MODULE 1b – SAFETY

OBJECTIVES

Materials: Power point projection system + screen

Time: 30 to 45 minutes

- **Terminal Objective**: The student will understand the importance of including sound safety practices in all phases of the planning and rescue operations.

- **Enabling Objectives**: At the conclusion of the lesson, the student will:

  - Understand the importance of safety during all phases of a mission
  - Understand the importance of recognizing and mitigating safety hazards
  - Understand the importance of incorporating safety into rescue planning and briefing
  - Adopt and employ the concept of "LCES" (Lookouts, Communications, Escape routes, and Safe zones)
  - Be able to perform a risk hazard analysis for a specific event and suggest actions to minimize risks and/or eliminate hazards
  - Understand issues related to personal and team security zones, as a planning tool.
  - Understand the importance of safety risk and hazard identification

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INTRODUCTION

Search and rescue is one of the most dangerous types of emergency response activities that can be performed. It exposes the team members to many hazards for which they have little training and virtually no experience to combat. The application of the most current SAR techniques and safe methods of operation are vital to the accomplishment of that mission. Hence the reason for this course.

- Safety is a very situation dependent issue.

- Safety is most importantly an attitude. It becomes a balance between accomplishing the task in the shortest possible time and minimizing the risk associated with the task.

- The most effective path is generally the one which expedites the operation AND provides accepted safety practices. This allows the victim to be rescued in a timely manner and the rescuers to return from the task unharmed. Keep in mind that when the team deploys, the Rescue team will face the probability of many challenges and multiple rescues over extended periods of time. So, stay healthy, share lessons learned and be safe.

MISSION RESPONSE OPERATIONS

- Risks and Hazards

  Response team personnel conducting SAR and support activities are exposed to many risks and hazards including, but not limited to:
  - Damaged infrastructure
  - Air transportation
  - Secondary collapse from aftershock, vibration, and gravity, and explosions.
  - Unfamiliar surroundings
  - Unstable structures
  - Fall or tripping hazards
  - Falling material or flying objects
  - Exposure to Haz Mat
  - Decontamination
  - Exposure to smoke, dust, etc.
  - Fire and explosion
  - Excessive noise

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- Risks and Hazards (continued)

  - Electrical hazards
  - Confined space operations
  - Oxygen deficient atmospheres
  - Contaminated air and water
  - Electrocution from damaged utilities
  - Dangerous equipment
  - Armed thieves and looters
  - Fitness for duty
  - Excessive fatigue, sleep
  - Food services
  - Adverse weather
  - Stress
  - Security
  - Safety equipment
  - Escape routes
  - Safety zones
  - Personal hygiene
  - Hydration

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SAFETY PLANNING

The multi-hazard safety plan is a guide to the basic elements of safety for a variety of incidents. The acronym is **LCES**, which stands for **L**ookouts, **C**ommunications, **E**scape routes, and **S**afe zones. In any operations scenario these areas must be addressed to insure the safety and accountability of all response team members.

■ L – Lookouts

This is normally the function of the dedicated Safety Officer. That person is the objective observer not involved in the "hands-on" portion of the operation. They are free to watch over the entire operation identifying potentially dangerous situations and mitigating them before they become disastrous.

- Several categories of Safety Officer exist.
- One is the overall Safety Officer for the response team.
- A second is a site specific Safety Officer may be a person or team assigned to a single location to monitor the existence of a special hazard.

    - Some examples of the latter might be one person designated to stand guard over an electrical box while rescue workers operate in a confined space; or a two person team tasked with hiking up slope to serve as early warning for rescuers working below a dam during earthquake aftershocks.

- Safety Officers or Lookouts work from a position of safety and clear visual access just outside of the direct work area.

    They should not become involved with the actual "hands-on" portion of the operation. To do so would possibly limit their ability to be that objective observer capable of identifying hazards.

    They should be readily identifiable to all, by their radio designation and by wearing a Safety Officer vest or in a small group identified during the safety briefing.

