

Chapter 1: Gear and Clothing

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1. GEAR AND CLOTHING - INTRODUCTION

Scenario: During a search in New Mexico, a searcher may be asked to hike up to ten miles on a search lasting one operational period (up to 12 hours) in an unfamiliar area on flat or in mountainous terrain, at temperatures between 10 and 110 °F, at an altitude between 3,000 and 10,000 feet. This means that, a searcher must be prepared for anything!

Many factors affect your decision about what gear to carry and what clothing to wear on a specific mission. These include weather (current, predicted, and possible), terrain, the number and possible condition of subjects, the length of time you may be in the field, and what you need for your own comfort and safety. The limits to what you can carry are how much your pack will hold, the weight you can safely and comfortably carry, and common sense.

The minimum survival gear required for search and rescue missions is spelled out in the gear and clothing lists below. Each person on a search team must carry all of the gear on the list. In addition, the team should share the weight of items such as radios, stoves and fuel, cook kits (or at least cups that can be heated), medical supplies, and shelter (see the last section of this Chapter). Remember, always know how to use your gear and equipment before you go out into the field.

Most search areas are isolated, so you must supply your own equipment, food, and water, especially at the beginning of a mission. As a mission lengthens, some supplies may be brought out to teams that have stayed out in the field, if necessary. If in doubt about whether to bring specific equipment, bring it to Incident Base and decide there what you need to take into the field.

Each searcher must carry personal drinking water. All water from streams, rivers, or lakes in New Mexico most likely carry Giardia, a micro-organism you do not want in your system. Giardia causes diarrhea, stomach cramps, nausea, and other gastro-intestinal symptoms. These symptoms can lead to dehydration and weight loss. (Should you have to use water from these sources, purify it with iodine or use an appropriate filter. Also, water may be boiled for 30 seconds per thousand feet of elevation above sea level.)

Remember, weather changes quickly, and you need to be prepared to protect yourself from almost anything. A search route may not end up as planned – you could be diverted to another area because of clues, to help with an evacuation, or to support another team. What appears in

Incident Base to be a straightforward route requiring four hours to cover can turn into an overnight trek at a moment's notice. Be prepared!

2. GEAR AND CLOTHING LISTS

These lists are intended to cover only the basic survival equipment needed to respond to SAR missions. Detailed descriptions of all items follow in Section 3. (Unless otherwise noted, you should bring all these items with you to the Certification session.)

Clothing

- Sturdy hiking boots
- Sturdy work gloves
- Head cover(s)
- Gloves and/or mittens
- Socks (and extras)
- Inner layer (basic underwear, long underwear – bottoms and tops)
- Middle layer(s) for warmth (bottoms and tops)
- Outer layer for wind and water protection (bottoms and top with hood)

Note: Although cotton and cotton-blend clothing may be included in a summertime pack, each candidate for Certification must also have non-cotton/cotton blend clothing layers (inner, middle, and outer layers) as described in this Chapter.

Gear

- Pack or container to carry/hold the required gear and clothing
- Eye protection
- Food for 24 hours
- Water (2 quarts minimum)¹
- Knife
- Fire starter
- Compass with 5 degree accuracy²
- Map of search area³
- Whistle
- Signal mirror⁴
- Light source (flashlight or headlamp, plus extra batteries and replacement bulbs)
- Personal first aid kit
- Space blanket
- Pencil or pen and paper
- 20 ft of 1 inch tubular webbing

1 Only the water containers need to be brought to the Certification session

2 Military or lensatic compasses are not acceptable

3 A map does not have to be brought to the Certification session

4 Glass or mil-spec plastic with mesh around sighting hole

3. CLOTHING

Sturdy Hiking Boots

Hiking boots are designed for walking long distances over rough terrain. Work boots or cowboy boots are not suitable. Even horseback riders wearing boots with heels need to have another appropriate hiking pair in their saddlebags, just in case. Searchers in vehicles and those flying in aircraft during a mission should also be prepared for an unexpected hike.

Considerations when choosing hiking boots include comfort and fit, ankle support, and sole thickness. Boots should be waterproof as well. (Remember, try on boots with the socks you will wear on a mission.) Leather boots will keep out cactus spines that the lightweight uppers, such as Gore-Tex or Cordura on many popular (and expensive) hiking boots, will not. A sturdy leather boot will also protect your feet from the sharp rocks found in desert areas and lava fields.

