Module 3 - Unit 8
Mission Specific Competencies:
Response to Illicit Laboratory Incidents

Scope of Unit
The purpose of this lesson is to train the operations level responder with a mission specific competency in Response to Illicit Laboratory Incidents.

Learning Objectives
Upon completion of this unit, Operations Level First Responders will have the knowledge and skills to safely and effectively:

• Analyze an incident to determine the complexity of the lab operation
• Plan a response within the capabilities of your personnel, training, personal protective equipment, and control and mitigation equipment
• Implement the planned response (IAP)

Student Performance Objectives
• List the 4 types of illicit laboratories
• List 2 methods to manufacture methamphetamines
• Identify the 5 types of chemical agents
• Identify common hazards found in illicit laboratories.

Resource List
• Manual
• Pen / Pencil

References
• The Ohio HazMat/WMD Technician Manual
• NFPA 472, NFPA1991 and NFPA1992
• Incident Response to Terrorist Bombings, New Mexico Tech
• Advanced Chem-Bio Integrated Response Course, Dugway, Utah
• Clandestine Drug Labs Course, Ohio Fire Academy

Unit Agenda 3-hour segment
• 15 minutes - Course introduction and mission specific overview
• 90 minutes – Lecture and unit test
• 75 minutes – Hands on and tabletop exercise
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<td>Determine if a HazMat/WMD incident is an illicit lab and meet the following requirements: 1) Describe operational consideration, hazards and products involved in illicit drug manufacturing 2) Describe operational consideration, hazards and products involved in illicit WMD chemical manufacturing 3) Describe operational consideration, hazards and products involved in illicit biological WMD manufacturing 4) Describe potential booby traps encountered by response personnel 5) Know what agencies have investigative authority and operational responsibility</td>
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Introduction

Illicit labs usually manufacture illegal drugs such as methamphetamine, but they may produce other illegal substances such as home made explosives, chemical weapons and/or biological agents intended to cause harm. The production of these materials is a violation of criminal statutes and the perpetrators usually hide the lab, the precursor chemicals and the equipment to prevent discovery.

Each type of lab, and each step in the process poses its own special hazard to the lab operators, nearby persons and emergency responders. Responders to illicit labs must be aware of these hazards and prepared for the threats they present. Labs may be discovered while they are in storage, while they are being transported or while they are set up and in production.

Responders may be called to suspected illegal labs for a variety of reasons and may not know their incident is related to a lab. The nature of these calls can include odor investigations, fires, explosions, medical emergencies, domestic disturbances or suspicious activities. Therefore, all emergency responders should be trained to recognize a potential lab, and specially trained operations level personnel who complete this course may be assigned to work with law enforcement officers, hazardous materials technicians and bomb technicians to help identify the type of lab, secure the scene, reduce hazards and preserve the evidence which may be present.

Hazmat/WMD Operations level responders who wish to complete the Illicit Laboratories training must have completed and be competent in Hazmat/WMD Awareness and Hazmat/WMD Operations Core Competencies training. They must also have completed NIMS, ICS and Mission Specific PPE classes to be considered capable of assisting at these incidents.
First Responder Operations Level personnel should always work under the supervision of Hazmat/WMD Technicians when working at a suspected illicit lab incident. They will also be working with law enforcement personnel since most suspected illicit labs are crime scenes. Since procedures will vary based upon your agency and level of experience, it is important to be familiar with and comply with local procedures for response and operations at scenes involving potential illicit labs.

Analyzing the Incident

One of the first tasks you will face is trying to identify the type of lab involved in your incident. There can be many substances produced in illicit labs, using a variety of different processes, and many different chemicals in the recipe. Each process has its own unique properties and hazards. We will group the labs by the four general categories; drug manufacturing, WMD chemical manufacturing, biological weapons production, and homemade explosives labs. We will discuss each lab, the precursor chemicals and the equipment needed for each process. Precursors are the ingredients needed to manufacture the illicit material in the lab. Clandestine activities are constantly changing so it is more important to realize that what is taught today may no longer be done tomorrow. Any unusual amount of a chemical in any unusual area should lead you to suspect illicit activities. Simply put the small bottle of acetone found in a bedroom is probably used to remove fingernail polish, the 5 gallon pail of acetone found in a bathroom is a good sign that they are up to something no good.