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SAFETY PLANNING (continued)

■ L – Lookouts (Continued)

- Team members tasked with this responsibility must resist the temptation to become involved in the tactical operations itself. This requires extreme self-discipline. Remember though that the direct success of the mission depends upon the ability to counteract hazards before they become problems.

■ C - Communication

The formal communications plan will be developed by the Communications Specialist. This plan will identify the Command, Tactical, and Special radio channels. These are the operations personnel's lifeline to the outside for resources, support, and safety. This plan will be provided as part of the Response Team Action Plan.

- The following Emergency Alerting System is to be used in the event of problems at the work site:

  - Evacuate -3 short blasts (1 second each)
  - Cease Operations - 1 long blast (3 seconds duration)
  - Resume Operations -1 long and 1 short blast

- The method of delivery may vary depending upon the device available.

As an example, by placing two radios together, speaker to microphone, and depressing the transmit buttons a loud tone is heard on all other radios tuned to that frequency.
Air horns, car horns, whistles, the P.A.S.S. device and clear text over the radio are all excellent methods for signaling.
The point is that during the safety briefing, before beginning to work, identify the specific methods of signaling that will be used at the work site should a problem arise during that operational period.

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SAFETY PLANNING (continued)

■ E - Escape Routes

An escape route is a pre-established path to an area of safe refuge.

- The safest method of exiting an area may not be the most direct route.

  As an example, after an earthquake structural columns may still be standing but subject to collapse during an aftershock.

  The most direct route to safe refuge may lie directly in the collapse path of the column. The route giving the column a wide berth will be the safest.

  Another consideration is to remain in place. If the working area has been shored and leaving this area exposes the rescuer to a variety of hazards, stay put.

- The rescue situation if often dynamic, constantly changing. This can occur as a result of external forces or as a result of the rescuer's action. The escape plan should be constantly updated to reflect changes in situation.

  - As a new plan is developed, each team member must be made aware of the change in operation. An acknowledgement of understanding must also be received from each team member.

  - If the order is not repeated, the new plan is probably not clear to each member of the team. The result can be injury or death.

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SAFETY PLANNING (continued)

- **S - Safe Zones**

Safe zones, also referred to as “safe havens” are the pre-established areas of safe refuge, safe from hazards. This could be a designated area outside the hot zone or agreed upon safe areas within the hot zone. If the safe zone is within the hot area, rescuers may have to construct that area around the victim and for rescuers themselves.

- An example of this is when a victim is trapped inside a collapsed structure and rescuers crib and shore the immediate area. In this case, the proper response for rescuers would be to hold their position during an aftershock.

- Part of the Safety Plan should provide for a designated Safe Zone where a team “head count” is taken. This count should be immediately communicated to the next in the chain-of-command to provide for 100% accountability in the event of an emergency.

CHAIN-OF-COMMAND

- Consult the Response Team Organization chart for chain-of-command. This chart will list the entire team and who reports to who.

  The Rescue Specialist will report to the Rescue Squad Leader, who reports to the Rescue Team Manager, who reports to the Task Force Leader.

- The Safety Briefing will identify who is in each Rescue Squad and who is designated as Rescue Squad Leader.

  The Safety Briefing will be given by the Rescue Team Manager or they’re appointed Squad Leader. Managers and Leaders for support functions will also be identified at this time. This is the Rescue Specialists’ opportunity to identify the entire team for the next operational period.

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IDENTIFY THE SAFETY OFFICER

- The Safety Officer for the operational period will also be identified. This will leave no doubt as to who is filling that position.

  The Safety Officer will also pass on information from the previous operational period that they have received from the Safety Officer that they have relieved.

SAFETY PLAN (LCES)

This portion of the Safety Briefing will cover Lookouts (or Safety Officer), Communications, Escape Routes, and Safe Zones. This information will be developed by advance recon of the work site by Team Managers or will be passed on from the previous teams operation.