Sturdy Work Gloves

Leather or leather palmed gloves are recommended for protection when traversing steep or brushy terrain, for assisting with a rope rescue, or when carrying a litter. These work gloves are not a substitute for the gloves required for warmth.

Head Cover(s)

As the saying goes, "If your hands or feet are cold, put on your hat"; because most body heat is lost through the head. Be sure your hat protects all of your head (no 'visors') and can shade your face, ears, and neck from the sun. Hard hats are vital when doing any rock work, when performing a cave rescue, or any time you are around a helicopter. Wool and synthetics work best in cold weather.

Gloves and/or Mittens

Hands typically will be warmer in mittens than in gloves because the bare fingers keep each other warm. Layers often work well to keep your hands warm and dry. Wool and synthetics, possibly with a wind/waterproof shell, work best.

Socks

Cotton socks are not suitable for hiking, even in the summer. They are more likely to cause blisters and they conduct heat out of your feet when wet – a possibly serious situation if you must spend a cold night out. Wool is very comfortable, gives good cushioning, stays warm when wet, and dries quickly. Polypropylene works well, but it is better as a thin inner sock than as a thick outer.

An ideal hiking sock combination is one inner pair of thin nylon, polypropylene, silk, or wool, and one outer pair of medium weight wool (hiking sock thickness). A second set of clean dry socks in your pack (in a plastic bag to keep them dry) is required.

Layers

Layering is a basic principle used for search and rescue clothing. It gives you the flexibility to adapt to changing weather and differing activity levels by allowing you to remove or add clothing. It is best to have many layers to mix and match to get just the right comfort level in different conditions, especially when hiking.

The trick is to keep warm enough without sweating and getting wet from the inside out. The layers include an inner layer (basic underwear and long underwear), warm middle layers, and an outer layer for wind/water protection.

Anywhere in New Mexico, at any time of year, you may need to protect yourself from hypothermia, a serious decrease in body temperature at which normal muscular and cerebral functions become impaired. (See a more detailed explanation of hypothermia in *Chapter 3: Safety in Search and Rescue*.) Even though you may be part of a four-wheel drive or horse team and believe that you will never be on foot, unexpected things happen. This Certification Program is based on the principle that all searchers must be prepared for the unexpected.

To pass the gear and clothing check section of this Certification, you must:

- Have silk, synthetics, or wool for the inner layer (next to your skin),
- Wool or synthetics for the middle (warm) layer, and

- A breathable wind/water protective outer layer.

You may have cotton/cotton blend for hot/dry weather, but you must be able to replace it with non-cotton/cotton blend clothing if it gets wet.

Inner layer

Wool is a wonderful material for the inner layer. It keeps its warmth when wet, is durable (especially in a blend with a little nylon, which also foils moths), and is relatively inexpensive. Polypropylene (polypro), Capilene, Thermax, Polartec 100, and others are called 'hydrophobic' materials (water-hating). They are almost as warm as wool, wick perspiration away from the body better than wool, and dry quickly. Polyester works also and is inexpensive. Silk, while expensive and significantly less warm than wool, both wet and dry, is acceptable, and is often used as a layer under wool.

If these materials are not used as an inner layer (including using these materials for your basic underwear) you could find yourself in a life threatening situation if you get wet and the temperature drops.

Remember, wet cotton/cotton blend clothing (even just damp from perspiration) must be removed before any dry layers are added. Otherwise, the inner layer can set up a hypothermia situation that endangers you and the whole team. If it is cold enough to need long underwear, it is too dangerous to be wearing cotton/cotton blends next to your skin. You can purchase Cool-Max, polypro, and silk t-shirts which are comparable in coolness to cotton/cotton blend t-shirts, but which do not need to be removed when layers are added.

Middle layer

The middle layer (for warmth) can be wool, polar fleece, and other synthetics. Acrylic knits (e.g., Orlon) are inferior but acceptable. Down loses its loft when wet and is then useless to provide warmth, so do not depend on just a down parka to keep you warm. You should have several middle layers (only one is required for this Certification) of different weights, instead of one very warm layer; this allows for even more layering as the temperature and your activity level changes.