Drug Manufacturing

A number of different illicit drugs (such as Ecstasy and LSD) can be manufactured in clandestine labs but the most common is methamphetamine.

Methamphetamine is a powerful stimulant that is extremely addictive. It can be injected, snorted, smoked or ingested. It is popular because it is easy to make, very addictive and extremely profitable. Meth is usually synthesized by converting pseudoephedrine into methamphetamine.

This can be accomplished in several methods, but two of the most common are:
Red Phosphorus Method (Cold Cook, Red-P)

Precursors: Pseudo ephedrine capsules, solvents such as isopropyl alcohol, acetone, ether or lantern fuel, red phosphorus, iodine, hydriodic acid, sodium hydroxide, rock salt and sulfuric acid, or muriatic acid.

Equipment: Blenders, Pyrex glassware, funnels, coffee filters, plastic spoons, tubing, glass jars, plastic 2 liter bottles

Anhydrous Method (Nazi)

Precursors: Pseudo ephedrine capsules, solvents such as isopropyl alcohol, acetone, ether or lantern fuel, reactive metals such as lithium or sodium, anhydrous ammonia, rock salt and sulfuric acid, or muriatic acid.

Equipment: Blenders, Pyrex glassware, funnels, coffee filters, plastic spoons, tubing, glass jars, plastic 2 liter bottles, LPG cylinders or insulated coolers used to store anhydrous ammonia, lithium batteries.

In both methods, the pseudo ephedrine pills are crushed, the pseudo ephedrine is extracted with a solvent, it is chemically converted to methamphetamine, extracted from solution and then dried.

There are many hazards which can be present in each of these processes:

**Flammables**  - The solvents can evaporate and form ignitable mixtures in the air. Without adequate ventilation these can rapidly ignite or explode. About 20% of labs are discovered when they catch fire. Vapors can collect in high concentrations as cooks attempt to avoid detection by sealing doors and windows.

**Toxic Gases**  - Toxic products are used in the production of meth and can accumulate to dangerous levels during production. Solvents are an inhalation hazard and skin contact hazard. Some precursors are more toxic when mixed, such as red phosphorus and iodine may produce deadly phosphine gas.

**Strong acids**  - Acids are used in most methods of production. These chemicals corrode metal and damage human tissue. The vapors can be strong and cause skin contact and inhalation injuries such as burns, redness, lung damage and eye damage.
**Strong alkalis** - Alkalis are used in most production techniques. These can also produce vapors which can cause skin contact and inhalation injuries such as burns, redness, lung damage and eye damage.

**Water reactive metals** - such as lithium and sodium with produce toxic vapors and potentially ignite in the presence of moisture, humidity or water. These products will react with the moisture in skin and cause burns. The violent exothermic reaction of these soft metals may cause them to splatter on contact with water.

**Over-pressurization** - If not properly vented, some of the natural physical properties and chemical reactions used to make meth will cause rapid pressurization of a closed container. This over pressurization can caused violent rupture of containers which can cause a blast pressure wave, fragmentation of the container and may spread toxic or corrosive chemicals.

**Contamination of Property** - Meth contaminates all of the furniture, carpeting, wall coverings, clothing and drywall of a lab. Labs are frequently set up in rental properties, hotel rooms, trailers, etc to avoid the responsibility of the clean up. Labs need drains, ventilation and running water, so they are typically set up in kitchens, laundry rooms or bathrooms. Property used as a lab should be thoroughly decontaminated by a qualified cleanup contractor before being re-inhabited following a lab seizure.

The lab operators are commonly called “cooks” and they frequently have little knowledge of chemistry. In most cases they are following a recipe and generally don’t follow any lab safety standards.

The lab operators will frequently protect themselves, their precursors and the finished product with weapons, motion detectors, scanners and booby traps. Booby traps can include explosives, shotgun shells, energized electrical sources, chemical releases and aggressive dogs.