- As this is a dynamic process, once the response team has arrived at the site another assessment should be made.

  If there are any changes to the Safety Plan, it should be modified then and all team members must acknowledge those changes. Those changes effecting the entire operation should be communicated up the chain-of-command immediately; those that are site specific can be passed on to the next operational team.

- The Safety Plan will review the signal for immediate evacuation, cease operations, and resume operations. It will also identify the area designated for the head count in case of emergency evacuation.

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RISK ASSESSMENT COMPONENTS

- Damaged infrastructure (infrastructure, including communications, roadways, bridges, railroads, air traffic control)

  - Assume all infrastructure has been compromised even though prior intelligence may have stated otherwise. Although telephone and cell systems may have survived the disaster intact, they will soon be overloaded by responder and/or public demands.

  - Traffic congestion will always occur following a disaster. The affected public will be evacuating the area as responders are moving toward the disaster.

  - US&R vehicles must be clearly marked and warning lights should be used to facilitate arriving at target sites. Assessment vehicles must be equipped with four wheel drive. Standard vehicles will have difficulty traversing terrain while getting to and around work sites. Consider using ATVs as mules.

- **Air transportation**

  - One method of travel frequently used by response teams is helicopter. A word of caution: be sure to receive a pre-flight safety briefing before boarding and follow instructions furnished by the pilot or loading supervisor.

  - Remember, following a disaster unusual hazards may exist that the pilot may not be familiar with. Unsafe acts on the part of the pilot and crew can also be a problem.

  - Some of the issues to be concerned with include overloading, proper clearances for takeoff and landing, rotor wash, security around the helicopter, and adequate intercom capabilities so that team members can communicate during flight. Example: Philippines Assessment Flight.

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RISK ASSESSMENT COMPONENTS (continued)

- Ground Transportation

  Response teams, in general have a long ways to go towards understanding and following good safety practices when utilizing ground transportation. Pay special attention to the following issues:

  - Never transport personnel and equipment on a open vehicle
  - Provide safe-seating for all personnel
  - Never drive and navigate at the same time
  - Cover tools and equipment for security purposes
  - Familiarize team with assigned vehicle
  - Conduct maintenance checks each day
  - Maintain adequate fuel levels.
  - Travel in convoy when possible.
  - Properly identify vehicles
  - Red tag unsafe vehicles

- Secondary collapse from aftershock, vibration, gravity, and explosions.

  - With the constant threat of terrorist attacks it is essential that response teams pay special attention to a very new and potentially deadly threat. Secondary explosions are becoming common techniques used to cause serious injury and possibly mass death for response teams.

  - Every one has to heighten their awareness to their surroundings. There are no second chances when explosions are used for this purpose. It is safe to assume that a secondary devise is involved, unless proven otherwise.

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RISK ASSESSMENT COMPONENTS (continued)

- Earthquakes aftershocks

  - Severe after shocks following a major earthquake are common and can create additional injuries and fatalities.
  - Unstable structures including bridges, overpasses, high rises and water towers may suffer further collapse as a result of after shocks.
  - First responders must be constantly aware that they may be effected by such events and take necessary precautions while conducting their operations.
  - Many injuries and deaths of first responders could be prevented if more precautions against additional shock waves were taken.

- Unfamiliar surroundings

  - Traffic directional signs and other land marks may not survive the disaster impact. Traditional road maps not be valid following a major disaster. Extra care to avoid accidents must be taken because the “new” landscape is distracting and may be confusing.

  - Team members should not conduct assessments and drive a vehicle at the same time. A designated driver with no other responsibility must be assigned to provide transportation for the team.

- Unstable structures

  - Injuries to emergency responders, in many cases, are the result of falling debris and compromised surfaces. Team members must take extra precautions to minimize injuries by wearing the required safety gear when working in the affected area. An injury during the mission becomes a team liability, which may prevent the completion of the entire assessment task.