Outer layer

The outer layer should be appropriate to the weather. A hooded, unlined (so you can use it in the summer) shell with lots of large, weather-proof outer pockets, some inner pockets, and a full two-way zipper with a weather flap is the most versatile. The shell should be loose fitting for freedom of movement and should extend down past the hips. Zippered vents under the arms are useful for ventilation. Wind, waterproof, and breathable pants are best for full protection against the wind and weather. Ideally the pants should have a two-way full-length zipper down the outside of the legs or at least a zipper part way up the leg.

A waterproof rain covering that is not breathable (a poncho, for example, of coated nylon) will keep perspiration in, causing you to get wet from the inside, so carefully consider ventilation. A good addition to a poncho for leg coverage is rain chaps. A poncho is usually large enough to cover your pack. This type of rain gear can also be used as a temporary emergency shelter if forced to seek shelter for a short while.

Breathable fabrics, such as Gore-Tex, are designed to let perspiration evaporate while keeping rain out. The good quality garments are expensive. Wash them exactly as the manufacturer suggests, or you could lose the waterproofing.

Whatever you use for the outer layer, a hood attached to your jacket/shell is required to keep your head warm and dry. If you wear a helmet frequently, the hood should be large enough to go over the helmet.

Clothing in Hot/Arid Climates

Most reference materials on proper clothing for search and rescue missions concentrate on staying warm in wet, cold, or windy conditions, thus avoiding hypothermia. However, in many areas of New Mexico, we need to consider the proper clothing to wear in the field when the temperature hovers near 100 degrees and the primary concern of searchers should be avoiding hyperthermia (overheating), which can be deadly.

The very factors that make cotton/cotton blend clothing dangerous in the cold can make it an appropriate choice for hot climates. Its breathability is an asset in these conditions. Cotton will absorb moisture from perspiration quickly and wicks moisture from damp or wet areas to dry areas. Cotton dries slowly because the fibers get completely saturated and can aid the cooling of the body by evaporation. Cotton's heat conduction when wet nearly equals complete immersion in water.

In hot environments, wear loose fitting clothing to allow air circulation, which will promote cooling. Light colored clothing will reflect heat and help maintain temperature balance. Long sleeves and pants not only help protect you from sunburn, heat gain and water loss, but also protect from some vegetation (cactus, catclaw and mesquite), wind-borne sand and the inevitable contact with abrasive rock. Resist the urge to remove clothing in severe heat; clothing reduces the evaporation rate and helps to slow the body's water loss.

Shorts are not appropriate on any search mission, whether you are in base camp or in the field. A dense cloth, such as denim, will protect against cactus and abrasive rock better than a thinner or more pliable cloth.

Do not, however, ignore the potential for quick weather changes in the desert southwest. Monsoon rainstorms can bring rapid and significant drops in temperature, as does nightfall. Be sure that the extra clothing in your pack will handle these situations. Lighter weight versions of cold weather clothing (wool, polar fleece, etc.) are a great choice.

4. GEAR

Pack or Other Container

All searchers need something in which to carry their gear and clothing. For example, searchers on horseback should have emergency gear on their person (in a fanny pack, in clothing pockets, etc.) in case the horse runs off with their saddlebags. It is also important to carry emergency gear on your body if you are in a helicopter (e.g., as an observer or being transported to your assignment). A vehicle driver or passenger should have a duffel bag or similar container which could be easily carried if a walkout were necessary. Hiking ground-pounders need a backpack.

Backpacks may have internal or external frames. Your pack needs to be large enough to carry all required gear and clothing and any additional equipment you may need to help you care for yourself, your teammates, or the subject(s), if necessary. Save room for gear that will be shared among the team (shelters, fuel and stove, etc.).

The pack must be comfortable to carry when well loaded. If it just hangs on your shoulders, it will not be comfortable after a few hours. Most of the larger capacity models have well-designed suspension systems that distribute the weight down your back, over the hip, and across the chest with a sternum strap.