In illicit drug labs the investigative authority can vary from the US Drug Enforcement Agency (DEA) to regional narcotics task forces, county sheriffs and local police departments. Be sure to understand who has authority in your jurisdiction. If you don’t know and need to report a suspected lab, start with your local law enforcement agency and let them escalate it to another agency if necessary.
WMD Chemical Manufacturing

The illicit laboratory could be manufacturing chemicals to be used to cause harm to people, property or the environment. Some of these, such as nerve agent or vesicants require complex processes and sophisticated lab equipment. But others require less sophistication. The “lab” may actually just be a “warehouse” for storage of toxic industrial chemicals, such as chlorine, ammonia or cyanide.

Lab operators in WMD chemical labs tend to be more knowledgeable in chemistry and often have some formal training. Many of these chemicals are so toxic that labs would have airtight laboratory grade ground glassware, heating mantels, corrosive resistant reactors, vacuum distillation glassware, personal protective equipment with high level respiratory protection and possibly even antidotes (if available).

Some of these labs might have vapor hoods with filtration or scrubbers on the exhausted air. Cylinders would likely be present as toxic chemicals would need to be stored in airtight containers.

Precursors vary with the WMD chemical agent they are trying to synthesize but most of the precursors have legitimate industrial uses in the production of dyes, plastics, insecticides, ceramics and inks. Therefore the precursors may be fairly accessible.

**Nerve agents** - Such as Sarin and VX, are organophosphate based. Their precursors include fluoride, cyanide, phosphorus and chlorine based products.

**Vesicants** - Blister agents such as Mustard, are sulfur based. Their precursors are more common chemicals such as: ethylene, hydrochloric acid, sodium sulfide, sulfur dichloride and thiodiglycol.

**Blood agents** - Usually cyanide based, such as hydrogen cyanide gas. Their precursors include: ammonia, formamide, methane, mineral acids, potassium cyanide and sodium cyanide. However, hydrogen cyanide is a common industrial chemical and may not need to be synthesized if it can be acquired.
Despite the challenges involved in production, chemical weapons have been produced by non-military scientists. In 1993-1994, members of the Japanese doomsday cult “Aum Shinrikyo”, were able to produce Sarin (a nerve agent) and disperse it in Matsumoto and Tokyo in separate attacks on the public in 1994-1995. Their scientists were well qualified and had substantial financial resources to build and operate their lab.

One of the telltale signs of a WMD lab is animal testing of the finished product. In the case of Aum Shinrikyo, they purchased a sheep ranch in remote western Australia and tested their Sarin on the herd. Twenty-nine sheep were killed in the tests. When lab operators are testing on animals, they have usually produced finished product and an attack is potentially imminent.

The hazards of chemical weapons production include chemical burns, toxic inhalation of gases and vapors, over pressurization of glassware, fires and explosions. Some of these materials are toxic by inhalation in parts per billion (ppb) so substantial PPE and ventilation would be required in production.

Agencies which would have investigative authority in cases of possible chemical weapons production could include local, county and state law enforcement agencies, Joint Terrorism Task Forces, and federal partners such as the Federal Bureau of Investigation. Type 1 Hazmat/WMD Teams and/or the Ohio National Guard Civil Support Team (WMD) should also be called to assist in assessing the incident, collecting public safety samples and identifying materials.

**Biological Weapons Production**

Biological weapons involve the use of pathogens and toxins as weapons. In these labs, new strains of viruses and bacteria are not “invented” but instead they are found in nature and then isolated and grown to be used as a weapon.

Biological agents may be selected as a weapon by a criminal based upon a number of factors which would likely include: ease of production, stability, transmissibility, infectivity, infective period and ease of dissemination. Information on these factors is found in Module 2 of this book.
For the purpose of discussing illicit labs, production of biological weapons will be considered in three categories: **bacteria, viruses** and **toxins**. Each lab has it’s own characteristics, hazards and operational considerations.

**Bacteria** - Bacteria are small free-living organisms, most of which may be grown on solid or liquid culture media. The organisms have a structure consisting of nuclear material, cytoplasm, and a cell membrane. They reproduce by simple division. The diseases they produce often respond to specific therapy with antibiotics. Examples of bacteria produced for use as weapons include bacillus anthrasis (anthrax) and yersinia pestis (plague).