MODULE 1b – SAFETY

RISK ASSESSMENT COMPONENTS (continued)

- **Fall or tripping hazards**

  Trip hazards are a common cause of falls resulting in injuries. This problem or hazard is commonly found in the Base of Operations (BoO) and work site. In most cases these problems can easily be mitigated once identified. Some common trip hazards are:
  - Downed wire
  - Electrical cord
  - Holes
  - Uneven sidewalks/roads
  - Protruding rebar, etc

- Falling material or flying objects

  - Displaced material may be everywhere - after shocks or winds may cause displaced objects to become airborne.

  - Eye and head protection are essential. Eye injuries are especially painful and immediate treatment will be required to prevent further injury. Eye and head injuries are a liability to the team and may even require aerial medical evacuation.

  - Contact lenses wearers are especially vulnerable. Responders with contact lenses should bringing an extra pair of glasses.

- Exposure to Haz Mat

  - There is a significant risk of exposure to hazardous material during the mission. There are two kinds of exposure to be consider prior to entering the impact area: direct exposure from an area that has been contaminated and indirect exposure from moving water or a cloud/vapor plume moving through or beyond the impact area.

  - Most facilities (major targets) such as hospitals, labs, universities, manufacturing plants and warehouses have a broad array of hazardous material on site. Other major sources of hazmats are underground pipe lines, railroad cars, and trucking companies. Displaced power line transformers may also pose a significant risk to assessment teams.

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RISK ASSESSMENT COMPONENTS (continued)

- Decontamination

  - When initiating patient care or working around body fluids, use all proper protective equipment.
  - This includes at least gloves, mask, and eye protection.
  - The Team member should remove gloves carefully in order to prevent contamination.
  - All medical waste should be properly disposed of in devices such as sharps containers and BioHazard bags.
  - If possible, wash hands thoroughly after each victim contact.
  - Clean all equipment not discarded as soon as possible. Ensure canine are decontaminated.

- Electrical hazards

  Response teams have to be especially aware of electrical hazards that are commonly found during disaster response operations. There are many electrical related fatalities associated with disaster response operations. Some of the things to consider are:
  - Re-energizing power grids
  - Improper electrical cord for current requirements
  - Jury rigged connective boxes
  - No weather protection
  - Power line back feed (generators)

- Confined space operations

- Oxygen deficient atmospheres

- Contaminated air , water, and fuel

  Contamination of air, water and fuel sources following a disaster is likely. It is best to assume contamination has occurred until proven otherwise. Ensure that you have an adequate supply of water and fuel before entering the affected area. All response teams should have water purification units as part of their cache.

- Dangerous equipment (i.e. cranes)

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RISK ASSESSMENT COMPONENTS (continued)

- Fitness for duty

  - Fitness for duty is a sometimes sensitive subject , especially when there is no national standard for response teams.

  - The better physical and mental condition that a team member is in prior to deployment, the better the individual will be able to perform their duties during extended operations.

  - Many of our response team members return home after a mission run down and very ill. This problem can be minimized by improving our fitness level.

  - Some disaster environmental issues to prepare for are:
    - Working at heights
    - Extensive climbing
    - Prolonged heavy lifting
    - Confined space
    - Transversing on unbalanced objects

  - A critical issue to remember is that the adverse effects of drugs and alcohol consumption will interfere with sharp motor skills.

- Food services

  - Response team members need to be aware of diets and food preparation in the disaster environment. Our ability to preserve and process food in the field is very basic.

  - Perishable foods need to be continuously monitored to ensure freshness. Spoilage in hot moist climates can happen surprisingly quickly.

  - Special precaution for monitoring food stock has to be followed. There is nothing more dangerous than a stale sandwich made using mayonnaise.

  - Consider using freeze-dried products whenever possible.

