or public health. In many cases, this means that the seizing agency takes on the financial burden of cleaning the chemical contamination that resulted from the clandestine operation.

This potential liability has sometimes made small agencies reconsider clandestine lab enforcement operations. The cleanup costs for the smallest operations can easily run into thousands of dollars. A medium-size operation could have devastating effects on the police department's budget. For this reason, task forces have been created and funds established to address the financial burden associated with clandestine lab seizures.

The generator is ultimately responsible for the waste that is generated from the lab. Therefore, it is imperative that the disposal company chosen be reputable in every way. When evaluating waste disposal companies, the low-bid approach taken by many government agencies may not be the optimum method of selection. The company selected should have the appropriate federal and local licenses to handle hazardous waste. They should be transporting it to approved facilities for proper disposal using approved methods. Finally, the personnel the waste disposal company sends to the site should have clean criminal histories, especially in the area of drug abuse.

4.3 Summary

The seizure of a clandestine lab often goes beyond the scope of a traditional crime scene. The dynamics of hazardous materials involved must be taken into account, and the safety of the personnel processing the scene must be paramount. However, during the process, personnel cannot lose sight of the goal of preserving the physical evidence that indicates the existence of a clandestine laboratory. This balancing act can be accomplished through the use of specialized teams with specific functions. The number of people involved can give the process a circus-like atmosphere; however, with a documented set of policies and procedures delineating the responsibilities of each of the teams in place, order can be derived from what appears to be total chaos. The array of arbitrary unknown items can be sequentially identified, documented, preserved, and properly disposed of in such a way that the health and safety of all parties is protected, while at the same time, a forensic investigation can be conducted that will prove or disprove the existence of criminal activity.