Growing bacteria for use as a weapon requires warmth, nutrition, mixing/aeration, aseptic technique and harvesting/finishing. Bacteria production typically begins with freeze-dried culture or spore stock. A small amount is applied to an agar plate with nutrients or a liquid culture. They are then placed in an incubator and kept warm. The material is periodically agitated and eventually harvested. The harvested material is then dried and milled.

Equipment which is usually present in bacterial production labs are: autoclave or steam sterilization equipment, biological safety cabinets, ventilation with HEPA filtration, agar plates and beakers with culture media, incubators, centrifuges and PPE.

**Viruses** – Unlike bacteria, viruses are organisms which require living cells in which to replicate. They are therefore intimately dependent upon the cells of the host which they infect. They produce diseases which generally do not respond to antibiotics but which may be responsive to antiviral compounds, of which there are few available, and those that are available are of limited use.

One of the other challenges with viruses is that they often mutate and adapt to the environment and host. This means that effective vaccines are difficult or impossible to produce. An example of a virus which could be used
as a weapon is variola major (smallpox) or viral hemorrhagic fevers such as the Ebola virus.

Laboratory production of viruses would start by isolating the desired virus and then infecting a host to grow additional virus. This is usually accomplished in chicken eggs. The membrane of a fertile egg is injected with the virus and then incubated. After the incubation period, the membranes are harvested. These can produce millions of virus which are stabilized and freeze dried.

An alternate method is to grow the virus on tissue cultures in a liquid suspension. This utilizes a tissue culture flask (T flask) which contain tissue cultures in a liquid growth medium. The cells are inoculated with the virus, then incubated and agitated until the virus is growing in the tissue. The virus is then harvested by rupturing the cells to release the virus.

A third method to produce virus is to grow it in laboratory animals. The animal is inoculated with the virus and then it is allowed to grow in the animal. The virus is harvested after the incubation period, which varies with the animal.

Typical lab equipment for virus production will include a bio-safety laminar airflow hood, an incubator, water bath, pipettes, disinfectant, centrifuge, refrigerator-freezer, cell counter, microscope, liquid nitrogen freezer, PPE and sterilizer.

In the case of bacteria or virus production, the primary hazard is becoming infected with a pathogen.

**Toxins** - Toxins are poisonous substances produced and derived from living plants, animals, or microorganisms, but which are not themselves alive and which cannot reproduce. Some toxins may also be produced or altered by chemical means. The toxic substance produced by living cells may in fact be a chemical but due to its biological origin it is classified as a biotoxin. Toxins may be countered by specific antisera and selected pharmacologic agents.

Toxins can also be a byproduct of a living organism. Botulinum toxin is produced by bacteria called clostridium botulinum and is one of the most toxic substances known.

Toxins may also be produced in illicit labs by extracting a toxin from a plant. An example is ricin. Ricin is an extremely toxic protein which can be extracted from the seeds of the castor bean plant. The beans are ground up and then chemicals are used to extract the toxin.
The equipment used in ricin extraction is more like a meth lab than a bacterial or virus production lab. The equipment includes: grinders, presses, solvents, pyrex glassware and milling equipment.

 Agencies which would have investigative authority in cases of possible biological weapons production could include local, county and state law enforcement agencies, Joint Terrorism Task Forces, and federal partners such as the Federal Bureau of Investigation. Type 1 Hazmat/WMD Teams and/or the Ohio National Guard Civil Support Team (WMD) should also be called to assist in assessing the incident, collecting public safety samples and identifying materials.

**Homemade Explosives Labs**

It is reported that at least 70% of all terrorist incidents involve the use of explosives. It is becoming more difficult to obtain commercial explosives for non-legitimate operations and therefore the production of homemade explosives is on the rise.

The ingredients to make homemade explosives are relatively easy to obtain, but the results are usually unstable explosives which are extremely sensitive and often detonate unexpectedly.

Homemade explosives can be made from many different chemical combinations, but they all contain an oxidizer and a fuel. One of the most common homemade explosives is a mixture of ammonia nitrate (an oxidizer) and fuel oil, which is commonly referred to as ANFO (Ammonium Nitrate Fuel Oil). ANFO was used in the first bombing of the World Trade Center in 1993 and the bombing of the Murrah Federal Building in Oklahoma City in 1995.