RISK ASSESSMENT COMPONENTS (continued)

MODULE 1b – SAFETY

- Food services (continued)
    - Civilians, with good intentions, will donate food to team members. Watch out! The consequences may be dysentery or food poisoning.
- Adverse weather
    - It is essential that you are prepared for any kind of weather change prior to leaving your point of departure. A weather change that the team is ill equipped to handle could jeopardize successful and timely completion of the mission.
    - Rain and cold weather gear, as well as appropriate amounts and types of clothing are required for all deployments. Wet and cold conditions could cause illness or injury among team members which would interfere with completing the assessment.
- Security
    - Don't always count on a disaster area being secure. In many cases one may find civil disturbance is jeopardizing response initiatives which further complicates the mission. These areas must be avoided until conditions are sufficiently safe for team members to perform their tasks.
    - Area security is a State/local government's Responsibility. In some cases, police escort may be necessary. Again, in these situations, uniformed personnel may be targeted by undesirables seeking to take advantage of the damaged infrastructure.
    - The work site may be a target of armed thieves and looters. Individuals may represent themselves as local rescue workers and blend into the operation. Watch for suspicious behavior.
    - Irate relatives may also be present. Emotions may be high and abnormal behavior can occur. Look out for potential hostile situations.

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RESPIRATORY PROTECTION

Protect the airway. Concrete dust when inhaled is an irritant to the alveoli of the lungs. When this membrane becomes irritated fluid is secreted to protect the lining of the lungs.

Unprotected rescuers and patients can contract pneumonia as a result of inhaling these particles.

Doctors have calculated the danger of inhaling small amounts of toxic materials (i.e., asbestos) over years, however they cannot predict the danger associated with inhaling large quantities over a short period of time. Don't take the chance, protect your airway.

The following is the description, function, and limitations of the respiration protection devices available to the Rescue Specialist:

- Dust Mask

  Simple paper or cloth mask which fits over the mouth and nose to filter out non-toxic particles will **NOT** filter out toxic materials and cannot be used in toxic environments or in an oxygen deficient atmosphere where the oxygen level is less than 19.5%.

- Respirator

  Mask normally made of plastic which depending on design fits over the mouth and nose or has a face piece design which covers the entire face. With appropriate filters the respirator can filter out some, but not all toxic particulates. It cannot be used in an oxygen deficient atmosphere where the level is less than 19.5%.

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RESPIRATORY PROTECTION (Continued)

- Self Contained Breathing Apparatus (SCBA)

  SCBA supplies air to the wearer for a limited amount of time, from 10 to 40 minutes. It can be used in toxic and oxygen deficient environments. The SCBA face piece covers the entire face as well as the mouth and nose. SCBA is bulky and can be difficult to use in confined spaces. When low on air, the bottle must be recharged or replaced. SCBA is portable to the rescue site and is not tied to an external air source.

- Supplied Air Breathing Apparatus (SABA)

  SABA supplies air to the wearer for virtually unlimited amounts of time via an air source (large bottles or compressor) outside the area of use. It can be used in toxic environments as well as oxygen deficient atmospheres.

  The air is supplied from the source through a supply line, through the regulator where the pressure is reduced, and to the rescuer who wears an SCBA style face piece.

  The rescuer also carries a small emergency air supply tank in case of emergency. This emergency supply is rated at 10 minutes, but may only deliver from 2 to 3-1/2 minutes of air depending upon the exertion rate of the wearer.

  SABA is not as bulky as SCBA and is easier to use in confined space, but the rescuer is limited in distance by the length of line and most importantly time to escape in the event the emergency air supply is needed.

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RESPIRATORY PROTECTION (Continued)

- Supplied Air Breathing Apparatus (SABA) (Continued)

  For confined space entries, SCBA or SABA will be used if atmospheres are toxic or the oxygen levels are below 19.5%. Also the rescuer should never place themselves in a position where they remove any portion of the breathing apparatus to get closer to the victim. Removing any portion of the breathing apparatus may cause the seal of the face piece to be broken, even just for seconds, causing severe consequences.