Whatever pack you carry, consider a padded hip belt and a sternum strap. If your pack lacks either of these, they can be purchased separately and put on your pack. Experiment to make sure it is comfortable when fully loaded. The fancier packs have many possibilities for adjustment and you may want to fiddle until you make it comfortable for you – especially making

sure that the weight does not hang mainly from your shoulders but is taken on the structure of the pelvis.

Eye Protection

Ideally, some form of eye protection should be worn at all times (day and night), especially when navigating through brush or trees and when blowing snow and/or sand is present. Sunglasses affording UV protection are needed in sun and many snow conditions. Also, goggles are needed when working around helicopters.

Food for 24 Hours

Food requirements vary from person to person. Everyone's metabolism is different. What kind of food you carry will depend on your tastes. Some people can do well with several Powerbars in a 24 hour period, but others need 'real' food. Medical conditions, such as diabetes, also play a role in how much and what kind of food you need.

You need to know your own body's requirements, learned from experience. On average, males aged 19 through 50 will need about 2300 calories per day if doing light day-to-day activities, but will need 3000 to 4000 calories per day if doing three to five hours of vigorous exercise in addition to the day-to-day activities. Foods high in sugar should not make up the bulk of your food supply. Food should have a ratio of 30% fat (with 10% or less of the fat being saturated and trans fat) to 40% - 60% carbohydrates to 10% - 30% protein. When exercising, you may lean towards the 60% carbohydrates and 10% protein.

Eat often while searching. Don't let your energy level fall. Carry plenty of food that tastes good, is nutritionally good for you, is lightweight, and will not spoil.

Water

Two quarts of water for a 24 hour period is the minimum required for this Certification. (For the Certification test, you do not have to bring the actual water, just having the containers will do.) As with the food requirement, you need to be familiar with your body's water requirements, both at rest and when exercising. Some people perspire more than others and therefore need more water.

On average, doing day-to-day activities, you lose about 48 ounces of water through urine production and another 24 ounces through perspiration and respiration. Some fluid is replaced from eating (e.g., from fruits and vegetables) and from drinking beverages other than water (avoiding alcoholic and caffeinated beverages). The rest of the lost fluid should be replaced by drinking water.

Obviously, exercising increases fluid losses. For example, you can lose an additional 24 ounces of fluid while running five miles and 33 ounces during a one hour bike ride. Two quarts of water will not be enough in very hot and dry conditions. Hard exertion in these conditions can cost upwards of two quarts of water in one hour. Seriously consider carrying as much water as is practical. We recommend you carry one or two gallons if you are searching for two to four hours in hot/dry weather. Drink often while you are searching. Do **not** wait till you are thirsty. (Also see *Chapter 3: Safety in Search and Rescue*.)

Knife

A knife can be useful in many situations, from using the knife while eating to cutting rope/cord to assist in making an emergency shelter. A standard folding knife with a three or four inch blade will suffice for the Certification. Many searchers carry a multi-tool (e.g., Leatherman-brand tool).

Fire Starter

The simplest fire starter is a match. Some searchers carry butane lighters. Others have the 'flint and steel' type fire starters. Having some sort of kindling (e.g. wax impregnated cardboard

or pieces of fireplace log starter) will enhance your ability to start a fire quickly. Of course, keeping your fire starter and kindling dry is essential.

Compass

A compass with 5° accuracy is required, and one with a sighting mirror is recommended. Military or lensatic compasses are not acceptable. (For a discussion on compass use, see *Chapter 5: Map and Compass*.)

Map of Search Area

Do not go into the field without a map of your search area. For more on what maps we use and how to work with maps, see *Chapter 5: Map and Compass*. (A map does not have to be brought with you to the Certification session.)

Whistle

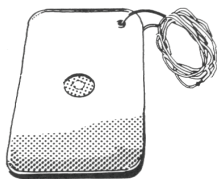
A whistle is used as a signaling device. It can be used as a signal in an emergency situation or can be used as a sound attraction device while searching. A good quality, sturdy, loud whistle is recommended. Metal whistles should be avoided as their use in cold, winter conditions is problematical.

Signal Mirror

The military style signal mirror is the most basic and best all-around signaling device. Compact and simple to operate, it has been used successfully for many rescues. This type of mirror is required for Certification. While any shiny object can and has been successfully used for signaling, a mirror especially designed for signaling and sighting is generally brighter and much easier to aim.