Examples of common oxidizers include: hydrogen peroxide, potassium or sodium chlorate, potassium perchlorate, sodium chlorite, nitric acid, sulfuric acid, potassium permanganate, ammonium nitrate and nitro-methane.
Examples of common fuels include: fuel oil, diesel fuel, acetone, petroleum jelly, methyl ethyl ketone and hexamine.

Other precursors used in homemade explosives include: food powders, such as black pepper, powdered sugar, cumin, coffee and flour, powdered aluminum, ethylene glycol, glycerin, acids, red phosphorus and powdered magnesium.

Common equipment which can be found in homemade explosives labs includes: grinders, mixers, dust masks, gloves, acid aprons, ice baths, distillation glassware and filters.

**Tri-acetone Tri-peroxide (TATP)** - This is an example of an explosive which has been produced in illicit labs. It was used as the primary explosive in the Richard Reid “Shoe-bomber” incident in 2001 and in the Christmas Day “Underwear Bomber” incident in Detroit in 2009. In both cases the bombers attempted to use TATP to detonate PETN as a secondary explosive. PETN is a commercial grade explosive. TATP is very unstable. It is shock, friction and temperature sensitive.

**Hexamethylene tri-peroxide di-amine (HMTD)** - Another example of a high explosive produced in clandestine labs. It is produced from camp stove fuel tablets, hydrogen peroxide and citric acid. It was one of the explosives used in the London subway bombings in July 2005.

One of the signatures of a homemade explosives lab is the presence of ice baths to slow and to reduce the heat generated by exothermic reactions. Few other labs use ice baths as part of their production process.

In addition to the materials used to make the explosive, these labs may also contain bomb making materials, such as cell phones, wires, timers, switches, power supplies, blasting caps, det-cord, pipes, shrapnel and recipes.

Agencies which would have investigative authority in cases of possible homemade explosives labs would include the Federal Bureau of Investigation, the Federal Aviation Administration, the Transportation Security Administration, other federal and state law enforcement and fire departments.
explosives production could include local, county and state law enforcement agencies, Joint Terrorism Task Forces, and federal partners such as the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and Federal Bureau of Investigation. Local Bomb Squads, Type 1 Hazmat/WMD Teams and/or the Ohio National Guard Civil Support Team (WMD) should also be called to assist in assessing the incident, collecting public safety samples and identifying materials.

Planning the Response

When you have responded to an incident where you discover precursors and/or other items which make you suspicious that it may involve an illicit lab, you should carefully withdraw from the incident scene to a safe distance and develop a plan for continued operations. This plan should include notification of other appropriate agencies such as fire service, law enforcement, Type 1 Hazmat/WMD Teams, Bomb Teams, FBI, ATF, DEA, Narcotics Task Force, Joint Terrorism Task Force and/or the Ohio National Guard Civil Support Team (WMD).

If you are responding to a lab at the request of one of these agencies, be sure to report to the incident commander on arrival and to determine what your role will be at the incident. Be sure to advise the IC of your level of training and if you have the appropriate equipment to carry out your assignment. It is important that you and the IC understand the First Responder Operations Level personnel should be working under the supervision of a Hazmat/WMD Technician or allied professional who is trained in illicit lab operations.

The Incident Commander should work with all the responding agencies to develop and implement a plan for collecting evidence and mitigating the hazards of the incident. This plan will focus on life safety, followed by stabilizing the incident and finally on preserving property and the environment.

Most plans will include the following:

Establish Incident Command/Unified Command – Determine who will have ultimate authority for this situation. Once it is determined which agency has investigative authority (a task which should be preplanned in advance) for this incident, the other agencies will coordinate their operations to support that agency.
Securing the Scene - If lab operators or other suspects are still be on the scene, law enforcement should be tasked with apprehending the suspects. The possible presence of booby traps and weapons should be considered as the plan is developed. In many cases SWAT teams may be assigned the task of securing and/or clearing the scene.

Preserving Evidence - Law enforcement will be tasked with securing the scene and preserving evidence. The lab and surrounding area are part of a crime scene. It is important to preserve the evidentiary value of items at the scene and to prevent the contamination of the scene with outside materials. Law enforcement officers will establish an entry log and control access and egress from the site. Law enforcement will also establish a chain of custody for all items collected at and/or removed from the scene.