- Monitoring Devices

  Ensure that appropriate monitoring equipment is available and utilized to support on-site operations including:

  - atmospheric monitoring devices for checking toxic and oxygen levels
  - Structural stability monitoring equipment for determining movement of building.

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RESCUE TOOLS AND EQUIPMENT

All rescue tools should be operated and maintained in accordance with the manufacturer's guidelines. The maintenance should be documented. Many of these tools are dangerous in that they cannot distinguish the rescuer from the material to be cut, broken, crushed, bent, folded, spindled or mutilated. Always operate tools with respect.

- The Rescue Specialist should only use tools that they have been properly trained to use. Some on-the-job training may occur out of necessity; when this happens always emphasize the safety aspects of the operation. Use tools only for their designed purpose. Failure to do so will add a victim to the rescue and take a tool out-of-service.

- Anticipate the consequence of your actions. Observe those around for your safety as well as theirs. Turn off tools when not in use and store them in a tool staging area or return them to Logistics in Base. A cluttered work site will lead to tripping hazards and damaged tools.

- Light dim or dark areas during rescue operations to ensure proper operation of all tools and equipment. Protect personnel from electrical shock hazards. Fuel gasoline or diesel powered equipment in a designated safe area, away from operations. Whenever possible, rotate rescue tools to provide for on-site inspection and maintenance.

- Provide hearing protection to rescuers and patients to protect them from excessive noise levels (greater than 90 decibels). Provide patients with helmet, goggles, blanket or other protection when necessary. Advise patients of your operation before starting. This will help prepare them for what will follow. Allow patients the ability to participate in their own rescue, do not treat them like a rescue manikin. Do not be surprised if the patient comes up with a better suggestion for own rescue. They are a captive audience and subject to your plan, but some do know their immediate position better. From that perspective, their input may be invaluable.

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SAFETY EQUIPMENT

- All response team members must take personal responsibility to ensure that when they are deployed they have appropriate safety equipment assigned to them.

- You are responsible for the accountability of such property. The response team equipment cache may have additional equipment and supplies for expendable items.

- The following items, at a minimum, should be with the team member at all times:
  - Safety boots
  - Respirator
  - Helmet/Headlamp
  - Spare batteries
  - Ear & eye protection
  - Gloves
  - Protective clothing
  - Radio (optional)

PERSONAL HYGIENE

- Maintaining good personal hygiene is critical during disaster response operations.

- Having adequate changes of clothing is essential for maintaining good health practices.

- Exposure to unhealthy situations is an inevitable part of disaster response but it is the team member's responsibility to take extra precautions to minimize the exposure.

- Special consideration should be given to the following:

  - Feeding and hydration at the BoO and at the work site.
  - Keeping sleep and rehab areas free of unnecessary negative health exposures.
  - Hand wash stations where ever possible.
  - Canine relief and rehab areas established and enforced.

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HYDRATION

- Ensure all team members are following appropriate hydration practices.

- An ample amount of fluids should be readily available at all facilities including:
  - BoO
  - Work site
  - Command Post
  - Rehab area
  - Transport vehicles

- Avoid the use of carbonated drinks. Stay with water and juices if possible.

SAFETY CONCERNS DURING MOBILIZATION

- **Safety concerns during mobilization** include:

  - Assessment of their current physical fitness.
  - Successful completion of a current physical examination.
  - Current health assessment
  - Proper inoculations.
  - Appropriate personal safety equipment on hand.
  - Adequate prescription drugs

RESPONSE TEAM WELFARE CONCERNS

- A long hour, multiple days operation soon leads to fatigue and increases the chances of injury to team members. Proper shift length needs to be enforced and appropriate rehab facilities should be provided if possible. These facilities (i.e. tents, bldgs) should be inspected to ensure quality rest can be obtained. Some things to consider are:

  - Individual sleep habits (snoring or talking in sleep)
  - Barking canine
  - Pagers/cell phones
  - Aircraft overflights
  - PA systems
  - Noise from generators