In normal sunlight, the flash from a 2-inch by 3-inch signal mirror can be seen easily for ten miles while the flash from a 3-inch by 5-inch mirror will be visible up to 30 miles, depending upon atmospheric conditions. A mirror will work on bright overcast days and with moonlight, though with much-reduced range.

The 2-inch by 3-inch size (standard, small military specification size) works adequately, and the convenient size and weight is an asset for ground-pounders.



To use a signal mirror, reflect sunlight from the mirror onto a nearby surface (your hand, a tree, etc.). Slowly bring the mirror to eye level and look through the sighting hole. You will see a bright spot – called the fireball – within the surrounding mesh. This is the aim indicator. Hold the mirror close to your eye and slowly turn it so that the fireball is on the target. Manipulate the mirror up and down rapidly to flash the target.

Once the target indicates your flash has been spotted and turns toward you, do not keep the mirror on it continuously, because the flash can be blinding. Continue flashing periodically until the target arrives and indicates you have been visually located.

Light Source

At least one source of light is required. A headlamp or flashlight, with extra batteries and bulbs, will satisfy this requirement. When working in a cave, three sources of light may be required.

Personal First Aid Kit

Every searcher needs to carry a personal first aid kit. This kit contains the medications you normally take and simple first aid supplies (Band-Aids, blister prevention pads, tape, gauze pads, etc.). This kit is not meant to be used for subject care. Your team may elect to carry a separate, larger first aid kit for this purpose.

Space Blanket

A silvered Mylar plastic space (or emergency) blanket can be very useful if you have to stay out overnight unexpectedly. Occasionally the heavier type of space blanket can be used as an emergency shelter during a change of weather or as protection from the sun. This space blanket is meant for the searcher, but it can be used for the subject if necessary. Make sure you check your space blankets a few times a year and replace them if needed.

Pen or Pencil and Paper

The pen/pencil and paper has many uses. Some examples are: making notes during your team briefing; leaving a note for the subject if you find a camp; or making a list of clues and their location. Remember that the ink in a pen may freeze in the colder months, so have a pencil as a backup.

20 feet of 1-inch Tubular Webbing

Twenty feet of one-inch tubular webbing is required for this Certification. The webbing can be used when assisting in a litter evacuation of an injured subject or for making an emergency seat harness. It can also be used when making an emergency shelter or securing items to your backpack, among other uses. Make sure your webbing is tubular for strength.

5. GEAR – NOT REQUIRED

Some gear is not required for survival, but would be good to have with you in the field, or at least, with your team. A few of these items are:

- Radio and spare batteries – a minimum of one radio per team, two would be better. (This item is not required for survival, but is required before you will be allowed into the field. You may have your own radio or may use team-owned radios.)
- Watch – used for taking vital signs, arriving at a rendezvous on time, estimating your distance, for radio check-in times, and knowing when to return to Incident Base.
- Larger first aid kit (one per team) – used to assist your team members and/or the subject.
- Sunscreen and lip balm with sunscreen – protect skin and lips from UV rays.
- Bandana – used for a bandage, a cool cloth on the forehead, sun protection for the back of the neck, and face protection in blowing sand.
- Shelter (tent, bivvy sack, or tarp) – used for protection from the environment.
- Lightweight snow shovel – used to make a snow shelter.
- Stove and fuel (one per team) – used to make warm/hot food or drinks.
- Trail tape – used for marking clues and search areas.
- Sleeping bag and pad – used to keep warm and comfortable if staying in the field overnight; pad is used for insulation from ground temperature and moisture.
- GPS receiving unit with spare batteries – used for transmitting locations to Incident Base (such as for you, the subject, clues), used for navigation.
- Toiletries – toilet paper and other personal items.
- Identification – may be needed when approached on a search by citizens or Law Enforcement (a team ID and driver's license would be best).
- Gaiters – protects lower legs from brush, cactus, and moisture.
- Pack rain cover – protects the gear in your pack from moisture.

You and your team should develop a team-required gear list. Include the required Field Certification gear and clothing and add items from the list above and others as you see fit. Do gear and clothing checks once or twice a year (possibly at the beginning of fall/winter and spring/summer) to ensure that you and your team members have all the required gear.