An entry log is established to document all personnel entering the scene, what time they entered, what time they left, and their reason for entering the scene. Documentation should also be maintained on all site activities and compiled for use in the incident report and for evidentiary purposes.

Site Safety Assessment - The hazmat team and the bomb teams should be assigned to conduct site safety assessments. Both teams should recon the site and identify potential hazards. The bomb team will assess the scene for energetic materials, including explosives and incendiary devices.

Atmospheric Assessment - The hazmat team will assess the atmosphere with air monitoring instruments and detection equipment. They should assess the atmosphere for pH, flammability, toxicity and radiation. Both of these assessments will help determine if it is safe for other personnel to process the crime scene.

Mitigate the Hazards - If hazards are found, the specialty teams will attempt to mitigate the immediate hazard while preserving the evidence at the scene. This can be very dangerous in an operating lab. This task may need to be mitigated by Hazmat/WMD Technicians from specialty teams.

Hazards, Safety Procedures and Tactical Guidelines

Incidents involving potential illicit labs can involve hazards that are not found at traditional law enforcement crime scenes. Fire and EMS responders may
become involved with situations that we traditionally do not encounter. Some of these hazards include:

**Chemicals** - Including acids, alkalis, flammable liquids, corrosive gases and combustible metals

**Explosives** - Including materials which are extremely sensitive to heat, friction, shock and electrical stimuli.

**Armed Suspects/Victims** - Including those with meth paranoia

**Booby traps** - Including explosives, chemical weapons, incendiaries, trip wires, punji sticks, etc...

**Biological materials** - Which if released from their containers could cause fatal disease or illness

When working around the above hazards the following safety procedures and tactical guidelines should be considered:

**PPE** - Airborne gases may be contaminating the atmosphere in and around the lab, particularly in enclosed spaces, and may pose a respiratory or flammability threat. Initial tactical entry teams should consider respiratory protection and fire retardant outer garments (such as FR cotton or Nomex BDU’s).

Initial tactical entry teams should avoid the use of “flash bangs” in the lab as it could ignite a flammable gas or initiate an explosive

**Utility Control** - Tactical teams should avoid cutting off power and/or water to the lab, as electricity or running tap water can be in use in an operating lab to control chemical reactions. Cutting these utilities could result in an explosion or over pressurization

**Decontamination** - A plan for both emergency decontamination and technical decontamination should be developed prior to entry. The emergency decon plan may simply be to use the shower in the illicit occupancy. The technical decon plan may need to include the securing of weapons and deconning the perpetrators.

**Safety Sweeps** - Booby traps are not uncommon in meth labs and may be present in the other types of labs. All personnel should be aware of the potential for anti-personnel devices. Slow and methodical sweeps must be done during initial entry.

**Air Monitoring** - The air should be monitored for flammable and toxic gases prior to allowing personnel to process the lab and collect evidence. The air
should be continuously monitored until all materials are correctly contained. This is usually conducted by Hazmat/WMD.

**Proper packaging and storage** – The Department of Transportation has requirements for the marking, shipment and storage of hazardous materials. These regulations must be followed even if the material is being held as evidence.

**Personal Protective Equipment (PPE)**

It is important that all responders wear PPE which is appropriate for the specific hazards present at the scene and which is applicable to their role at the incident.

Law enforcement officers initially entering the lab to secure it will usually wear Police Tactical Gear, body armor and helmets. In many cases, air purifying respirators (APR) may also be worn. In this case the threat is from armed suspects, booby traps and respiratory hazards.

Law enforcement personnel, who are securing perimeters outside of the lab, will likely be in a lower level of tactical gear and will not be wearing respiratory protection.

Hazmat and Bomb Team personnel who will access the lab area for safety should be dressed in splash protective chemical protective clothing, including gloves, boots and self contained breathing apparatus (SCBA). They will use direct reading instruments to assess the atmosphere for chemicals as well as looking at the process to determine if any physical hazards exist. They will also be carefully checking for booby traps,

If booby traps involving energetic materials (explosives or incendiaries) are suspected, the bomb team will likely use remote controlled robots to further assess the situation. If this is not possible, a bomb technician may wear explosive protective clothing (a bomb suit or search suit) to approach the suspected device.

Law enforcement or hazmat personnel who process the lab will likely wear splash protective chemical protective clothing, including gloves, boots and self contained breathing apparatus (SCBA) or air purifying respirators (APR). They
will also wear multiple layers of gloves, so the top layer can be removed after each sample is collected so as to not contaminate other samples.

Personnel performing decontamination (usually fire service or hazmat team members) should also be dressed in splash protective chemical protective clothing, including gloves, boots and self contained breathing apparatus (SCBA) or air purifying respirators (APR).

Fire service standing by outside of the lab area should be dressed in structural firefighting protective clothing and EMS personnel in the standby area should be wearing gloves and masks for body substance isolation as a minimum. If EMS personnel will come in contact with contaminated victims or will assist with decontamination, then they should wear appropriate PPE designated by the supervising Hazmat/WMD Technician.

**Decontamination**

In many cases, the process used in the operating lab will produce airborne contamination which will contaminate other objects within the lab. This can include clothing, furnishings, wall coverings, pets and people.

The contamination could be wet or dry, and may not be visible to the human eye. It can be from chemicals or biological agents. These contaminants could cause acute or chronic health affects to people who are exposed to the agents.

In an effort to limit effects of contamination and thus reduce the need for decontamination, most responders utilize disposable chemical protective clothing for working inside the lab, but as mentioned above, some responders must enter in police tactical gear. Lab operators and others present in the lab may also have contaminants in their clothing and on their skin. Therefore, it is important to develop a decontamination plan.
Operations Level First Responders may be asked to assist with decontamination if they are appropriately trained and equipped.

The decontamination (decon) plan should be developed by the supervising Hazmat/WMD Technicians and should consider the following:

- Nature of the lab, what is being produced?
- What specific chemicals or biologicals are suspected of being present?
- Was the lab operating, in storage or in transit?
- Location of the lab, can it be ventilated, is it a confined space?
- Was the lab occupied?
- What will be the plan if an unexpected contamination occurs?
- What are the ambient weather conditions?
- What level of PPE will be required?
- Will decon be wet or dry?
- Are appropriate decontamination solutions available?

Some items, often including wall coverings, floor coverings and furniture, may not be able to be adequately decontaminated and will need to be disposed of by a licensed hazardous waste cleanup contractor. This is particularly true for cloth and leather items.

**Detection Equipment**

Following the tactical entry to secure suspects and the scene, it is often appropriate to send in Hazmat/WMD and Bomb Team personnel to conduct air monitoring in the lab and surrounding areas to determine what level of PPE and respiratory protection will be necessary to process the lab for evidence and sample collection.

The specific direct reading instruments selected by the supervising Hazmat/WMD Technician will vary with the type of suspected lab and intelligence available on the specific process. Some examples of typical direct reading instruments used in labs are:

- **pH paper** - to check the atmosphere for corrosivity as found in acid or alkali vapors.
**Multi-gas meters** – These will measure oxygen concentration in the air (usually as percentage), the lower explosive limit (LEL), carbon monoxide concentration in the air (usually as ppm) and hydrogen sulfide concentration in the air (usually as ppm). Sometimes other chemical sensors may be present.

**Radiological meters** – to check for the presence of radioactive materials.

**Photo Ionization Detector (PID)** - to check for volatile organic compounds and many toxic gases (usually in ppm)

**Colormetric Tubes** - to check for specific gases which may be present in a lab, ammonia tubes may be drawn to check for anhydrous ammonia gas in a suspected methamphetamine lab. Phosphine tubes for meth labs, since it is a by-product of hydriodic acid synthesis

**Oxidizer paper** – or Potassium iodide (KI) test strips may be used in a suspected explosives lab to test for oxidizer presence.

**M256A1** kits may be used to test for the presence of nerve agents, blood agents and vesicants in a suspected chemical weapons lab.

**Immunoassay test strip** – test for specific biological agents in the field. Many teams also use protein test kits and pH test kits for initial biological screening.

Depending on the safety of the lab and the likelihood of booby traps, these monitors may be sent in on a robot rather than hand carried by public safety personnel.

Many other direct reading instruments may also be used. It is important for you to understand the chemicals you expect to encounter in a specific type of lab and to test for their presence to ensure the safety of public safety responders working to process the lab.

**Remediation Plan**

Once the lab is finished being inventoried, photographed, sketched and processed for evidence, the lab will need to be dismantled. Items such as equipment and glassware may be retained as evidence, but chemicals are typically disposed of by a licensed hazardous waste contractor after evidentiary samples are obtained.
Part of the remediation plan will be identifying who this contractor will be. This is often determined in advance through a contract or bidding process. Check with the investigative authority to determine who will do the clean-up of the site. The clean-up contractor will identify and characterize the chemicals in order to sort them. The chemical containers are often over-packed into more secure containers to prevent spillage during transportation. The chemicals are usually taken off site for proper disposal.

In the case of an explosives lab, unstable chemical mixtures and homemade explosives may be too dangerous to transport and may need to be destroyed at the scene. Frequently this is accomplished by burning the explosives in place.

In the case of a biological weapons lab, it may be necessary to sterilize items at the scene due to the danger posed by transportation. In these cases, the building may be sealed and fumigated, or a liquid disinfectant may be used, based upon the suspected pathogen.

In all cases, the investigative authority should work with chemical and environmental experts, as well as health department personnel to develop a safe and effective plan to remediate the lab and affected areas.

**Implementing the Planned Response**

Once the plan is developed and approved by the Incident Commander, he or she will assign resources to carry out the plan. As identified previously, each agency will typically have a specific role and function within the plan. Joint agency crime scene operations require coordination of resources and activities.

Each person operating at the scene needs to keep safety in mind with each step of the process. It is important to understand how your role might affect others working at the scene and to coordinate all the activities for a safe and effective outcome.

Continual evaluation of the success of the plan is needed. If new information is discovered then the plan may need to be revised.

**Summary**

Illicit labs will continue to pose challenges to the safety of public safety personnel. Awareness of the hazards they pose and the steps necessary to secure, identify the type of lab, preserve evidence and protect the public are important to safe operations.
Rapid identification of the proper investigative agency and early establishment of a Unified Command System (UCS) will assist in the complex coordination of resources and optimize the opportunity to successfully prosecute the suspects involved.

Equally important is the safety of responders and the proper remediation of the lab site and surrounding areas.
Module 3 - Unit 8

Mission Specific Competencies:
Response to Illicit Laboratory Incidents
Review Quiz

1) Which of the following is not considered one of the 4 types of illicit laboratories?
   a) WMD Chemical manufacturing
   b) Drug manufacturing
   c) Veterinarian laboratory
   d) Homemade explosive labs

2) Which of the following would be a precursor of a drug manufacturing lab?
   a) hydrogen peroxide
   b) acetone
   c) hydrogen cyanide
   d) eggs

3) Which of the following would be a precursor of a WMD chemical manufacturing lab?
   a) hydrogen peroxide
   b) acetone
   c) hydrogen cyanide
   d) eggs

4) Which of the following would be a precursor of a Biological weapons production lab?
   a) hydrogen peroxide
   b) acetone
   c) hydrogen cyanide
   d) eggs
5) Which of the following would be a precursor of a homemade explosives lab?
   a) hydrogen peroxide  
   b) pseudo ephedrine  
   c) hydrogen cyanide  
   d) eggs

6) Toxins are considered to be?
   a) Chemical agents  
   b) Biological agents  
   c) Toxic Industrial Chemicals  
   d) Flammable liquids

7) TATP is?
   a) A chemical agent  
   b) A biological precursor  
   c) An explosive  
   d) A radiological isotope

8) Which of the below witnessed items is probably an indication that an illicit activity may have been discovered.
   a) 6 ounces of acetone is found in an unconscious female’s purse  
   b) A bottle of 3% hydrogen peroxide is discovered in a bathroom  
   c) During overhaul, 15 empty bottles of decongestants are found in the trash.  
   d) A 2 gallon can of gasoline is found in a garage.

9) Which federal agency usually works with local law enforcement to handle known illicit drug labs?
   a) DEA  
   b) ATF  
   c) FBI  
   d) ICE

10) The two types of decon discussed in this unit are?
    a) Hospital and emergency decon  
    b) Emergency and tactical decon  
    c) Emergency and technical decon  
    d) Equipment and mass casualty decon